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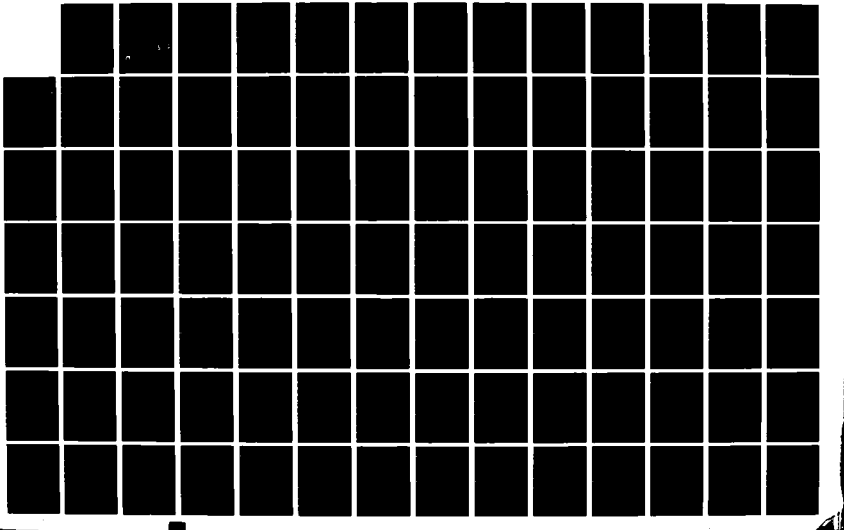

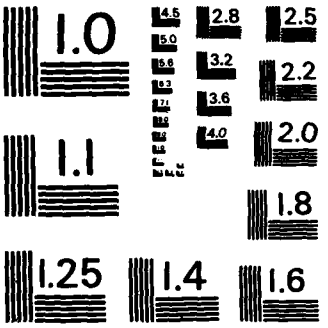

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FINAL REPORT

ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER AROUND SMOOTH & ROUGH CIRCULAR CYLINDERS

PREPARED FOR

OFFICE OF NAVAL RESEARCH

Department Of Physics

Alabama Agricultural And Mechanical University

Normal, Alabama 35762

(205) 859-7308

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PREPARED BY

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Alabama A&M University

and

Bill Shih
Physical Research Inc.

SUBMITTED TO

THE OFFICE OF NAVAL RESEARCH

JULY, 1985

TABLE OF CONTENTS

ABSTRACT

This final report prepared for Contract No. N00015-83-K-0351 and is submitted to the Office of Naval Research as required by the terms of the research contract. This has been a follow up of ONR contract No. N00014-81-K-0479 the final report of which was submitted to ONR in 1983. The experimental data collected under the above referenced contract has been interpreted and analyzed through the present effort. The results of the analysis are presented in the form of several graphs sequentially identified in this document.

Part 1 of this report is the analysis of steady state pressure measurements which have been analyzed, and plotted by Alabama A&M University.

Part 2 of this report is analysis of boundary layer profiles which was conducted by Physical Research Inc.

DATA ON
ANALYSIS OF FLUID FLOW AROUND
ROUGH AND SMOOTH CIRCULAR CYLINDERS
AT VERY HIGH REYNOLDS NUMBER

INTRODUCTION:

Wind tunnel tests were performed in the 12-ft pressure wind tunnel at NASA Ames Research Center during the months of May and June 1982. The model is an instrumented circular cylinder of 31.65 cm (12.46 in) diameter. Surface roughness was varied using wire mesh screens. Steady pressures, unsteady pressures, and boundary layer profiles were measured in these tests.

The data pertaining to these experiments were summarized in ~~ONR~~ Report Number N00014-81-K-0479. The entire data, archived in the Learning Resources Center (LRC) at Alabama A&M University, can be accessed by contacting Alabama A&M University LRC at telephone number (205) 859-7475. The collected experimental data have been analyzed during the present contract period. The task of analyzing voluminous amount of data stored on magnetic tapes by NASA was divided between Alabama A&M University and Physical Research Inc. who has been a participating subcontractor.

The steady pressure distributions have been analyzed by the prime contractor. The results of this analysis conducted by Alabama A&M University is given in Part 1 of this document. The analysis of the boundary layer profiles was conducted by Physical Research Inc. and the corresponding plots are given in Part 2.

PART 1

1. Discussion of Steady Pressure Measurements

Flow past circular cylinders has been a challenging research area for the study of fundamental fluid dynamic behavior. The main parameters governing the rigid cylinder flow are the Reynolds number based on diameter, the relative surface roughness and the free stream Mach number. The various flow regimes as defined by Roshko are followed in this report. The subcritical regime is associated with the region for which Re is less than that at which minimum drag occurs. The critical regime refers to the region where the drag coefficient undergoes a sharp decrease towards the minimum. The supercritical regime is in the upper transition regime as the drag increases from its minimum value. Finally the transcritical regime is the region where the drag curve flattens out. The high Reynolds number regime that we consider in this work is the transcritical region.

The parameters of general interest for cylinder flow are the steady pressure coefficient C_p, drag coefficient C_D, unsteady lift coefficient $C_L(t)$, unsteady pressure coefficient $C_p(t)$, and the strouhal number S. In general, all of these parameters are functions of the Reynolds number Re, and relative roughness k/d. Free stream turbulence scale as well as intensity are important. Surface roughness has several interesting effects on the cylinder flow. Surface roughness affects the position of boundary layer separation and consequently the pressure coefficient on the cylinder. Roughness ahead of transition tends to move the transition forward, and roughness beneath the turbulent boundary layer changes the velocity profile. Increase in the roughness parameter k/d will modify the flow regimes by increasing the

minimum drag coefficient and by reducing the Reynolds number values which delineate the flow regimes.

The objectives of the present tests are to determine steady and unsteady flow properties on smooth and rough cylinders up to a Reynolds number of 8 million, and to investigate the Reynolds number independence regime for rough cylinders.

2. Experimental Arrangement and Instrumentation

The wind tunnel tests were conducted in the 12 foot pressure wind tunnel at NASA Ames Research Center during the months of May and June 1982. The operating characteristics of the wind tunnel are shown in Figure 1. The tests were conducted over a range of Reynolds numbers per foot of 0.2×10^6 to 7.5×10^6 at a Mach number range of 0 to 0.25, with most of the tests at M=0.24.

The model instrumented and tested is a circular cylinder with a diameter of 31.65 cm (12.46 in) machined from extra heavy, seamless "black" pipe. The ratio of surface roughness to model diameter is 1.85×10^{-6}. The model spanned the wind tunnel test section horizontally to obtain 2-dimensional flow. The instrumentation on the model consists of 18 static pressure ports evenly spaced at 20^o intervals around the circumference near the middle of the cylinder as shown in Figure 2. The model is rotated at 5^o increments through a total rotation of 20^o. Values of static sectional drag and lift coefficients were obtained by appropriate integration of these pressure measurements. In addition to the circumferential ports in the middle there are 8 bands of static pressure ports located at sections A-1 to A-8 longitudinally. At each section, there are ports 4^o, 64^o and 124^o when the roll angle of the model is zero degrees. The pressure measurements at these

ports provide information on the two-dimensionality of the flow over the span of the cylinder.

The unsteady pressure measurements are made using 12 kulite pressure transducers evenly spaced around the circumference near the model center. The unsteady data from these transducers will be used to study lift spectra and vortex shedding frequencies as the Reynolds number is varied.

The behavior of the boundary layer as the Reynolds number is varied is studied using the boundary layer probe shown in Figure 3.

Surface roughness is simulated by the use of three square mesh wire screens. Table I gives the details of the screens.

Table I

Wire Mesh Particulars for Roughness Simulation

Wire Dia (in)	Mesh	% Open	K/D
0.0016	250	36	3×10^{-4}
0.0065	60	37.5	1×10^{-3}
0.063	6	38.9	1×10^{-2}

The screens were attached in two 36 inch long end sections and one 30 inch long center section.

3. Experimental Results

(a) Static Pressure Distributions

The nature of the flow around the circular cylinder and the variation of drag and lift coefficients generated by the flow are indicated by the changes in the static pressure coefficient C_p as the angular position around the cylinder and the Reynolds number are varied. Typical C_p variations are shown in Figure 4 as the Reynolds number is varied from 0.2×10^6 to 7.5×10^6 for smooth cylinder.

(b) Comment on data

Experimental points corresponding to ports 3, 6 and 11 were exhibiting unreasonable scatter for a number of runs. These points have been selectively edited and are not shown in the pressure plots.

(c) Calculation of drag and lift coefficients

The drag and lift coefficients are calculated from the following relations.

$$C_D = \tfrac{1}{2} \int_0^{2\pi} C_p \cos\theta \, d\theta \qquad (1)$$

$$C_L = \tfrac{1}{2} \int_0^{2\pi} C_p \sin\theta \, d\theta \qquad (2)$$

The integrations in eq(1) and (2) are performed using a least squares fit to the experimental points. In other words, C_p was expressed

$$C_p = a\theta^3 + b\theta^2 + C\theta + d \qquad (3)$$

and the coefficients a, b, c, d were obtained fromthe computer program listed in appendix A. The program fits 1st degree, 2nd degree and 3rd degree curves and calculates the mean r.m.s. deviation from the experimental points. The curve that has the least r.m.s. deviation is then chosen to calculate the C_D

and C_L coefficients. After several trials, it was decided to divide each C_p versus 0 curve into seven sections and compute the least square fit and C_L, C_D values for each of the seven sections, and add them up. Typical least square fits are shown in Appendix A.

The run particulars, C_L and C_D values are displayed in the top portion for all the static pressure runs.

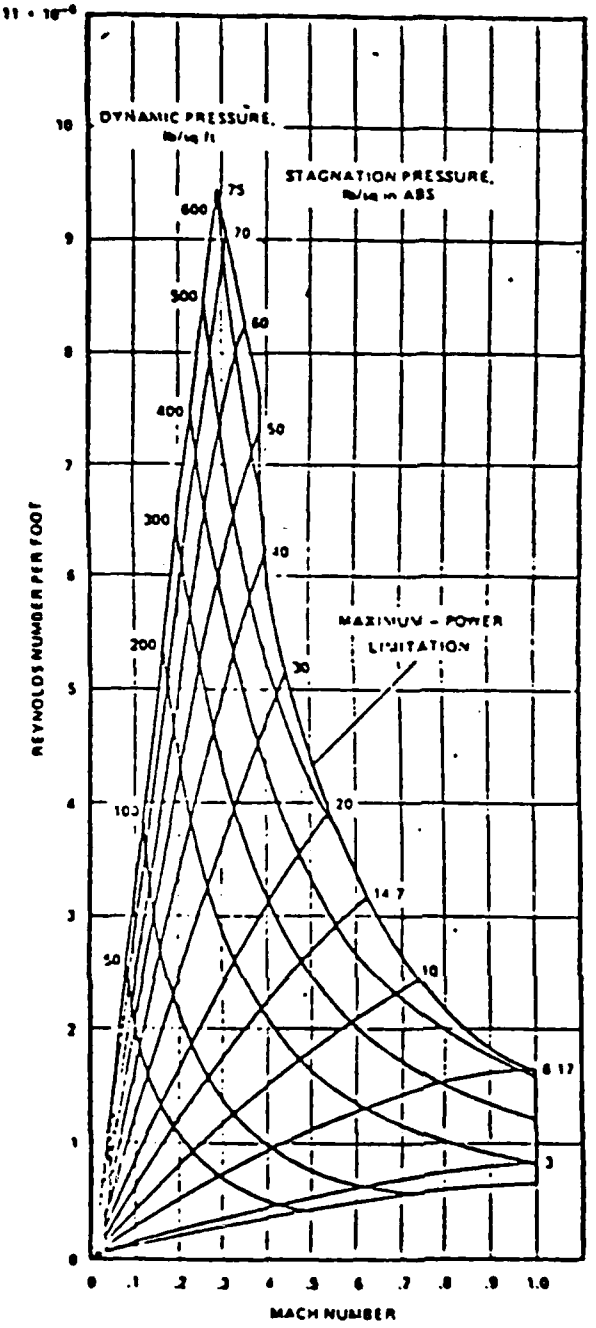


FIGURE 1. NASA TWELVE FOOT PRESSURE WIND TUNNEL OPERATING MAP

20.01	0.4712
24.98	0.2659
30.03	0.0574
34.97	-0.1466
40.14	-0.3600
40.01	-0.3547
44.98	-0.5599
50.03	-0.7684

COS IS 0.12857

SIN IS -0.01105

BETA IS 0.01841

FOR DEGREE OF 2 COEFFICIENTS ARE

0.10825E 01 -0.14435E-01 -0.53343E-03

0.02	1.0822
4.98	0.9974
10.03	0.8840
14.97	0.7468
20.14	0.5754
20.01	0.5800
24.98	0.3890
30.03	0.1679
34.97	-0.0747
40.14	-0.3564
40.01	-0.3490
44.98	-0.6461
50.03	-0.9749

COS IS 0.13409

SIN IS -0.00810

BETA IS 0.00366

FOR DEGREE OF 3 COEFFICIENTS ARE

0.10035E 01 0.95950E-02 -0.17938E-02 0.16946E-04

0.02	1.0037
4.98	1.0089
10.03	0.9364
14.97	0.8020
20.14	0.6076
20.01	0.6130
24.98	0.3880
30.03	0.1329
34.97	-0.1299
40.14	-0.4056
40.01	-0.3988
44.98	-0.6520
50.03	-0.8843

COS IS 0.13506

SIN IS -0.00924

BETA IS 0.00056

```
                SUM2=TT5
              ENDIF
              IF(I.EQ.2)THEN
                SUM1=TT5
              ENDIF
           10 CONTINUE
      C
            ALPHA=SUM2-SUM1
            PRINT .' '
            PRINT 66.ALPHA
           66 FORMAT(9X.' SIN  IS '.F10.5)
            IF(J.EQ.2)THEN
              CL3=CL3+ALPHA
            ENDIF
            IF(J.EQ.3)THEN
              CL2=CL2+ALPHA
            ENDIF
            IF(J.EQ.4)THEN
              CL=CL+ALPHA
            ENDIF
            IF(J.EQ.5)THEN
               CL1=CL1+ALPHA
            ENDIF
            RETURN
            END

         /DATA
COMPILE =    0.97 SU
RUN:SEQ
94:5
----------


SECTION--1
  X          Y
   0.02     1.0178
   4.98     0.9957
  10.03     0.9212
  14.97     0.7979
  20.14     0.6117
  20.01     0.6202
  24.98     0.3995
  30.03     0.1502
  34.97    -0.1226
  40.14    -0.4605
  40.01    -0.4036
  44.98    -0.6230
  50.03    -0.8828

 0.130000E 02    0.335290E 03    0.116424E 05    0.451053E 06    0.186008E 08
 0.302170E 01    0.335290E 03    0.116424E 05    0.451053E 06    0.186008E 08
 0.798112E 09   -0.457259E 02    0.116424E 05    0.451053E 06    0.186008E 08
 0.798112E 09    0.351963E 11   -0.383072E 04    0.451053E 06    0.186008E 08
 0.798112E 09    0.351963E 11    0.158392E 13   -0.204129E 06    0.186008E 08
 0.798112E 09    0.351963E 11    0.158392E 13    0.724167E 14   -0.996618E 07

FOR DEGREE OF  1 COEFFICIENTS ARE

        0.12974E 01  -0.41291E-01

   0.02     1.2966
   4.98     1.0918
  10.03     0.8833
  14.97     0.6793
  20.14     0.4658
  20.01     0.4712
  24.98     0.2659
  30.03     0.0574
  34.97    -0.1466
  40.14    -0.3600
  40.01    -0.3547
  44.98    -0.5599
  50.03    -0.7684

        COS  IS    0.12857

        SIN  IS   -0.01105

        BETA IS    0.01341
```

```
      ALPHA=SUM2-SUM1
      PRINT ,' '
      PRINT 66,ALPHA
   66 FORMAT(9X,' COS  IS ',F10.5)
      IF(J.EQ.2)THEN
        CE3=CE3+ALPHA
      ENDIF
      IF(J.EQ.3)THEN
        CE2=CE2+ALPHA
      ENDIF
      IF(J.EQ.4)THEN
        CE=CE+ALPHA
      ENDIF
      IF(J.EQ.5)THEN
        CE1=CE1+ALPHA
      ENDIF
      RETURN
      END

      SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
      REAL C1(100),B1(100)
C
      C1(1)=B1(1)
      DO 5 K=2,J
        C1(K)=B1(K)*(57.3**(K-1))
    5 CONTINUE
C
      ALPHA=0.0
      DO 10 I=1,2
         IF(I.EQ.1)THEN
           XF1=XL/57.3
         ELSE
           XF1=XF/57.3
         ENDIF
C
         T1=C1(1)*(-COS(XF1))
            TB1=SIN(XF1)-(XF1*COS(XF1))
         T2=T1+(C1(2)*TB1)
         IF(J.EQ.2)THEN
            TT5=0.5*T2
         ELSE
            TB2=(2.*XF1)*SIN(XF1)
            TB3=TB2+((2.-(XF1**2))*COS(XF1))
         T3=T2+(C1(3)*TB3)
         ENDIF
         IF(J.EQ.3)THEN
            TT5=0.5*T3
         ENDIF
         IF((J.NE.2).AND.(J.NE.3))THEN
            TB4=((3.*(XF1**2))-6.)*SIN(XF1)
            TB5=TB4+(((6.*XF1)-(XF1**3))*COS(XF1))
         T4=T3+(C1(4)*TB5)
         ENDIF
         IF(J.EQ.4)THEN
            TT5=0.5*T4
         ENDIF
         IF(J.EQ.5)THEN
           T5=((4.*(XF1**3))-(24.*XF1))*SIN(XF1)
           T6=((XF1**4)-(12.*(XF1**2))+24.)*COS(XF1)
           T7=(T5-T6)*C1(5)
           T8=T4+T7
           TT5=0.5*T8
         ENDIF
         IF(I.EQ.1)THEN
```

```
      20 CONTINUE
C
      DO 40 J=2,N
        NMJP2=N-J+2
        NMJP1=N-J+1
        SUM=0.0
        DO 30 K=NMJP2,N
          SUM=SUM+A(NMJP1,K)*B(K)
   30   CONTINUE
        B(NMJP1)=B(NMJP1)-SUM
   40 CONTINUE
      RETURN
      END


      SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
      REAL C1(100),B1(100)
C
      C1(1)=B1(1)
      DO 5 K=2,J
         C1(K)=B1(K)*(57.3**(K-1))
    5 CONTINUE
C
      ALPHA=0.0
      DO 10 I=1,2
         IF(I.EQ.1)THEN
           XF1=XL/57.3
         ELSE
           XF1=XF/57.3
         ENDIF
C
         T1=C1(1)*SIN(XF1)
            TB1=COS(XF1)+(XF1*SIN(XF1))
         T2=T1+(C1(2)*TB1)
         IF(J.EQ.2)THEN
           TT5=0.5*T2
         ELSE
            TB2=(2.*XF1)*COS(XF1)
            TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
         T3=T2+(C1(3)*TB3)
         ENDIF
         IF(J.EQ.3)THEN
           TT5=0.5*T3
         ENDIF
         IF((J.NE.2).AND.(J.NE.3))THEN
            TB4=((3.*(XF1**2))-6.)*COS(XF1)
            TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
         T4=T3+(C1(4)*TB5)
         ENDIF
         IF(J.EQ.4)THEN
            TT5=0.5*T4
         ENDIF
         IF(J.EQ.5)THEN
           T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
           T6=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
           T7=((T5+T6)*C1(5))
           T8=T4+T7
           TT5=0.5*T8
         ENDIF
         IF(I.EQ.1)THEN
           SUM2=TT5
         ENDIF
         IF(I.EQ.2)THEN
           SUM1=TT5
         ENDIF
   10 CONTINUE
C
      ALPHA=SUM2-SUM1
      PRINT ,' '
      PRINT 66,ALPHA
   66 FORMAT(9X,' COS  IS ',F10.5)
      IF(J.EQ.2)THEN
        CE3=CE3+ALPHA
      ENDIF
      IF(J.EQ.3)THEN
        CE2=CE2+ALPHA
      ENDIF
      IF(J.EQ.4)THEN
        CE=CE+ALPHA
      ENDIF
      IF(J.EQ.5)THEN
        CE1=CE1+ALPHA
      ENDIF
```

```
165           CP(N1)=C(L)
166       66  CONTINUE
          C
          C
167           DO 55 K=1,N
168             FV=CP(1)
169             DO 49 J=2,I
170       49      FV=(FV*X(K))+CP(J)
171             PRINT 1,X(K),FV
172       55  CONTINUE
173           END BLOCK
174           END
          C


175           SUBROUTINE LUDCMQ(A,N,NDIM)
176           REAL A(NDIM,NDIM),SUM
177           INTEGER N,I,J,JM1,IM1,K
          C
178           DO 30 I=1,N
179           DO 30 J=2,N
180             SUM=0.0
181             IF(J.LE.I)THEN
182               JM1=J-1
183               DO 10 K=1,JM1
184                 SUM=SUM+A(I,K)*A(K,J)
185       10      CONTINUE
186               A(I,J)=A(I,J)-SUM
187             ELSE
188               IM1=I-1
189               IF(IM1.NE.0)THEN
190                 DO 20 K=1,IM1
191                   SUM=SUM+A(I,K)*A(K,J)
192       20        CONTINUE
193               ENDIF
          C
194       25    IF(ABS(A(I,I)).LT. 1.0E-10)THEN
195               PRINT 100,I
196               RETURN
197             ELSE
198               A(I,J)=(A(I,J)-SUM)/A(I,I)
199             ENDIF
200           ENDIF
201       30  CONTINUE
202           RETURN
          C
203       100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE',
              |        ' FOUND FOR DIVISION IN ROW ',I3)
204           END
          C


205           SUBROUTINE SOLNQ(A,B,N,NDIM)
206           REAL A(NDIM,NDIM),B(NDIM),SUM
207           INTEGER N,I,IM1,K,J,NMJP1,NMJP2
          C
          C
208           B(1)=B(1)/A(1,1)
209           DO 20 I=2,N
210             IM1=I-1
211             SUM=0.0
212             DO 10 K=1,IM1
213               SUM=SUM+A(I,K)*B(K)
214       10    CONTINUE
215             B(I)=(B(I)-SUM)/A(I,I)
```

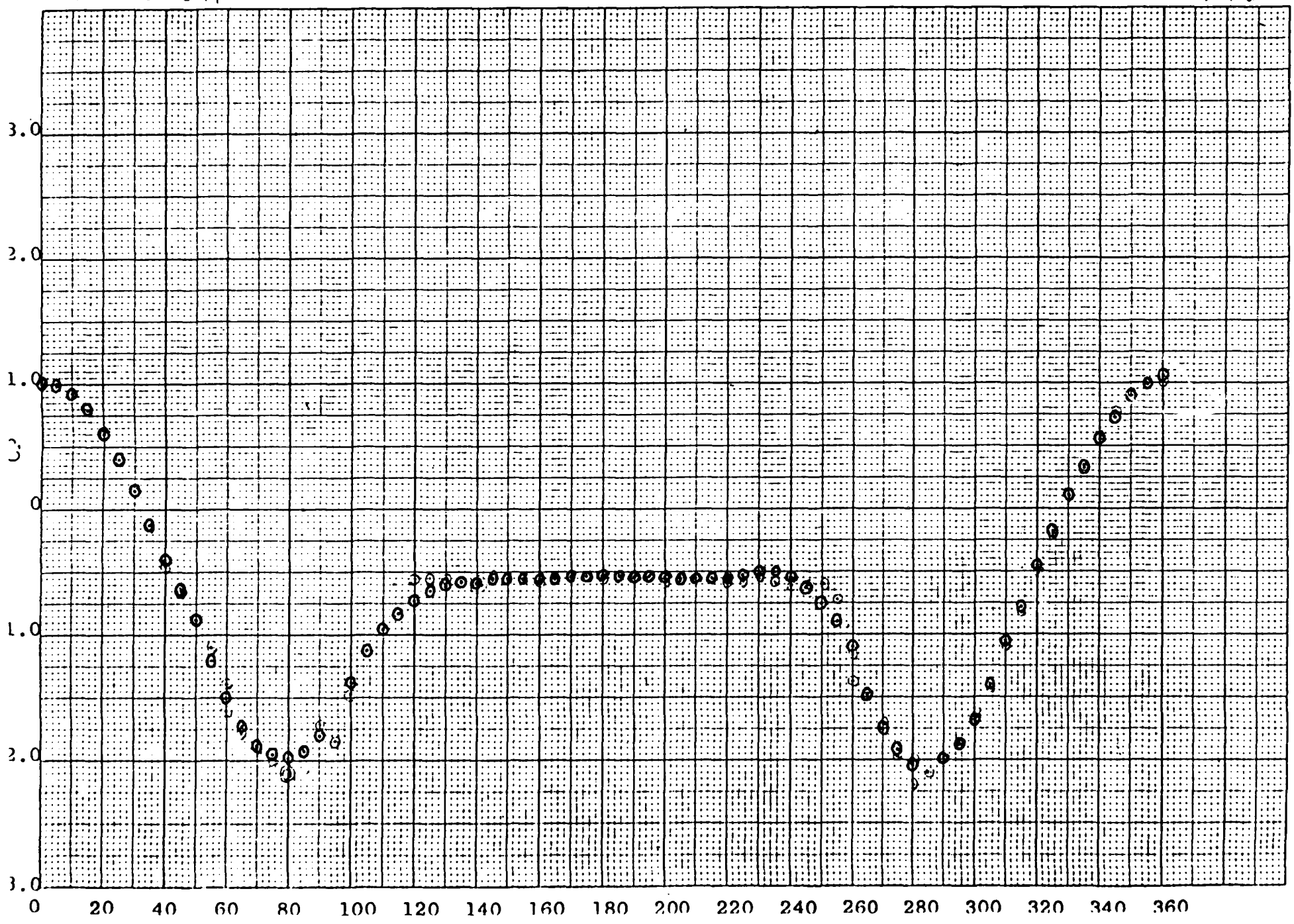
```
111         PRINT 201, ((A(I,J) J=1,MFP2),I=1,MFP1)
      C
112         CALL LUDCMQ(A,MFP1,10)
      C
113         MSP1=MS+1
114         DO 95 I=MSP1,MFP1
115           DO 90 J=1,I
116             C(J)=A(J,MFP2)
117      90   CONTINUE
118           CALL SOLNQ(A,C,I,10)
119           IM1=I-1
      C
120         PRINT 202,IM1,(C(J),J=1,I)
121         PRINT ,' '
122         EXECUTE COEF
      C
123         DO 300 K=1,I
124     300  B1(K)=C(K)
125         CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
126         CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
      C
127         PRINT ,' '
128         BETA=0.0
129         DO 94 IPT =1,N
130            SUM=0.0
131            DO 93 ICOEF=2,I
132              JCOEF=I-ICOEF+2
133              SUM=(SUM+C(JCOEF))*X(IPT)
134      93    CONTINUE
135            SUM=SUM+C(1)
136            BETA=BETA+(Y(IPT)-SUM)**2
137      94 CONTINUE
138         BETA=BETA/(N-I)
139         PRINT 203,BETA
140         IF((KK.EQ.7).AND.(I.EQ.2))THEN
141            PRINT 301,CE3,CL3
142          ENDIF
143         IF((KK.EQ.7).AND.(I.EQ.3))THEN
144            PRINT 301,CE2,CL2
145         ENDIF
146         IF((KK.EQ.7).AND.(I.EQ.4))THEN
147           PRINT 301,CE,CL
148     301 FORMAT(//45X,'  CD =',F10.5//,45X,'  CL =',F10.5)
149         ENDIF
150         IF((KK.EQ.7).AND.(I.EQ.5))THEN
151         PRINT 301,CE1,CL1
152         ENDIF
153      95 CONTINUE
      C
      C
154     999 CONTINUE
      C
155     200 FORMAT(//' DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1.'/
           |       '  REQUESTED MAXIMUM DEGREE TOO LARGE - '.
           |       'REDUCED TO  ',I3)
156     201 FORMAT(5(3X,E13.6))
157     202 FORMAT(/' FOR DEGREE OF ',I2,' COEFFICIENTS ARE'//
           |       ' ',5X,6(2X,E12.5))
158     203 FORMAT(9X,' BETA IS ',F10.5//)
159         PRINT 299,ISEQ
160     299 FORMAT(//////,35X,'END OF RUN:SEQ ',5A1////)
161         STOP
      C
162         REMOTE BLOCK COEF
163         DO 66 L=1,I
164           N1=I-L+1
165           CP(N1)=C(L)
166       66  CONTINUE
      C
      C
167         DO 55 K=1,N
168           FV=CP(1)
169           DO 49 J=2,I
170       49      FV=(FV*X(K))+CP(J)
171           PRINT 1,X(K),FV
172       55 CONTINUE
173         END BLOCK
174         END
      C


175         SUBROUTINE LUDCMQ(A,N,NDIM)
```

```
54              TEMP1=X(N)
55              TEMP2=Y(N)
56            ENDIF
57            IF(KK.NE.1)THEN
58              X(1)=TEMP1
59              Y(1)=TEMP2
60              DO 4 I=2,N
61        4       READ ,K1,Y(I),K2,X(I)
62              TEMP1=X(N)
63              TEMP2=Y(N)
64            ENDIF
      C
65            PRINT 1,(X(I),Y(I),I=1,N)
66        1 FORMAT(2X,F6.2,2X,F8.4)
      C
67            IF(KK.EQ.1)THEN
68               XF=0.0
69               XL=X(N)
70            ELSE
71              XF=X(1)
72              XL=X(N)
73            ENDIF
      C
74            IF(KK.EQ.7)THEN
75               XF=X(1)
76               XL=360.
77            ELSE
78              XL=X(N)
79            ENDIF
      C
      C
      C     READ , MS,MF
      C
80            IF(MF.GT.(N-1))THEN
81            MF=N-1
82              PRINT 200,MF
83            ENDIF
84         5 MFP1=MF+1
85            MFP2=MF+2
      C
86            DO 10 I=1,N
87              XN(I)=1.0
88       10 CONTINUE
      C
89            DO 30 I=1,MFP1
90              A(I,1)=0.0
91              A(I,MFP2)=0.0
92              DO 20 J=1,N
93                A(I,1)=A(I,1)+XN(J)
94                A(I,MFP2)=A(I,MFP2)+Y(J)*XN(J)
95                XN(J)=XN(J)*X(J)
96       20       CONTINUE
97       30     CONTINUE
      C
98            DO 50 I=2,MFP1
99              A(MFP1,I)=0.0
100             DO 40 J=1,N
101               A(MFP1,I)=A(MFP1,I)+XN(J)
102               XN(J)=XN(J)*X(J)
103      40     CONTINUE
104      50 CONTINUE
      C
105           DO 70 J=2,MFP1
106             DO 60 I=1,MF
107               A(I,J)=A(I+1,J-1)
108      60     CONTINUE
109      70 CONTINUE
      C
```

```
      REAL X(100),Y(100),C(100),B1(100),A(10,11),XN(100),SUM,BETA
      REAL CP(100),FV
      INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IPT,ICOEF,JCOEF
C     CHARACTER*5 ISEQ
      DATA MS/1/,MF/4/
C
C
      PRINT ,'RUN:SEQ'
      READ 11,ISEQ
   11 FORMAT(5A1)
      PRINT 11,ISEQ
      PRINT ,'----------'
C
      CE=0.0
      CL=0.0
      CE1=0.0
      CL1=0.0
      CE2=0.0
      CL2=0.0
      CE3=0.0
      CL3=0.0
      DO 999 KK=1,7
      PRINT 33
   33 FORMAT('0')
      IF(KK.EQ.1)THEN
         PRINT ,'SECTION--1'
         N=13
      ENDIF
C
      IF(KK.EQ.2)THEN
        PRINT ,'SECTION--2'
        N=12
      ENDIF
C
      IF(KK.EQ.3)THEN
        PRINT ,'SECTION--3'
        N=14
      ENDIF
C
      IF(KK.EQ.4)THEN
        PRINT ,'SECTION--4'
        N=21
      ENDIF
C
      IF(KK.EQ.5)THEN
        PRINT ,'SECTION--5'
        N=12
      ENDIF
C
      IF(KK.EQ.6)THEN
        PRINT ,'SECTION--6'
        N=11
      ENDIF
C
      IF(KK.EQ.7)THEN
       PRINT ,'SECTION-7'
       N=13
      ENDIF
C
      PRINT ,'  X          Y'
      IF(KK.EQ.1)THEN
        DO 3 I=1,N
    3     READ , K1,Y(I),K2,X(I)
        TEMP1=X(N)
        TEMP2=Y(N)
      ENDIF
      IF(KK.NE.1)THEN
        X(1)=TEMP1
        Y(1)=TEMP2
        DO 4 I=2,N
    4     READ ,K1,Y(I),K2,X(I)
        TEMP1=X(N)
        TEMP2=Y(N)
      ENDIF
C
      PRINT 1,(X(I),Y(I),I=1,N)
    1 FORMAT(2X,F6.2,2X,F8.4)
C
      IF(KK.EQ.1)THEN
         XF=0.0
         XL=X(N)
      ELSE
```

RUN NO: 6 14

INITIALS: M



APPENDIX A

EXAMPLES OF
LEAST SQUARE FIT COMPUTER PROGRAM
RESULTS AND PLOTS

REFERENCES

1. M. C. George, High Reynolds Number Cylinder Flow Studies, Dept. of Physics, Alabama A&M University, Normal, AL, 1982.

2. W. C. L. Shih, High Reynolds Number Cylinder Flow Workshop, Final Report, 17 August 1981, PRi-LA-81-R003, Physical Research Inc.

3. W. C. L. Shih, High Reynolds Number Cylinder Flow Tests Pretest Report, 20 April 1982, PRi-LA-82-R001, Physical Research Inc.

4. A. Roshko, Experiments on Flow Past a Circular Cylinder at Very High Reynolds Numbers, J. Fluid Mechanics, Vol. 10, pp. 345-356, 1961.

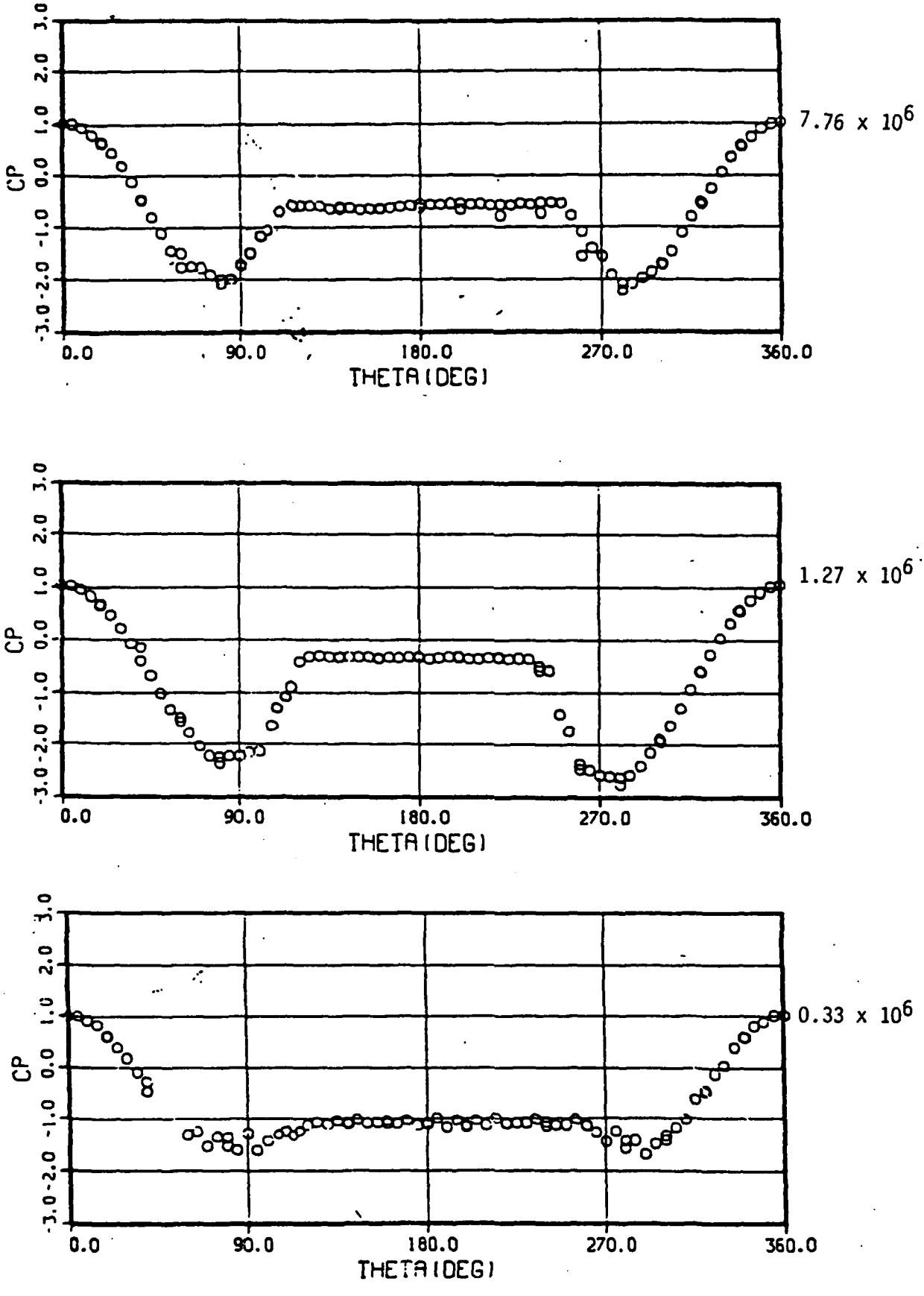


Figure 4. Typical changes in the pressure distribution over the smooth cylinder as Reynolds number is varied.

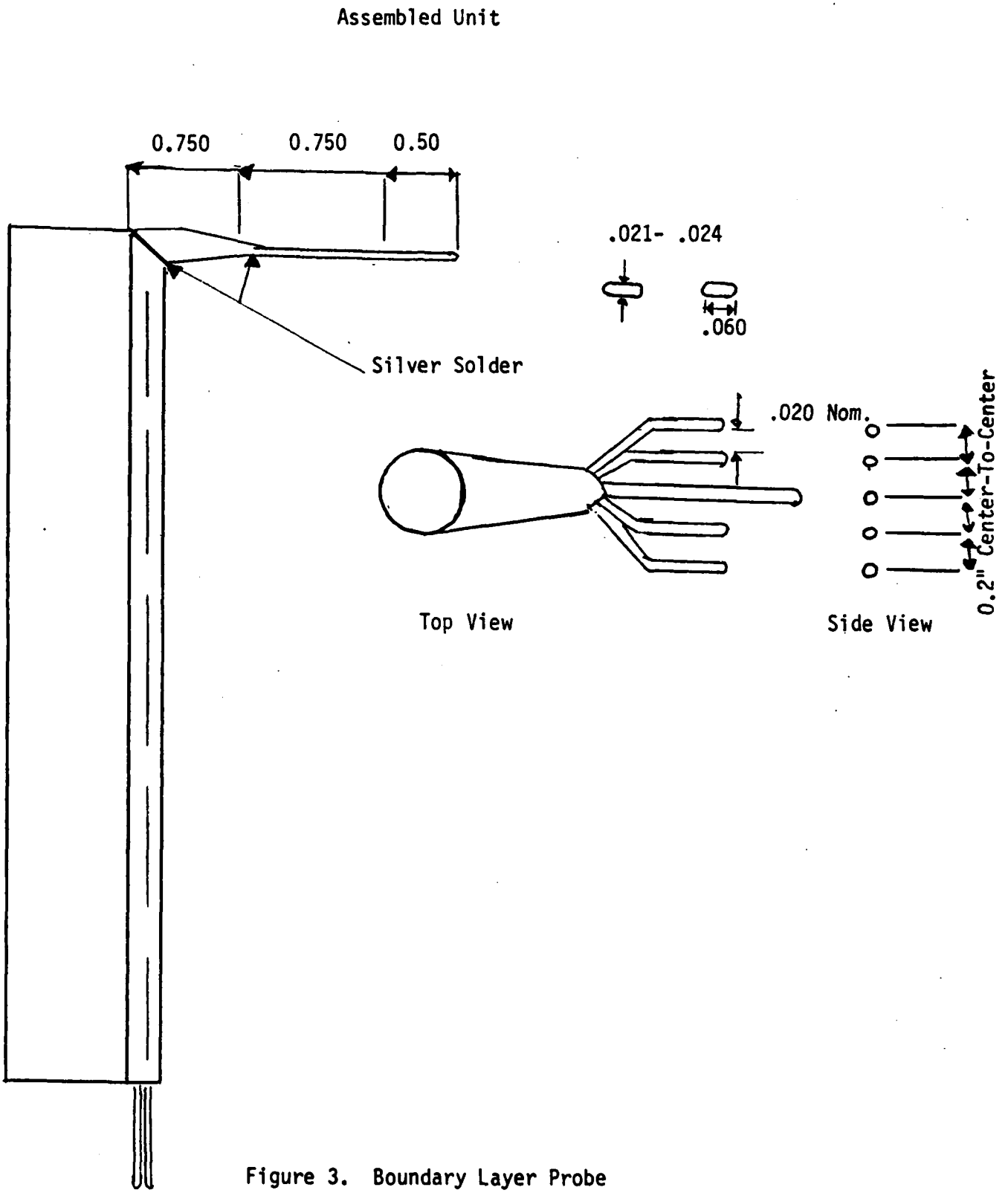
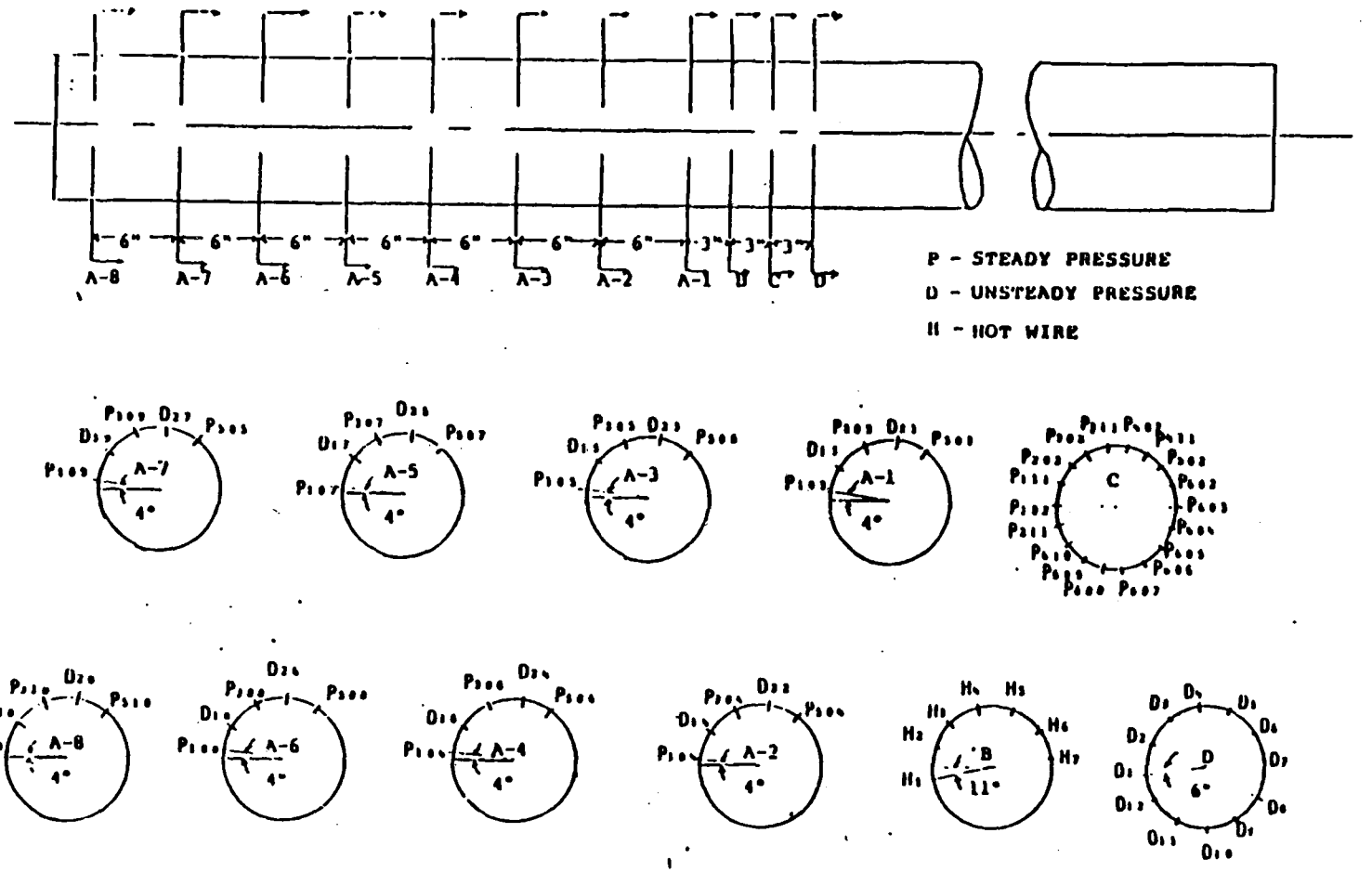


Figure 3. Boundary Layer Probe



SECTION A-1 → A-8, B, D: ORIFICES LOCATED 30° APART

SECTION C: ORIFICES LOCATED 20° APART

FIGURE 2. Model Instrumentation at 0 Degrees Roll Angle

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10168E 01 0.84769E-03 -0.95523E-03 -0.91412E-05 0.25605E-06

0.02	1.0169
4.98	0.9964
10.03	0.9226
14.97	0.7977
20.14	0.6139
20.01	0.6191
24.98	0.3992
30.03	0.1416
34.97	-0.1297
40.14	-0.4147
40.01	-0.4077
44.98	-0.6614
50.03	-0.8722

COS IS 0.13440

SIN IS -0.00937

BETA IS 0.00048

SECTION--2

X	Y
50.03	-0.8828
54.97	-1.1068
60.14	-1.3975
60.01	-1.6055
64.98	-1.7802
70.03	-1.9043
74.97	-1.9986
80.14	-1.9990
84.98	-1.9226
90.03	-1.7120
100.14	-1.4689
100.01	-1.3358

0.120000E 02	0.890429E 03	0.692692E 05	0.562675E 07	0.474613E 09
-0.191140E 02	0.890429E 03	0.692692E 05	0.562675E 07	0.474613E 09
0.413187E 11	-0.144267E 04	0.692692E 05	0.562675E 07	0.474613E 09
0.413187E 11	0.369112E 13	-0.113169E 06	0.562675E 07	0.474613E 09
0.413187E 11	0.369112E 13	0.336642E 15	-0.919925E 07	0.474613E 09
0.413187E 11	0.369112E 13	0.336642E 15	0.312140E 17	-0.771955E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.10273E 01 -0.76215E-02

50.03	-1.4086
54.97	-1.4463
60.14	-1.4857
60.01	-1.4847
64.98	-1.5225
70.03	-1.5610
74.97	-1.5987
80.14	-1.6381
84.98	-1.6750
90.03	-1.7135
100.14	-1.7905
100.01	-1.7895

COS IS -0.16322

SIN IS -0.65558

BETA IS 0.12591

FOR DEGREE OF 2 COEFFICIENTS ARE

0.65178E 01 -0.21553E 00 0.13655E-02

50.03	-0.8473
54.97	-1.2038
60.14	-1.5054
60.01	-1.4987
64.98	-1.7217
70.03	-1.8791
74.97	-1.9657
80.14	-1.9850
84.98	-1.9369
90.03	-1.8185
100.14	-1.3722
100.01	-1.3797

COS IS -0.16853

SIN IS -0.69364

BETA IS 0.00687

```
100.14   -1.7905
100.01   -1.7895

         COS  IS   -0.16322

         SIN  IS   -0.65550

         BETA IS    0.12591


FOR DEGREE OF  2 COEFFICIENTS ARE

        0.65178E 01  -0.21553E 00   0.13655E-02

 50.03   -0.8473
 54.97   -1.2038
 60.14   -1.5054
 60.01   -1.4987
 64.98   -1.7217
 70.03   -1.8791
 74.97   -1.9657
 80.14   -1.9850
 84.98   -1.9369
 90.03   -1.8185
100.14   -1.3722
100.01   -1.3797

         COS  IS   -0.16853

         SIN  IS   -0.69364

         BETA IS    0.00687


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.78889E 01  -0.27302E 00   0.21461E-02  -0.34363E-05

 50.03   -0.8289
 54.97   -1.2049
 60.14   -1.5159
 60.01   -1.5090
 64.98   -1.7330
 70.03   -1.8859
 74.97   -1.9651
 80.14   -1.9764
 84.98   -1.9228
 90.03   -1.8036
100.14   -1.3809
100.01   -1.3878

         COS  IS   -0.16879

         SIN  IS   -0.69263

         BETA IS    0.00736


FOR DEGREE OF  4 COEFFICIENTS ARE

        0.13080E 02  -0.57381E 00   0.85424E-02  -0.62585E-04   0.20077E-06

 50.03   -0.8257
```

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	-1.7289
[illegible]	[illegible]
74.97	-1.9551
[illegible].14	-1.9730
84.98	-1.9300
90.03	-1.8204
100.14	-1.3762
100.01	-1.3841

COS IS -0.16862

SIN IS -0.69372

BETA IS 0.00951

SECTION--3

X	Y
100.01	-1.3358
104.98	-1.2371
105.98	-1.0010
109.02	-0.7490
110.03	-1.1297
112.02	-0.5890
114.97	-1.2055
120.14	-1.0330
120.01	-0.5638
124.98	-0.5517
130.03	-0.5475
134.97	-0.5694
140.14	-0.5971
140.01	-0.5796

0.140000E 02	0.166729E 04	0.200835E 06	0.244695E 08	0.301510E 10
-0.116892E 02	0.166729E 04	0.200835E 06	0.244695E 08	0.301510E 10
0.375610E 12	-0.135367E 04	0.200835E 06	0.244695E 08	0.301510E 10
0.375610E 12	0.472867E 14	-0.158507E 06	0.244695E 08	0.301510E 10
0.375610E 12	0.472867E 14	0.601262E 16	-0.187749E 08	0.301510E 10
0.375610E 12	0.472867E 14	0.601262E 16	0.771667E 18	-0.225018E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.28464E 01 0.16890E-01

100.01	-1.1572
104.98	-1.0733
105.98	-1.0564
109.02	-1.0051
110.03	-0.9880
112.02	-0.9544
114.97	-0.9046
120.14	-0.8172
120.01	-0.8194
124.98	-0.7355
130.03	-0.6502
134.97	-0.5668
140.14	-0.4794
140.01	-0.4816

COS IS 0.12839

SIN IS -0.24947

BETA IS 0.04593

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10564E 02 0.14565E 00 -0.53097E-03

100.01	-1.3081
104.98	-1.1252
105.98	-1.0915
109.02	-0.9958
110.03	-0.9661
112.02	-0.9109
114.97	-0.8368
120.14	-0.7291
120.01	-0.7315
124.98	-0.6541
130.03	-0.6023
134.97	-0.5779
140.14	-0.5801
140.01	-0.5797

COS IS 0.12434

SIN IS -0.24450

BETA IS 0.04391

FOR DEGREE OF 3 COEFFICIENTS ARE

SIN IS 0.24947

BETA IS 0.04593

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10564E 02 0.14565E 00 -0.53097E-03

100.01	-1.3081
104.98	-1.1252
105.98	-1.0915
109.02	-0.9958
110.03	-0.9661
112.02	-0.9109
114.97	-0.8368
120.14	-0.7291
120.01	-0.7315
124.98	-0.6541
130.03	-0.6023
134.97	-0.5779
140.14	-0.5801
140.01	-0.5797

COS IS 0.12434

SIN IS -0.24458

BETA IS 0.04391

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.39924E 01 -0.14355E-01 0.75819E-03 -0.34382E-05

100.01	-1.2840
104.98	-1.1215
105.98	-1.0907
109.02	-1.0012
110.03	-0.9729
112.02	-0.9194
114.97	-0.8461
120.14	-0.7357
120.01	-0.7382
124.98	-0.6557
130.03	-0.5988
134.97	-0.5718
140.14	-0.5768
140.01	-0.5762

COS IS 0.12432

SIN IS -0.24459

BETA IS 0.04833

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.28856E 01 -0.52032E-02 0.50180E-04 0.38284E-05 -0.22013E-07

100.01	-1.2768
104.98	-1.1232

```
109.98    -1.0934
109.02    -1.0055
110.03    -0.9773
112.02    -0.9236
114.97    -0.8487
120.14    -0.7338
120.01    -0.7364
124.98    -0.6492
130.03    -0.5900
134.97    -0.5660
140.14    -0.5831
140.01    -0.5021

          COS  IS    0.12385

          SIN  IS   -0.24411

          BETA IS    0.05379



SECTION--4
  X          Y
 140.01    -0.5796
 144.98    -0.5646
 150.03    -0.5444
 154.97    -0.5629
 160.14    -0.5654
 160.01    -0.5568
 164.98    -0.5363
 170.03    -0.5312
 174.97    -0.5278
 180.14    -0.5394
 180.01    -0.5227
 184.98    -0.5301
 190.03    -0.5312
 194.97    -0.5341
 200.14    -0.5738
 200.01    -0.5173
 204.98    -0.5707
 210.03    -0.5545
 214.97    -0.5622
 220.14    -0.5778
 220.01    -0.5343

  0.210000E 02    0.382053E 04    0.707601E 06    0.133286E 09    0.255026E 11
 -0.115171E 02    0.382053E 04    0.707601E 06    0.133286E 09    0.255026E 11
  0.494994E 13   -0.209444E 04    0.707601E 06    0.133286E 09    0.255026E 11
  0.494994E 13    0.973240E 15   -0.387896E 06    0.133286E 09    0.255026E 11
  0.494994E 13    0.973240E 15    0.193572E 18   -0.730862E 08    0.255026E 11
  0.494994E 13    0.973240E 15    0.193572E 18    0.388954E 20   -0.139919E 11

FOR DEGREE OF  1 COEFFICIENTS ARE

       -0.56089E 00   0.68452E-04

 140.01    -0.5513
 144.98    -0.5510
 150.03    -0.5506
 154.97    -0.5503
 160.14    -0.5499
 160.01    -0.5499
 164.98    -0.5496
 170.03    -0.5492
 174.97    -0.5489
 180.14    -0.5486
 180.01    -0.5486
 184.98    -0.5482
 190.03    -0.5479
 194.97    -0.5475
 200.14    -0.5472
 200.01    -0.5472
 204.98    -0.5469
 210.03    -0.5465
 214.97    -0.5462
 220.14    -0.5458
 220.01    -0.5458

          COS  IS    0.35259

          SIN  IS   -0.00044

          BETA IS    0.00040

FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.12688E 01   0.80077E-02  -0.21857E-04

 140.01    -0.5761
 144.98    -0.5673
 150.03    -0.5594
 154.97    -0.5528
 160.14    -0.5470
 160.01    -0.5471
 164.98    -0.5426
 170.03    -0.5391
 174.97    -0.5368
```

```
174.97   -0.5489
180.14   -0.5486
180.01   -0.5486
184.98   -0.5482
190.03   -0.5479
194.97   -0.5475
200.14   -0.5472
200.01   -0.5472
204.98   -0.5469
210.03   -0.5465
214.97   -0.5462
220.14   -0.5458
220.01   -0.5458

         COS  IS    0.35259

         SIN  IS   -0.00044

         BETA IS    0.00040


FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.12688E 01   0.80077E-02  -0.21857E-04

140.01   -0.5761
144.98   -0.5673
150.03   -0.5594
154.97   -0.5528
160.14   -0.5470
160.01   -0.5471
164.98   -0.5426
170.03   -0.5391
174.97   -0.5368
180.14   -0.5356
180.01   -0.5356
184.98   -0.5354
190.03   -0.5364
194.97   -0.5384
200.14   -0.5413
200.01   -0.5415
204.98   -0.5457
210.03   -0.5511
214.97   -0.5574
220.14   -0.5652
220.01   -0.5650

         COS  IS    0.35122

         SIN  IS   -0.00088

         BETA IS    0.00026


FOR DEGREE OF  3 COEFFICIENTS ARE

       -0.13458E 01   0.93171E-02  -0.29193E-04   0.13547E-07

140.01   -0.5764
144.98   -0.5673
150.03   -0.5593
154.97   -0.5526
160.14   -0.5468
160.01   -0.5469
164.98   -0.5424
```

174.97	-0.5368
180.14	-0.5356
180.01	-0.5356
184.98	-0.5355
190.03	-0.5365
194.97	-0.5386
200.14	-0.5418
200.01	-0.5417
204.98	-0.5459
210.03	-0.5512
214.97	-0.5574
220.14	-0.5650
220.01	-0.5648

COS IS 0.35123

SIN IS -0.00087

BETA IS 0.00027

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.10692E 01 -0.35781E-02 0.13497E-03 -0.79924E-06 0.13970E-08

140.01	-0.5811
144.98	-0.5693
150.03	-0.5592
154.97	-0.5510
160.14	-0.5444
160.01	-0.5445
164.98	-0.5398
170.03	-0.5366
174.97	-0.5350
180.14	-0.5348
180.01	-0.5348
184.98	-0.5358
190.03	-0.5379
194.97	-0.5409
200.14	-0.5448
200.01	-0.5446
204.98	-0.5488
210.03	-0.5532
214.97	-0.5575
220.14	-0.5616
220.01	-0.5615

COS IS 0.35132

SIN IS -0.00071

BETA IS 0.00028

SECTION--5

X	Y
220.01	-0.5343
224.98	-0.5707
230.03	-0.5639
234.97	-0.5809
240.14	-0.6122
240.01	-0.5467
244.98	-0.6059
250.03	-0.5981
254.97	-0.7184
258.98	-0.9475
260.14	-1.3848
260.01	-1.1545

0.120000E 02	0.291925E 04	0.712305E 06	0.174317E 09	0.427816E 11
-0.881790E 01	0.291925E 04	0.712305E 06	0.174317E 09	0.427816E 11
0.105290E 14	-0.217733E 04	0.712305E 06	0.174317E 09	0.427816E 11
0.105290E 14	0.259830E 16	-0.539224E 06	0.174317E 09	0.427816E 11
0.105290E 14	0.259830E 16	0.642874E 18	-0.133920E 09	0.427816E 11
0.105290E 14	0.259830E 16	0.642874E 18	0.159460E 21	-0.333502E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

0.29297E 01 -0.15064E-01

220.01	-0.3844
224.98	-0.4593
230.03	-0.5354
234.97	-0.6098
240.14	-0.6877
240.01	-0.6857
244.98	-0.7606
250.03	-0.8366
254.97	-0.9111
258.98	-0.9715
260.14	-0.9889
260.01	-0.9870

COS IS 0.10682

SIN IS 0.20912

```
244.98   -0.6059
250.03   -0.5981
254.97   -0.7184
258.98   -0.9475
260.14   -1.3848
260.01   -1.1545

 0.120000E 02    0.291925E 04    0.712305E 06    0.174317E 09    0.427816E 11
-0.881790E 01    0.291925E 04    0.712305E 06    0.174317E 09    0.427816E 11
 0.105290E 14   -0.217733E 04    0.712305E 06    0.174317E 09    0.427816E 11
 0.105290E 14    0.259830E 16   -0.539224E 06    0.174317E 09    0.427816E 11
 0.105290E 14    0.259830E 16    0.642874E 18   -0.133920E 09    0.427816E 11
 0.105290E 14    0.259830E 16    0.642874E 18    0.159460E 21   -0.333502E 11

FOR DEGREE OF  1 COEFFICIENTS ARE

        0.29297E 01  -0.15064E-01

220.01   -0.3844
224.98   -0.4593
230.03   -0.5354
234.97   -0.6098
240.14   -0.6877
240.01   -0.6857
244.98   -0.7606
250.03   -0.8366
254.97   -0.9111
258.98   -0.9715
260.14   -0.9889
260.01   -0.9870

         COS  IS    0.10682

         SIN  IS    0.20912

         BETA IS    0.03648


FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.39123E 02   0.33391E 00  -0.72174E-03

220.01   -0.5955
224.98   -0.5322
230.03   -0.5044
234.97   -0.5128
240.14   -0.5593
240.01   -0.5577
244.98   -0.6379
250.03   -0.7558
254.97   -0.9069
258.98   -1.0554
260.14   -1.1027
260.01   -1.0973

         COS  IS    0.10285

         SIN  IS    0.19823

         BETA IS    0.01914


FOR DEGREE OF  3 COEFFICIENTS ARE
```

```
220.01   -0.6382
224.98   -0.5530
230.03   -0.5043
234.97   -0.4958
240.14   -0.5307
240.01   -0.5292
244.98   -0.6060
250.03   -0.7307
254.97   -0.9004
258.98   -1.0744
260.14   -1.1310
260.01   -1.1245

        COS  IS    0.10216

        SIN  IS    0.19562

        BETA IS    0.02013


FOR DEGREE OF  4 COEFFICIENTS ARE

      -0.85208E 01  -0.16731E-01   0.33092E-03   0.61200E-06  -0.46778E-08

220.01   -0.6264
224.98   -0.5503
230.03   -0.5073
234.97   -0.5014
240.14   -0.5363
240.01   -0.5349
244.98   -0.6100
250.03   -0.7321
254.97   -0.8991
258.98   -1.0713
260.14   -1.1275
260.01   -1.1211

        COS  IS    0.10232

        SIN  IS    0.19599

        BETA IS    0.02251


SECTION--6
  X        Y
260.01   -1.1545
264.98   -1.5054
270.03   -1.7206
274.97   -1.9735
280.01   -2.0539
290.03   -1.9826
294.97   -1.8565
300.14   -1.6905
300.01   -1.6266
304.98   -1.4154
310.03   -1.0917

  0.110000E 02    0.315016E 04    0.905096E 06    0.260886E 09    0.754336E 11
 -0.180712E 02    0.315016E 04    0.905096E 06    0.260886E 09    0.754336E 11
  0.218777E 14   -0.516959E 04    0.905096E 06    0.260886E 09    0.754336E 11
  0.218777E 14    0.636378E 16   -0.140303E 07    0.260886E 09    0.754336E 11
  0.218777E 14    0.636378E 16    0.185636E 19   -0.426629E 09    0.754336E 11
  0.218777E 14    0.636378E 16    0.185636E 19    0.542992E 21   -0.123064E 12

FOR DEGREE OF  1 COEFFICIENTS ARE

      -0.21847E 01   0.18920E-02

260.01   -1.6927
264.98   -1.6833
270.03   -1.6738
274.97   -1.6644
280.01   -1.6549
290.03   -1.6359
294.97   -1.6266
300.14   -1.6168
300.01   -1.6170
304.98   -1.6076
310.03   -1.5981

        COS  IS   -0.17717

        SIN  IS    0.67265

        BETA IS    0.11669


FOR DEGREE OF  2 COEFFICIENTS ARE

       0.12129E 03  -0.86767E 00   0.15259E-02

260.01   -1.1581
264.98   -1.4891
270.03   -1.7482
```

```
 0.218777E 14    0.636378E 16   -0.148303E 07    0.260886E 09    0.754336E 11
 0.218777E 14    0.636378E 16    0.185636E 19   -0.426629E 09    0.754336E 11
 0.218777E 14    0.636378E 16    0.185636E 19    0.542992E 21   -0.123064E 13

FOR DEGREE OF  1 COEFFICIENTS ARE

       -0.21847E 01   0.18920E-02

260.01   -1.6927
264.98   -1.6833
270.03   -1.6738
274.97   -1.6644
280.01   -1.6549
290.03   -1.6359
294.97   -1.6266
300.14   -1.6168
300.01   -1.6170
304.98   -1.6076
310.03   -1.5981

         COS  IS   -0.17717

         SIN  IS    0.67265

         BETA IS    0.11669


FOR DEGREE OF  2 COEFFICIENTS ARE

        0.12129E 03  -0.86767E 00   0.15259E-02

260.01   -1.1581
264.98   -1.4891
270.03   -1.7482
274.97   -1.9263
280.01   -2.0313
290.03   -2.0099
294.97   -1.8865
300.14   -1.6777
300.01   -1.6839
304.98   -1.4082
310.03   -1.0509

         COS  IS   -0.18811

         SIN  IS    0.71507

         BETA IS    0.00132


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.86534E 02  -0.49445E 00   0.19226E-03   0.15855E-05

260.01   -1.1599
264.98   -1.4867
270.03   -1.7453
274.97   -1.9254
280.01   -2.0337
290.03   -2.0178
294.97   -1.8944
300.14   -1.6819
300.01   -1.6883
304.98   -1.4045
```

```
 310.03   -1.0937

        COS  IS    -0.18827

        SIN  IS     0.71557

        BETA IS     0.00198


FOR DEGREE OF  4 COEFFICIENTS ARE

       0.83888E 02  -0.53460E 00   0.81080E-03  -0.80930E-06   0.29233E-08

 260.01   -1.1637
 264.98   -1.4854
 270.03   -1.7414
 274.97   -1.9211
 280.01   -2.0305
 290.03   -2.0189
 294.97   -1.8972
 300.14   -1.6850
 300.01   -1.6914
 304.98   -1.4059
 310.03   -1.0297

        COS  IS    -0.18833

        SIN  IS     0.71528

        BETA IS     0.00256


SECTION-7
   X         Y
 310.03   -1.0917
 314.97   -0.8182
 320.14   -0.5099
 320.01   -0.4734
 324.98   -0.2023
 330.03    0.1129
 334.97    0.3500
 340.14    0.5774
 340.01    0.5977
 344.98    0.7671
 350.03    0.9074
 354.97    0.9903
 360.14    1.0239

  0.130000E 02   0.434540E 04   0.145549E 07   0.488522E 09   0.164303E 12
  0.223120E 01   0.434540E 04   0.145549E 07   0.488522E 09   0.164303E 12
  0.553721E 14   0.880003E 03   0.145549E 07   0.488522E 09   0.164303E 12
  0.553721E 14   0.186986E 17   0.339313E 06   0.488522E 09   0.164303E 12
  0.553721E 14   0.186986E 17   0.632692E 19   0.128673E 09   0.164303E 12
  0.553721E 14   0.186986E 17   0.632692E 19   0.214499E 22   0.481807E 11

FOR DEGREE OF  1 COEFFICIENTS ARE

      -0.14801E 02   0.44792E-01

 310.03   -0.9137
 314.97   -0.6925
 320.14   -0.4609
 320.01   -0.4667
 324.98   -0.2441
 330.03   -0.0179
 334.97    0.2034
 340.14    0.4349
 340.01    0.4291
 344.98    0.6517
 350.03    0.8780
 354.97    1.0992
 360.14    1.3308

        COS  IS     0.10803

        SIN  IS     0.02639

        BETA IS     0.02356


                                          CD =    0.48400

                                          CL =   -0.00838

FOR DEGREE OF  2 COEFFICIENTS ARE

      -0.57091E 02   0.29709E 00  -0.37791E-03

 310.03   -1.0596
 314.97   -0.7549
 320.14   -0.4556
 320.01   -0.4629
 324.98   -0.1938
 330.03    0.0605
 334.97    0.2904
```

324.98	-0.1441
330.03	-0.0179
334.97	0.2034
340.14	0.4349
340.01	0.4291
344.98	0.6517
350.03	0.8780
354.97	1.0992
360.14	1.3308

COS IS 0.10803

SIN IS 0.02639

BETA IS 0.02356

CD = 0.48400

CL = -0.00838

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.57091E 02 0.29789E 00 -0.37791E-03

310.03	-1.0596
314.97	-0.7549
320.14	-0.4556
320.01	-0.4629
324.98	-0.1938
330.03	0.0605
334.97	0.2906
340.14	0.5117
340.01	0.5064
344.98	0.7003
350.03	0.8783
354.97	1.0338
360.14	1.1767

COS IS 0.11202

SIN IS 0.02433

BETA IS 0.00576

CD = 0.46788

CL = -0.00965

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.57796E 02 0.16100E 00 0.45920E-03 -0.12577E-05

310.03	-1.2211
314.97	-0.8282
320.14	-0.4552
320.01	-0.4640
324.98	-0.1421
330.03	0.1461
334.97	0.3893
340.14	0.6017

```
344.03     0.7607
350.03     0.8845
354.97     0.9631
360.14     0.9994

          COS  IS     0.11672

          SIN  IS     0.02226

          BETA IS     0.00319


                                                CD =    0.47242

                                                CL =   -0.01388

 FOR DEGREE OF  4 COEFFICIENTS ARE

         0.22222E 02  -0.24545E 00   0.51577E-04   0.35096E-05  -0.61454E-08

  310.03    -1.1055
  314.97    -0.7853
  320.14    -0.4655
  320.01    -0.4733
  324.98    -0.1832
  330.03     0.0901
  334.97     0.3335
  340.14     0.5588
  340.01     0.5535
  344.98     0.7392
  350.03     0.8921
  354.97     1.0032
  360.14     1.0746

          COS  IS     0.11429

          SIN  IS     0.02347

          BETA IS     0.00131


                                                CD =    0.46924

                                                CL =   -0.01317


                                  END OF RUN:SEQ 94:5


 EXEC =    1.56 SU

 STATEMENTS EXECUTED=    18717
 CORE USAGE        OBJECT CODE=    14320 BYTES.ARRAY AREA=     3660 BYTES.TOTAL AREA AVAILABLE=
 DIAGNOSTICS         NUMBER OF ERRORS=        0. NUMBER OF WARNINGS=        0. NUMBER OF EXTENSIO

 END OF JOB MUSJOB   CODE=ME01 000 AT 08H57M FRI JUN 14, 1985 EXECUTE TIME       2.8 SERVICE UN
          420 CARDS READ     1372 LINES PRINTED        0 CARDS PUNCHED 0 TAPE MOUNTS 0 DISK MOU
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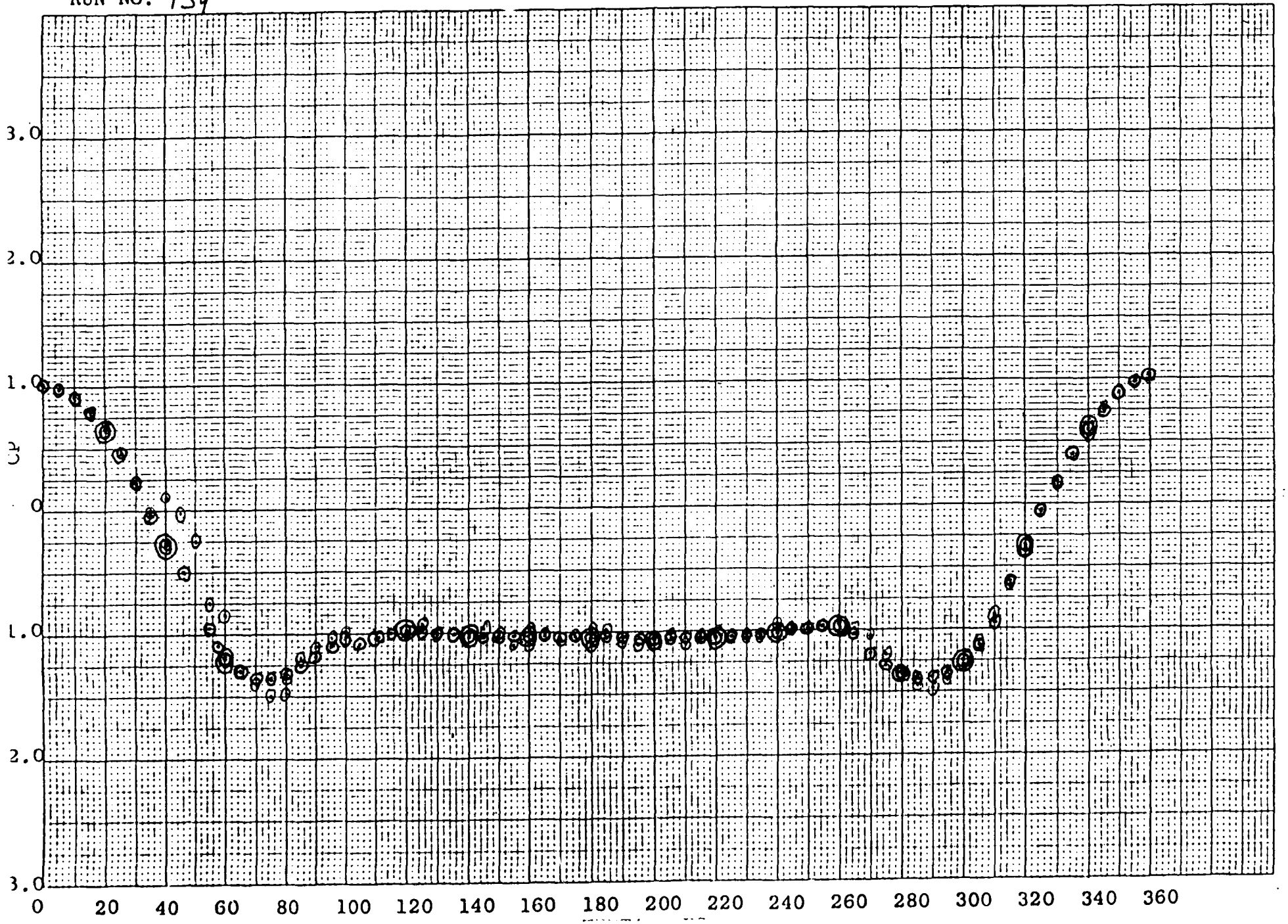
RUN NO: 139

INITIALS: GD



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    114.86   -1.0178
    119.97   -0.9899
    119.98   -0.9899
    124.94   -0.9739
    129.90   -0.9735
    134.86   -0.9937
    139.97   -1.0418
    139.98   -1.0419

             COS  IS    0.17212

             SIN  IS   -0.30329

             BETA IS    0.00149

0
 SECTION--4
   X          Y
  139.98   -1.0118
  144.94   -0.9665
  149.90   -1.0216
  154.86   -1.1005
  159.97   -1.0969
  159.98   -0.9980
  164.94   -1.0224
  169.90   -1.0694
  174.86   -1.0319
  179.97   -1.1069
  179.98   -0.9841
  184.94   -0.9947
  189.90   -1.0729
  194.86   -1.1010
  199.97   -1.0656
  199.98   -1.0812
  204.94   -1.0259
  209.90   -1.0971
  214.86   -1.0353
  219.97   -1.0449
  219.98   -1.0223

    0.210000E 02    0.301858E 04    0.706883E 06    0.133085E 09    0.254515E 11
   -0.219509E 02    0.381858E 04    0.706883E 06    0.133085E 09    0.254515E 11
    0.493763E 13   -0.399675E 04    0.706883E 06    0.133085E 09    0.254515E 11
    0.493763E 13    0.970354E 15   -0.740670E 06    0.133085E 09    0.254515E 11
    0.493763E 13    0.970354E 15    0.192907E 18   -0.139565E 09    0.254515E 11
    0.493763E 13    0.970354E 15    0.192907E 18    0.387435E 20   -0.267076E 11

 FOR DEGREE OF  1 COEFFICIENTS ARE

        -0.96868E 00  -0.42127E-03

  139.98   -1.0276
  144.94   -1.0297
  149.90   -1.0318
  154.86   -1.0339
  159.97   -1.0361
  159.98   -1.0361
  164.94   -1.0382
```

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.48100E 01 0.61052E-01 -0.24345E-03

99.98	-1.1396
104.94	-1.0842
109.90	-1.0408
110.98	-1.0329
114.86	-1.0094
119.97	-0.9895
119.98	-0.9895
124.94	-0.9824
129.90	-0.9873
134.86	-1.0042
139.97	-1.0341
139.98	-1.0342

COS IS 0.17268

SIN IS -0.30366

BETA IS 0.00083

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.38873E 01 0.37557E-01 -0.45455E-04 -0.55213E-06

99.98	-1.1385
104.94	-1.0847
109.90	-1.0417
110.98	-1.0338
114.86	-1.0099
119.97	-0.9892
119.98	-0.9892
124.94	-0.9813
129.90	-0.9859
134.86	-1.0033
139.97	-1.0351
139.98	-1.0352

COS IS 0.17261

SIN IS -0.30362

BETA IS 0.00096

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10297E 01 -0.45220E-01 -0.44527E-04 0.51770E-05 -0.23626E-07

99.98	-1.1226
104.94	-1.0876
109.90	-1.0515
110.98	-1.0438
114.86	-1.0178
119.97	-0.9899
119.98	-0.9899
124.94	-0.9739
129.90	-0.9735
134.86	-0.9937
139.97	-1.0418
139.98	-1.0419

COS IS 0.17212

SIN IS -0.30329

BETA IS 0.00149

0

SECTION--4

X	Y
139.98	-1.0118
144.94	-0.9665
149.90	-1.0216
154.86	-1.1005
159.97	-1.0969
159.98	-0.9980
164.94	-1.0224
169.90	-1.0624

```
     89.90   -1.1848
     94.86   -1.1058
     99.97   -1.0307
     99.98   -1.0306

             COS  IS   -0.13842

             SIN  IS   -0.50141

             BETA IS    0.01854


 0
  SECTION--3
    X          Y
    99.98   -1.1592
   104.94   -1.0613
   109.90   -1.0598
   110.98   -0.9990
   114.86   -1.0266
   119.97   -1.0155
   119.98   -0.9668
   124.94   -0.9470
   129.90   -1.0286
   134.86   -1.0127
   139.97   -1.0396
   139.98   -1.0118

     0.120000E 02    0.145026E 04    0.177241E 06    0.218985E 08    0.273414E 10
    -0.123279E 02    0.145026E 04    0.177241E 06    0.218985E 08    0.273414E 10
     0.344798E 12   -0.148600E 04    0.177241E 06    0.218985E 08    0.273414E 10
     0.344798E 12    0.438924E 14   -0.181207E 06    0.218985E 08    0.273414E 10
     0.344798E 12    0.438924E 14    0.563661E 16   -0.223476E 08    0.273414E 10
     0.344798E 12    0.438924E 14    0.563661E 16    0.729726E 18   -0.278617E 10

 FOR DEGREE OF  1 COEFFICIENTS ARE

        -0.12657E 01    0.19725E-02

     99.98   -1.0685
    104.94   -1.0587
    109.90   -1.0489
    110.98   -1.0468
    114.86   -1.0391
    119.97   -1.0291
    119.98   -1.0290
    124.94   -1.0193
    129.90   -1.0095
    134.86   -0.9997
    139.97   -0.9896
    139.98   -0.9896

             COS  IS    0.17444

             SIN  IS   -0.30566

             BETA IS    0.00236
```

```
    57.97   -1.0324
    59.98   -1.0985
    64.94   -1.2318
    69.90   -1.3227
    74.86   -1.3714
    79.98   -1.3772
    84.94   -1.3398
    89.90   -1.2601
    94.86   -1.1381
    99.97   -0.9681
    99.98   -0.9677

            COS  IS   -0.13703

            SIN  IS   -0.50633

            BETA IS    0.01852


 FOR DEGREE OF  3 COEFFICIENTS ARE

          0.97064E 01  -0.38862E 00   0.44235E-02  -0.16110E-04

    46.02   -0.3797
    54.86   -0.9600
    57.97   -1.0949
    59.98   -1.1652
    64.94   -1.2876
    69.90   -1.3468
    74.86   -1.3545
    79.98   -1.3211
    84.94   -1.2606
    89.90   -1.1845
    94.86   -1.1045
    99.97   -1.0305
    99.98   -1.0304

            COS  IS   -0.13838

            SIN  IS   -0.50137

            BETA IS    0.01606


 FOR DEGREE OF  4 COEFFICIENTS ARE

          0.10569E 02  -0.43729E 00   0.54259E-02  -0.25058E-04   0.29297E-07

    46.02   -0.3749
    54.86   -0.9630
    57.97   -1.0979
    59.98   -1.1677
    64.94   -1.2884
    69.90   -1.3457
    74.86   -1.3524
    79.98   -1.3190
    84.94   -1.2595


    89.90   -1.1848
    94.86   -1.1058
    99.97   -1.0307
    99.98   -1.0306

            COS  IS   -0.13842

            SIN  IS   -0.50141

            BETA IS    0.01854

 0
  SECTION--3
      X        Y
    99.98   -1.1592
   104.94   -1.0613
   109.90   -1.0598
   110.98   -0.9990
   114.86   -1.0266
   117.97   -1.0155
   119.98   -0.9668
   124.94   -0.9470
   129.90   -1.0286
   134.86   -1.0127
   139.97   -1.0396
   139.98   -1.0118
```

BETA IS 0.00025

0
SECTION--2

X	Y
46.02	-0.4990
54.86	-0.7520
57.97	-0.9835
59.98	-1.2173
64.94	-1.3158
69.90	-1.4323
74.86	-1.5115
79.98	-1.3517
84.94	-1.1756
89.90	-1.0910
94.86	-1.0404
99.97	-0.9913
99.98	-1.1592

0.130000E 02	0.978159E 03	0.774748E 05	0.641118E 07	0.549904E 09
-0.145206E 02	0.978159E 03	0.774748E 05	0.641118E 07	0.549904E 09
0.485312E 11	-0.111270E 04	0.774748E 05	0.641118E 07	0.549904E 09
0.485312E 11	0.437974E 13	-0.888241E 05	0.641118E 07	0.549904E 09
0.485312E 11	0.437974E 13	0.402184E 15	-0.735235E 07	0.549904E 09
0.485312E 11	0.437974E 13	0.402184E 15	0.374366E 17	-0.627822E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.72622E 00 -0.51931E-02

46.02	-0.9652
54.86	-1.0111
57.97	-1.0273
59.98	-1.0377
64.94	-1.0635
69.90	-1.0892
74.86	-1.1150
79.98	-1.1416
84.94	-1.1673
89.90	-1.1931
94.86	-1.2188
99.97	-1.2454
99.98	-1.2454

COS IS -0.13696

SIN IS -0.48246

BETA IS 0.07416

FOR DEGREE OF 2 COEFFICIENTS ARE

0.38639E 01 -0.13433E 00 0.86021E-03

46.02	-0.4961
54.86	-0.9165

```
     19.98     0.6285
     24.94     0.4565
     29.90     0.2579
     34.86     0.0325
     39.97    -0.2276
     46.02    -0.5722

            COS  IS     0.17254

            SIN  IS     0.02664

            BETA IS     0.00221


 FOR DEGREE OF  3 COEFFICIENTS ARE

          0.10004E 01   0.75146E-02  -0.15730E-02   0.15039E-04

     -0.02     1.0003
      4.94     1.0010
      9.90     0.9352
     14.86     0.8141
     19.97     0.6429
     19.98     0.6426
     24.94     0.4427
     29.90     0.2208
     34.86    -0.0121
     39.97    -0.2520
     46.02    -0.5195

            COS  IS     0.17242

            SIN  IS     0.02532

            BETA IS     0.00067


 FOR DEGREE OF  4 COEFFICIENTS ARE

          0.10203E 01  -0.79133E-02   0.75507E-04  -0.41836E-04   0.61521E-06

     -0.02     1.0204
      4.94     0.9783
      9.90     0.9146
     14.86     0.8121
     19.97     0.6570
     19.98     0.6566
     24.94     0.4589
     29.90     0.2245
     34.86    -0.0276
     39.97    -0.2767
     46.02    -0.5021

            COS  IS     0.17053

            SIN  IS     0.02458


            BETA IS     0.00025

 0
  SECTION--2
    X          Y
    46.02    -0.4990
    54.86    -0.7520
    57.97    -0.9835
    59.98    -1.2173
    64.94    -1.3158
    69.90    -1.4323
    74.86    -1.5115
    79.98    -1.3517
    84.94    -1.1756
    89.90    -1.0910
    94.86    -1.0404
    99.97    -0.9913
    99.98    -1.1592

     0.130000E 02    0.978159E 03    0.774748E 05    0.641111E 07    0.549904E 09
    -0.145206E 02    0.978159E 03    0.774748E 05    0.641111E 07    0.549904E 09
     0.485312E 11   -0.111270E 04    0.774748E 05    0.641111E 07    0.549904E 09
     0.485312E 11    0.437974E 13   -0.808241E 05    0.641111E 07    0.549904E 09
     0.485312E 11    0.437974E 13    0.402184E 15   -0.755235E 07    0.549904E 09
     0.485312E 11    0.437974E 13    0.402184E 15    0.574344E 13    0.549904E 09

 FOR DEGREE OF  1 COEFFICIENTS ARE
```

END

RUN:SEQ
139:5

0
SECTION--1

X	Y
-0.02	1.0166
4.94	0.9856
9.90	0.9199
14.86	0.7998
19.97	0.6315
19.98	0.6738
24.94	0.4736
29.90	0.2241
34.86	-0.0245
39.97	-0.2854
46.02	-0.4990

0.110000E 02	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.491599E 01	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 09	0.352008E 02	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 09	0.164652E 11	-0.235955E 03	0.266238E 06	0.100778E 08
0.400637E 09	0.164652E 11	0.692760E 12	-0.405198E 05	0.100778E 08
0.400637E 09	0.164652E 11	0.692760E 12	0.296543E 14	-0.238418E 07

FOR DEGREE OF 1 COEFFICIENTS ARE

0.12311E 01 -0.35163E-01

-0.02	1.2318
4.94	1.0574
9.90	0.8830
14.86	0.7086
19.97	0.5289
19.98	0.5286
24.94	0.3541
29.90	0.1797
34.86	0.0053
39.97	-0.1744
46.02	-0.3871

COS IS 0.16855

SIN IS 0.02508

BETA IS 0.01497

FOR DEGREE OF 2 COEFFICIENTS ARE

0.10508E 01 -0.10293E-01 -0.54267E-03

-0.02	1.0510
4.94	0.9867
9.90	0.8957
14.86	0.7780
19.97	0.6288

```
      303              XF1=XL/57.3
      304            ELSE
      305              XF1=XF/57.3
      306            ENDIF
           C
      307            T1=C1(1)*(-COS(XF1))
      308               TB1=SIN(XF1)-(XF1*COS(XF1))
      309            T2=T1+(C1(2)*TB1)
      310            IF(J.EQ.2)THEN
      311               TT5=0.5*T2
      312            ELSE
      313               TB2=(2.*XF1)*SIN(XF1)
      314               TB3=TB2+((2.-(XF1**2))*COS(XF1))
      315            T3=T2+(C1(3)*TB3)
      316            ENDIF
      317            IF(J.EQ.3)THEN
      318               TT5=0.5*T3
      319            ENDIF
      320            IF((J.NE.2).AND.(J.NE.3))THEN
      321               TB4=((3.*(XF1**2))-6.)*SIN(XF1)
      322               TB5=TB4+(((6.*XF1)-(XF1**3))*COS(XF1))
      323            T4=T3+(C1(4)*TB5)
      324            ENDIF
      325            IF(J.EQ.4)THEN
      326               TT5=0.5*T4
      327            ENDIF
      328            IF(J.EQ.5)THEN
      329              T5=((4.*(XF1**3))-(24.*XF1))*SIN(XF1)
      330              T6=((XF1**4)-(12.*(XF1**2))+24.)*COS(XF1)
      331              T7=(T5-T6)*C1(5)
      332              T8=T4+T7
      333              TT5=0.5*T8
      334            ENDIF
      335            IF(I.EQ.1)THEN
      336              SUM2=TT5
      337            ENDIF
      338            IF(I.EQ.2)THEN
      339              SUM1=TT5
      340            ENDIF
      341         10 CONTINUE
           C
      342         ALPHA=SUM2-SUM1
      343         PRINT ,' '
      344         PRINT 66,ALPHA
      345      66 FORMAT(9X,' SIN  IS ',F10.5)
      346         IF(J.EQ.2)THEN
      347           CL3=CL3+ALPHA
      348         ENDIF
      349         IF(J.EQ.3)THEN
      350           CL2=CL2+ALPHA
      351         ENDIF
      352         IF(J.EQ.4)THEN
      353           CL=CL+ALPHA
      354         ENDIF
      355         IF(J.EQ.5)THEN
      356            CL1=CL1+ALPHA
      357         ENDIF
      358         RETURN
      359         END
```

```
 RUN:SEQ
139:5
 ----------
0
 SECTION--1
   X          Y
  -0.02     1.0166
   4.94     0.9056
   9.90     0.9199
  14.86     0.7998
  19.97     0.6315
  19.98     0.6738
  24.94     0.4736
  29.90     0.2241
  34.86    -0.0245
  39.97    -0.2854
  46.02    -0.4990

  0.110000E 02    0.245320E 03    0.758791E 04    0.266238E 06    0.100778E 08
  0.491599E 01    0.245320E 03    0.758791E 04    0.266238E 06    0.100778E 08
  0.400637E 09    0.352000E 02    0.758791E 04    0.266238E 06    0.100778E 08
  0.400637E 09    0.164652E 11   -0.335955E 03    0.266238E 06    0.100778E 08
  0.400637E 09    0.164652E 11    0.692760E 12   -0.405198E 05    0.100778E 08
  0.400637E 09    0.164652E 11    0.692760E 12    0.296543E 14   -0.238418E 07

 FOR DEGREE OF  1 COEFFICIENTS ARE
```

```
247                TB2=(2.*XF1)*COS(XF1)
248                TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
249             T3=T2+(C1(3)*TB3)
250             ENDIF
251             IF(J.EQ.3)THEN
252               TT5=0.5*T3
253             ENDIF
254             IF((J.NE.2).AND.(J.NE.3))THEN
255                TB4=((3.*(XF1**2))-6.)*COS(XF1)
256                TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257             T4=T3+(C1(4)*TB5)
258             ENDIF
259             IF(J.EQ.4)THEN
260                TT5=0.5*T4
261             ENDIF
262             IF(J.EQ.5)THEN
263               T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
264               T6=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
265               T7=((T5+T6)*C1(5))
266               T8=T4+T7
267               TT5=0.5*T8
268             ENDIF
269             IF(I.EQ.1)THEN
270               SUM2=TT5
271             ENDIF
272             IF(I.EQ.2)THEN
273               SUM1=TT5
274             ENDIF
275          10 CONTINUE
             C
276             ALPHA=SUM2-SUM1
277             PRINT ,' '
278             PRINT 66,ALPHA
279          66 FORMAT(9X,' COS  IS ',F10.5)
280             IF(J.EQ.2)THEN
281               CE3=CE3+ALPHA
282             ENDIF
283             IF(J.EQ.3)THEN
284               CE2=CE2+ALPHA
285             ENDIF
286             IF(J.EQ.4)THEN
287               CE=CE+ALPHA
288             ENDIF
289             IF(J.EQ.5)THEN
290               CE1=CE1+ALPHA
291             ENDIF
292             RETURN
293             END
294             SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
295             REAL C1(100),B1(100)
             C
296             C1(1)=B1(1)
297             DO 5 K=2,J
298               C1(K)=B1(K)*(57.3**(K-1))
299          5 CONTINUE
             C
300             ALPHA=0.0
301             DO 10 I=1,2
302                IF(I.EQ.1)THEN
```

```
      197            ELSE
      198              A(I,J)=(A(I,J)-SUM)/A(I,I)
      199            ENDIF
      200          ENDIF
      201       30 CONTINUE
      202          RETURN
                C
      203       100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE',
                   |       ' FOUND FOR DIVISION IN ROW ',I3)
      204          END
                C
      205          SUBROUTINE SOLNQ(A,B,N,NDIM)
      206          REAL A(NDIM,NDIM),B(NDIM),SUM
      207          INTEGER N,I,IM1,K,J,NMJP1,NMJP2
                C
                C
      208          B(1)=B(1)/A(1,1)
      209          DO 20 I=2,N
      210            IM1=I-1
      211            SUM=0.0
      212            DO 10 K=1,IM1
      213              SUM=SUM+A(I,K)*B(K)
      214       10   CONTINUE
      215            B(I)=(B(I)-SUM)/A(I,I)
      216       20 CONTINUE
                C
      217          DO 40 J=2,N
      218            NMJP2=N-J+2
      219            NMJP1=N-J+1
      220            SUM=0.0
      221            DO 30 K=NMJP2,N
      222              SUM=SUM+A(NMJP1,K)*B(K)
      223       30   CONTINUE
      224            B(NMJP1)=B(NMJP1)-SUM
      225       40 CONTINUE
      226          RETURN
      227          END
      228          SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
      229          REAL C1(100),B1(100)
                C
      230          C1(1)=B1(1)
      231          DO 5 K=2,J
      232             C1(K)=B1(K)*(57.3**(K-1))
      233        5 CONTINUE
                C
      234          ALPHA=0.0
      235          DO 10 I=1,2
      236             IF(I.EQ.1)THEN
      237               XF1=XL/57.3
      238             ELSE
      239               XF1=XF/57.3
      240             ENDIF
                C
      241             T1=C1(1)*SIN(XF1)
      242                TB1=COS(XF1)+(XF1*SIN(XF1))
      243             T2=T1+(C1(2)*TB1)
      244             IF(J.EQ.2)THEN
      245               TT5=0.5*T2
      246             ELSE
      247                TB2=(2.*XF1)*COS(XF1)
      248                TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
      249             T3=T2+(C1(3)*TB3)
      250             ENDIF
      251             IF(J.EQ.3)THEN
      252               TT5=0.5*T3
      253             ENDIF
      254             IF((J.NE.2).AND.(J.NE.3))THEN
      255                TB4=((3.*(XF1**2))-6.)*COS(XF1)
      256                TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
      257             T4=T3+(C1(4)*TB5)
      258             ENDIF
      259             IF(J.EQ.4)THEN
      260                TT5=0.5*T4
      261             ENDIF
      262             IF(J.EQ.5)THEN
      263               T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
      264               TA=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
      265               T7=((T5+T6)*C1(5))
      266               T8=T4+T7
      267               TT5=0.5*T8
      268             ENDIF
      269             IF(I.EQ.1)THEN
      270               SUM2=TT5
      271             ENDIF
      272             IF(I.EQ.2)THEN
      273               SUM1=TT5
```

```
      150         IF((KK.EQ.7).AND.(I.EQ.5))THEN
      151         PRINT 301.CE1.CL1
      152         ENDIF
      153      95 CONTINUE
               C
               C
      154     999 CONTINUE
               C
      155     200 FORMAT(//' DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1.'./
                 |       '  REQUESTED MAXIMUM DEGREE TOO LARGE - '.
                 |       'REDUCED TO  '.I3)
      156     201 FORMAT(5(3X.E13.6))
      157     202 FORMAT(/' FOR DEGREE OF '.I2.' COEFFICIENTS ARE'//
                 |       ' '.5X.6(2X.E12.5))
      158     203 FORMAT(9X.' BETA IS '.F10.5//)
      159         PRINT 299.ISEQ
      160     299 FORMAT(//////.35X.'END OF RUN SEQ '.5A1////)
      161         STOP
               C
      162         REMOTE BLOCK COEF
      163         DO 66 L=1.I
      164           N1=I-L+1
      165           CP(N1)=C(L)
      166      66  CONTINUE
               C
               C
      167         DO 55 K=1.N
      168           FV=CP(1)
      169           DO 49 J=2.I
      170      49     FV=(FV*X(K))+CP(J)
      171           PRINT 1.X(K).FV
      172      55 CONTINUE
      173         END BLOCK
      174         END
               C
      175         SUBROUTINE LUDCMQ(A.N.NDIM)
      176         REAL A(NDIM.NDIM).SUM
      177         INTEGER N.I.J.JM1.IM1.K
               C
      178         DO 30 I=1.N
      179         DO 30 J=2.N
      180           SUM=0.0
      181           IF(J.LE.I)THEN
      182             JM1=J-1
      183             DO 10 K=1.JM1
      184               SUM=SUM+A(I.K)*A(K.J)
      185      10       CONTINUE
      186             A(I.J)=A(I.J)-SUM
      187           ELSE
      188             IM1=I-1
      189             IF(IM1.NE.0)THEN
      190               DO 20 K=1.IM1
      191                 SUM=SUM+A(I.K)*A(K.J)
      192      20         CONTINUE
      193             ENDIF
               C
      194      25     IF(ABS(A(I.I)).LT. 1.0E-10)THEN
      195               PRINT 100.I
      196               RETURN
```

```
      DO 50 I=2,MFP1
        A(MFP1,I)=0.0
        DO 40 J=1,N
          A(MFP1,I)=A(MFP1,I)+XN(J)
          XN(J)=XN(J)*X(J)
   40   CONTINUE
   50 CONTINUE
C
      DO 70 J=2,MFP1
        DO 60 I=1,MF
          A(I,J)=A(I+1,J-1)
   60   CONTINUE
   70 CONTINUE
C
      PRINT ,' '
      PRINT 201, ((A(I,J),J=1,MFP2),I=1,MFP1)
C
      CALL LUDCMQ(A,MFP1,10)
C
      MSP1=MS+1
      DO 95 I=MSP1,MFP1
        DO 90 J=1,I
          C(J)=A(J,MFP2)
   90   CONTINUE
        CALL SOLNQ(A,C,I,10)
        IM1=I-1
C
      PRINT 202,IM1,(C(J),J=1,I)
      PRINT ,' '
      EXECUTE COEF
C
      DO 300 K=1,I
  300  B1(K)=C(K)
      CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
      CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
C
      PRINT ,' '
      BETA=0.0
      DO 94 IPT =1,N
         SUM=0.0
         DO 93 ICOEF=2,I
           JCOEF=I-ICOEF+2
           SUM=(SUM+C(JCOEF))*X(IPT)
   93    CONTINUE
         SUM=SUM+C(1)
         BETA=BETA+(Y(IPT)-SUM)**2
   94 CONTINUE
      BETA=BETA/(N-I)
      PRINT 203,BETA
      IF((KK.EQ.7).AND.(I.EQ.2))THEN
         PRINT 301,CE3,CL3
       ENDIF
      IF((KK.EQ.7).AND.(I.EQ.3))THEN
         PRINT 301,CE2,CL2
      ENDIF
      IF((KK.EQ.7).AND.(I.EQ.4))THEN
        PRINT 301,CE,CL
  301 FORMAT(//45X,'  CD =',F10.5//,45X,'  CL =',F10.5)
      ENDIF
      IF((KK.EQ.7).AND.(I.EQ.5))THEN
      PRINT 301,CE1,CL1
      ENDIF
   95 CONTINUE
C
C
  999 CONTINUE
C
  200 FORMAT(//' DEGREE OF POLYNOM...  :NNOT EXCEED N - 1.'/
     |       '  REQUESTED MAXIMUM DEGREE TOO LARGE - '.
     |       'REDUCED TO  ',I3)
  201 FORMAT(5(3X,E13.6))
  202 FORMAT(/' FOR DEGREE OF ',I2,' COEFFICIENTS ARE'//
     |       ' ',5X,6(2X,E12.5))
  203 FORMAT(9X,' BETA IS ',F10.5//)
      PRINT 299,ISEQ
  299 FORMAT(//////,35X,'END OF RUN SEQ ',5A1////)
      STOP
C
      REMOTE BLOCK COEF
      DO 66 L=1,I
        N1=I-L+1
        CP(N1)=C(L)
   66  CONTINUE
C
C
      DO 55 K=1,N
```

```
      C
   50       PRINT .'  X          Y'
   51       IF(KK.EQ.1)THEN
   52         DO 3 I=1.N
   53    3      READ . K1.Y(I).K2.X(I)
   54         TEMP1=X(N)
   55         TEMP2=Y(N)
   56       ENDIF
   57       IF(KK.NE.1)THEN
   58         X(1)=TEMP1
   59         Y(1)=TEMP2
   60         DO 4 I=2.N
   61    4      READ .K1.Y(I).K2.X(I)
   62         TEMP1=X(N)
   63         TEMP2=Y(N)
   64       ENDIF
      C
   65       PRINT 1.(X(I).Y(I).I=1.N)
   66    1 FORMAT(2X.F6.2.2X.F8.4)
      C
   67       IF(KK.EQ.1)THEN
   68          XF=0.0
   69          XL=X(N)
   70       ELSE
   71         XF=X(1)
   72         XL=X(N)
   73       ENDIF
      C
   74       IF(KK.EQ.7)THEN
   75          XF=X(1)
   76          XL=360.
   77       ELSE
   78         XL=X(N)
   79       ENDIF
      C
      C
      C     READ . MS.MF
      C
   80       IF(MF.GT.(N-1))THEN
   81       MF=N-1
   82         PRINT 200.MF
   83       ENDIF
   84     5 MFP1=MF+1
   85       MFP2=MF+2
      C
   86       DO 10 I=1.N
   87         XN(I)=1.0
   88    10 CONTINUE
      C
   89       DO 30 I=1.MFP1
   90         A(I.1)=0.0
   91         A(I.MFP2)=0.0
   92         DO 20 J=1.N
   93           A(I.1)=A(I.1)+XN(J)
   94           A(I.MFP2)=A(I.MFP2)+Y(J)*XN(J)
   95           XN(J)=XN(J)*X(J)
   96    20     CONTINUE
   97    30   CONTINUE
      C
```

```
      DIMENSION ISEQ(5)
      REAL X(100),Y(100),C(100),B1(100),A(10,11),XN(100),SUM,BETA
      REAL CP(100),FV
      INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IPT,ICOEF,JCOEF
C     CHARACTER*5 ISEQ
      DATA MS/1/,MF/4/
C
C
      PRINT ,'RUN:SEQ'
      READ 11,ISEQ
   11 FORMAT(5A1)
      PRINT 11,ISEQ
      PRINT ,'----------'
C
      CE=0.0
      CL=0.0
      CE1=0.0
      CL1=0.0
      CE2=0.0
      CL2=0.0
      CE3=0.0
      CL3=0.0
      DO 999 KK=1,7
      PRINT 33
   33 FORMAT('0')
      IF(KK.EQ.1)THEN
         PRINT ,'SECTION--1'
         N=11
      ENDIF
C
      IF(KK.EQ.2)THEN
        PRINT ,'SECTION--2'
        N=13
      ENDIF
C
      IF(KK.EQ.3)THEN
        PRINT ,'SECTION--3'
        N=12
      ENDIF
C
      IF(KK.EQ.4)THEN
        PRINT ,'SECTION--4'
        N=21
      ENDIF
C
      IF(KK.EQ.5)THEN
        PRINT ,'SECTION--5'
        N=11
      ENDIF
C
      IF(KK.EQ.6)THEN
        PRINT ,'SECTION--6'
        N=13
      ENDIF
C
      IF(KK.EQ.7)THEN
       PRINT ,'SECTION-7'
       N=13
      ENDIF
C
      PRINT ,'  X          Y'
      IF(KK.EQ.1)THEN
        DO 3 I=1,N
    3     READ ,K1,Y(I),K2,X(I)
        TEMP1=X(N)
        TEMP2=Y(N)
      ENDIF
      IF(KK.NE.1)THEN
        X(1)=TEMP1
        Y(1)=TEMP2
        DO 4 I=2,N
    4     READ ,K1,Y(I),K2,X(I)
        TEMP1=X(N)
        TEMP2=Y(N)
      ENDIF
C
      PRINT 1,(X(I),Y(I),I=1,N)
    1 FORMAT(2X,F6.2,2X,F8.4)
C
      IF(KK.EQ.1)THEN
         XF=0.0
         XL=X(N)
      ELSE
        XF=X(1)
        XL=X(N)
      ENDIF
```

```
 169.90   -1.0402
 174.86   -1.0423
 179.97   -1.0445
 179.98   -1.0445
 184.94   -1.0466
 189.90   -1.0487
 194.86   -1.0508
 199.97   -1.0529
 199.98   -1.0529
 204.94   -1.0550
 209.90   -1.0571
 214.86   -1.0592
 219.97   -1.0613
 219.98   -1.0613

          COS  IS    0.67135

          SIN  IS    0.00222

          BETA IS    0.00180


 FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.26577E 00  -0.83080E-02   0.21722E-04

 139.98   -1.0031
 144.94   -1.0136
 149.90   -1.0230
 154.86   -1.0314
 159.97   -1.0389
 159.98   -1.0389
 164.94   -1.0451
 169.90   -1.0503
 174.86   -1.0543
 179.97   -1.0574
 179.98   -1.0574
 184.94   -1.0593
 189.90   -1.0601
 194.86   -1.0599
 199.97   -1.0585
 199.98   -1.0585
 204.94   -1.0561
 209.90   -1.0526
 214.86   -1.0480
 219.97   -1.0422
 219.98   -1.0422

          COS  IS    0.67270

          SIN  IS    0.00263

          BETA IS    0.00174


 FOR DEGREE OF  3 COEFFICIENTS ARE



       -0.45509E 00  -0.50696E-02   0.34717E-05   0.33893E-07

 139.98   -1.0037
 144.94   -1.0137
 149.90   -1.0229
 154.86   -1.0310
 159.97   -1.0385
 159.98   -1.0385
 164.94   -1.0447
 169.90   -1.0500
 174.86   -1.0542
 179.97   -1.0575
 179.98   -1.0575
 184.94   -1.0595
 189.90   -1.0605
 194.86   -1.0604
 199.97   -1.0590
 199.98   -1.0590
 204.94   -1.0565
 209.90   -1.0528
 214.86   -1.0479
 219.97   -1.0415
 219.98   -1.0415

          COS  IS    0.67273

          SIN  IS    0.00267
```

-0.45509E 00 -0.50696E-02 0.34717E-05 0.33893E-07

139.98	-1.0037
144.94	-1.0137
149.90	-1.0229
154.86	-1.0310
159.97	-1.0385
159.98	-1.0385
164.94	-1.0447
169.90	-1.0500
174.86	-1.0542
179.97	-1.0575
179.98	-1.0575
184.94	-1.0595
189.90	-1.0605
194.86	-1.0604
199.97	-1.0590
199.98	-1.0590
204.94	-1.0565
209.90	-1.0528
214.86	-1.0479
219.97	-1.0415
219.98	-1.0415

COS IS 0.67273

SIN IS 0.00267

BETA IS 0.00184

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.56109E 00 -0.45290E-02 0.14482E-04 -0.63854E-07 0.21166E-09

139.98	-1.0052
144.94	-1.0143
149.90	-1.0228
154.86	-1.0306
159.97	-1.0378
159.98	-1.0378
164.94	-1.0440
169.90	-1.0493
174.86	-1.0537
179.97	-1.0573
179.98	-1.0573
184.94	-1.0596
189.90	-1.0609
194.86	-1.0610
199.97	-1.0598
199.98	-1.0598
204.94	-1.0573
209.90	-1.0533
214.86	-1.0479
219.97	-1.0407
219.98	-1.0406

COS IS 0.67275

SIN IS 0.00271

BETA IS 0.00196

0
SECTION--5

X	Y
219.98	-1.0223
224.94	-1.0467
229.90	-1.0451
234.86	-1.0526
239.97	-1.0380
239.98	-0.9529
244.94	-0.9740
249.90	-0.9793
254.86	-0.9628
259.97	-0.9828
259.98	-0.9598

0.110000E 02	0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
-0.110163E 02	0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
0.934615E 13	-0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
0.934615E 13	0.229132E 16	-0.643806E 06	0.156769E 09	0.382251E 11
0.934615E 13	0.229132E 16	0.563217E 18	-0.156312E 09	0.382251E 11
0.934615E 13	0.229132E 16	0.563217E 18	0.138795E 21	-0.380593E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.15121E 01 0.21120E-02

219.98	-1.0475
224.94	-1.0370
229.90	-1.0265
234.86	-1.0160
239.97	-1.0052
239.98	-1.0052
244.94	-0.9947
249.90	-0.9843
254.86	-0.9738
259.97	-0.9630
259.98	-0.9630

COS IS 0.17355

SIN IS 0.29676

BETA IS 0.00080

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10929E 01 -0.13742E-02 0.72278E-05

219.98	-1.0454
224.94	-1.0363
229.90	-1.0268

234.86	-1.0170
239.97	-1.0065
239.98	-1.0064
244.94	-0.9959
249.90	-0.9849
254.86	-0.9737
259.97	-0.9617
259.98	-0.9617

COS IS 0.17359

SIN IS 0.29685

BETA IS 0.00090

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.90292E 00 -0.42227E-02 0.21037E-04 -0.21807E-07

219.98	-1.0459
224.94	-1.0365
229.90	-1.0268
234.86	-1.0168
239.97	-1.0061
239.98	-1.0061

```
234.86   -1.0170
239.97   -1.0065
239.98   -1.0064
244.94   -0.9959
249.90   -0.9849
254.86   -0.9737
259.97   -0.9617
259.98   -0.9617

         COS  IS    0.17359

         SIN  IS    0.29685

         BETA IS    0.00090


FOR DEGREE OF  3 COEFFICIENTS ARE

      -0.90292E 00  -0.42227E-02   0.21037E-04  -0.21807E-07

219.98   -1.0459
224.94   -1.0365
229.90   -1.0268
234.86   -1.0168
239.97   -1.0061
239.98   -1.0061
244.94   -0.9955
249.90   -0.9847
254.86   -0.9737
259.97   -0.9621
259.98   -0.9620

         COS  IS    0.17358

         SIN  IS    0.29683

         BETA IS    0.00103


FOR DEGREE OF  4 COEFFICIENTS ARE

      -0.37306E 01   0.16109E-01   0.58441E-04  -0.57191E-06   0.10245E-08

219.98   -1.0480
224.94   -1.0365
229.90   -1.0258
234.86   -1.0157
239.97   -1.0055
239.98   -1.0055
244.94   -0.9956
249.90   -0.9853
254.86   -0.9744
259.97   -0.9621
259.98   -0.9621

         COS  IS    0.17356
```

SIN IS 0.29681

BETA IS 0.00123

0

SECTION--6

X	Y
259.98	-0.9598
264.94	-0.9955
269.90	-1.0633
274.86	-1.1925
279.97	-1.3674
279.98	-1.3655
284.94	-1.4562
289.90	-1.4585
294.86	-1.3758
299.97	-1.2466
299.98	-1.2761
304.94	-1.1038
309.90	-0.8904

0.130000E 02	0.371412E 04	0.106412E 07	0.305726E 09	0.880768E 11
-0.157514E 02	0.371412E 04	0.106412E 07	0.305726E 09	0.880768E 11
0.254423E 14	-0.450586E 04	0.106412E 07	0.305726E 09	0.880768E 11
0.254423E 14	0.736872E 16	-0.129210E 07	0.305726E 09	0.880768E 11
0.254423E 14	0.736872E 16	0.213964E 19	-0.371411E 09	0.880768E 11
0.254423E 14	0.736872E 16	0.213964E 19	0.622833E 21	-0.107014E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.67006E 00 -0.18956E-02

259.98	-1.1629
264.94	-1.1723
269.90	-1.1817
274.86	-1.1911
279.97	-1.2008
279.98	-1.2008
284.94	-1.2102
289.90	-1.2196
294.86	-1.2290
299.97	-1.2387
299.98	-1.2387
304.94	-1.2481
309.90	-1.2575

COS IS -0.13431

SIN IS 0.49268

BETA IS 0.03978

FOR DEGREE OF 2 COEFFICIENTS ARE

0.19369E 03 -0.13685E 01 0.23956E-02

259.98	-0.1860
264.94	-0.7367
269.90	-1.1696
274.86	-1.4845
279.97	-1.6058
279.98	-1.6860
284.94	-1.7615
289.90	-1.7190
294.86	-1.5587
299.97	-1.2703
299.98	-1.2696
304.94	-0.8697
309.90	-0.3520

COS IS -0.14368

SIN IS 0.51930

BETA IS 0.15062

FOR DEGREE OF 3 COEFFICIENTS ARE

0.23550E 02 -0.41987E-01 -0.61200E-03 0.16042E 05

259.98 -0.8706

```
259.98   -0.1860
264.94   -0.7367
269.90   -1.1696
274.86   -1.4845
279.97   -1.6058
279.98   -1.6860
284.94   -1.7615
289.90   -1.7190
294.86   -1.5587
299.97   -1.2703
299.98   -1.2696
304.94   -0.8697
309.90   -0.3520

         COS  IS   -0.14368

         SIN  IS    0.51930

         BETA IS    0.15062


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.23550E 02  -0.41987E-01  -0.61700E-03   0.16047E-05

259.98   -0.8706
264.94   -1.0404
269.90   -1.1777
274.86   -1.2815
279.97   -1.3521
279.98   -1.3522
284.94   -1.3841
289.90   -1.3789
294.86   -1.3354
299.97   -1.2492
299.98   -1.2490
304.94   -1.1240
309.90   -0.9572

         COS  IS   -0.13696

         SIN  IS    0.50121

         BETA IS    0.00557


FOR DEGREE OF  4 COEFFICIENTS ARE

        0.23210E 02  -0.40151E-01  -0.61160E-03   0.15580E-05   0.69849E-10

259.98   -0.8710
264.94   -1.0405
269.90   -1.1776
274.86   -1.2813
279.97   -1.3519
279.98   -1.3520
284.94   -1.3840
```

```
289.90   -1.3789
294.86   -1.3354
299.97   -1.2494
299.98   -1.2491
304.94   -1.1242
309.90   -0.9572

        COS  IS   -0.13697

        SIN  IS    0.50120

        BETA IS    0.00626


SECTION-7
  X        Y
309.90   -0.8904
314.86   -0.6486
319.97   -0.3612
319.98   -0.3306
324.94   -0.0695
329.90    0.1687
334.86    0.3996
339.97    0.6171
339.98    0.6010
344.94    0.7677
349.90    0.8886
354.86    0.9720
359.97    1.0098

  0.130000E 02    0.434403E 04    0.145458E 07    0.488059E 09    0.164096E 12
  0.312420E 01    0.434403E 04    0.145458E 07    0.488059E 09    0.164096E 12
  0.552844E 14    0.116365E 04    0.145458E 07    0.488059E 09    0.164096E 12
  0.552844E 14    0.186630E 17    0.429363E 06    0.488059E 09    0.164096E 12
  0.552844E 14    0.186630E 17    0.631283E 19    0.157243E 09    0.164096E 12
  0.552844E 14    0.186630E 17    0.631283E 19    0.213952E 22    0.572382E 11

FOR DEGREE OF  1 COEFFICIENTS ARE

      -0.13117E 02   0.39972E-01

309.90   -0.7292
314.86   -0.5310
319.97   -0.3267
319.98   -0.3263
324.94   -0.1281
329.90    0.0702
334.86    0.2685
339.97    0.4727
339.98    0.4731
344.94    0.6714
349.90    0.8696
354.86    1.0679
359.97    1.2722

        COS  IS    0.13085

        SIN  IS    0.00786


        BETA IS    0.01784


                                                CD =   1.04747

                                                CL =   0.03648

FOR DEGREE OF  2 COEFFICIENTS ARE

      -0.31079E 03   0.18219E 01  -0.26612E-02

309.90   -1.7642
314.86   -0.9741
319.97   -0.2974
319.98   -0.2961
324.94    0.2275
329.90    0.6206
334.86    0.8823
339.97    1.0154
339.98    1.0154
344.94    1.0112
349.90    0.8762
354.86    0.6101
359.97    0.1992
```

COS IS 0.13556

SIN IS 0.00529

BETA IS 0.00149

CD = 1.05157

CL = 0.02633

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.25801E 02 0.20266E-01 0.29248E-03 0.13964E-06 -0.14814E-08

309.90	-0.9385
314.86	-0.6248
319.97	-0.3251
319.98	-0.3246
324.94	-0.0579
329.90	0.1837
334.86	0.3988
339.97	0.5915
339.98	0.5918
344.94	0.7492
349.90	0.8760
354.86	0.9709
359.97	1.0337

COS IS 0.13663

SIN IS 0.00491

BETA IS 0.00080

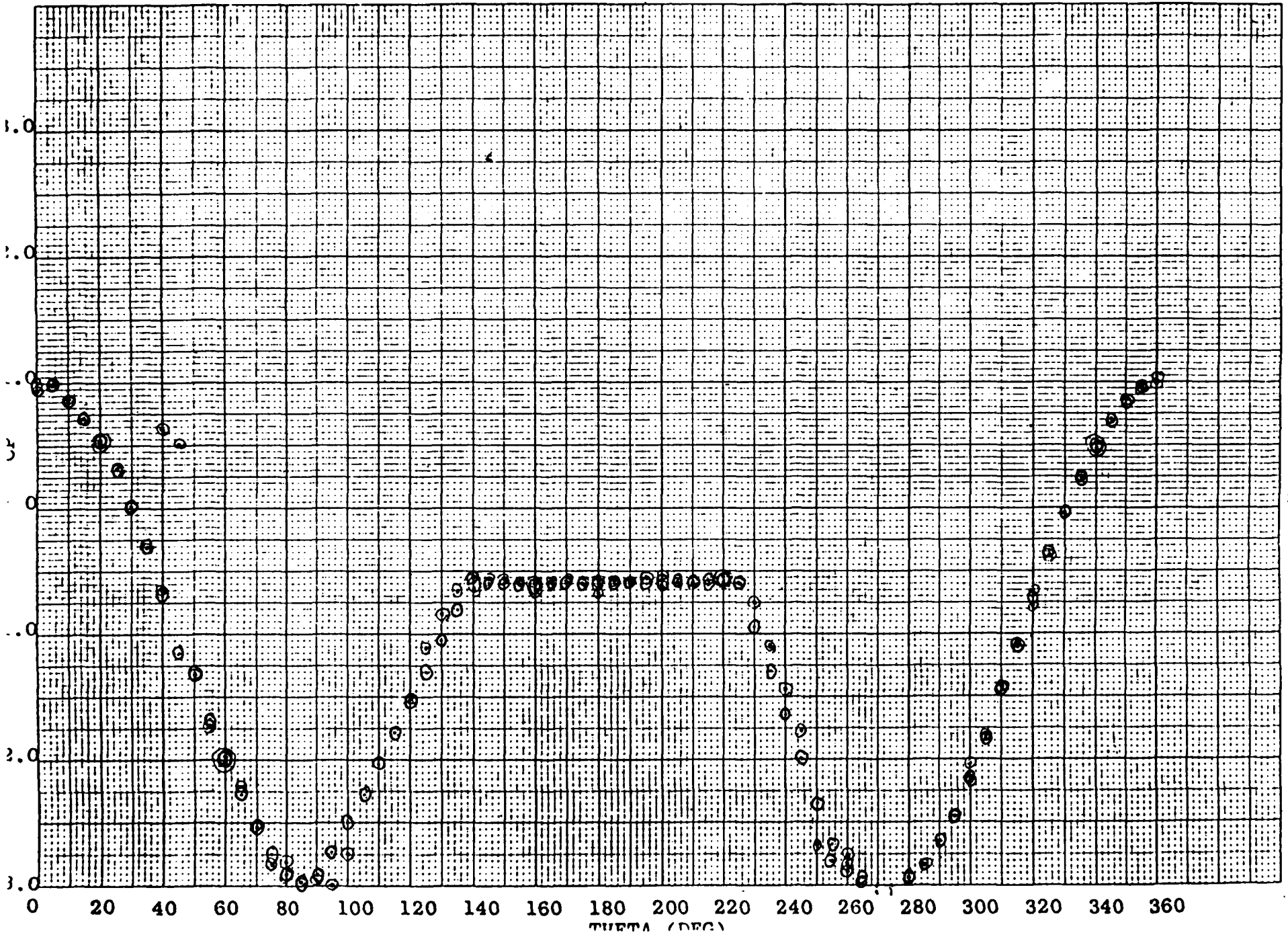
CD = 1.05021

CL = 0.02551

END OF RUN:SEQ 139:5

RUN NO: 188

INITIALS: M. M.



```
      1         DIMENSION ISEQ(5)
      2         REAL X(100),Y(100),C(100),B1(100),A(10,11),XN(100),SUM,BETA
      3         REAL CP(100),FV
      4         INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IPT,ICOEF,JCOEF
      C         CHARACTER*5 ISEQ
      5         DATA MS/1/,MF/4/
      C
      C
      6         PRINT ,'RUN:SEQ'
      7         READ 11,ISEQ
      8      11 FORMAT(5A1)
      9         PRINT 11,ISEQ
     10         PRINT ,'----------'
      C
     11         CE=0.0
     12         CL=0.0
     13         CE1=0.0
     14         CL1=0.0
     15         CE2=0.0
     16         CL2=0.0
     17         CE3=0.0
     18         CL3=0.0
     19         DO 999 KK=1,7
     20         PRINT 33
     21      33 FORMAT('0')
     22         IF(KK.EQ.1)THEN
     23            PRINT ,'SECTION--1'
     24            N=12
     25         ENDIF
      C
     26         IF(KK.EQ.2)THEN
     27           PRINT ,'SECTION--2'
     28           N=13
     29         ENDIF
      C
     30         IF(KK.EQ.3)THEN
     31           PRINT ,'SECTION--3'
     32           N=15
     33         ENDIF
      C
     34         IF(KK.EQ.4)THEN
     35           PRINT ,'SECTION--4'
     36           N=21
     37         ENDIF
      C
     38         IF(KK.EQ.5)THEN
     39           PRINT ,'SECTION--5'
     40           N=13
     41         ENDIF
      C
     42         IF(KK.EQ.6)THEN
     43           PRINT ,'SECTION--6'
     44           N=12
     45         ENDIF
      C
     46         IF(KK.EQ.7)THEN
     47          PRINT ,'SECTION-7'
     48          N=13
     49         ENDIF
```

```
      C
   50       PRINT ,'  X          Y'
   51       IF(KK.EQ.1)THEN
   52         DO 3 I=1,N
   53    3      READ , K1,Y(I),K2,X(I)
   54         TEMP1=X(N)
   55         TEMP2=Y(N)
   56       ENDIF
   57       IF(KK.NE.1)THEN
   58         X(1)=TEMP1
   59         Y(1)=TEMP2
   60         DO 4 I=2,N
   61    4      READ ,K1,Y(I),K2,X(I)
   62         TEMP1=X(N)
   63         TEMP2=Y(N)
   64       ENDIF
      C
   65       PRINT 1,(X(I),Y(I),I=1,N)
   66    1 FORMAT(2X,F6.2,2X,F8.4)
      C
   67       IF(KK.EQ.1)THEN
   68          XF=0.0
   69          XL=X(N)
   70       ELSE
   71         XF=X(1)
   72         XL=X(N)
   73       ENDIF
      C
   74       IF(KK.EQ.7)THEN
   75          XF=X(1)
   76          XL=360.
   77       ELSE
   78         XL=X(N)
   79       ENDIF
      C
      C
      C     READ , MS,MF
      C
   80       IF(MF.GT.(N-1))THEN
   81       MF=N-1
   82         PRINT 200,MF
   83       ENDIF
   84    5  MFP1=MF+1
   85       MFP2=MF+2
      C
   86       DO 10 I=1,N
   87         XN(I)=1.0
   88   10  CONTINUE
      C
   89       DO 30 I=1,MFP1
   90         A(I,1)=0.0
   91         A(I,MFP2)=0.0
   92         DO 20 J=1,N
   93           A(I,1)=A(I,1)+XN(J)
   94           A(I,MFP2)=A(I,MFP2)+Y(J)*XN(J)
   95           XN(J)=XN(J)*X(J)
   96   20      CONTINUE
   97   30    CONTINUE
      C
      
      
      
      
      
      
      
   98       DO 50 I=2,MFP1
   99         A(MFP1,I)=0.0
  100         DO 40 J=1,N
  101           A(MFP1,I)=A(MFP1,I)+XN(J)
  102           XN(J)=XN(J)*X(J)
  103   40    CONTINUE
  104   50  CONTINUE
      C
  105       DO 70 J=2,MFP1
  106         DO 60 I=1,MF
  107           A(I,J)=A(I+1,J-1)
  108   60    CONTINUE
  109   70  CONTINUE
      C
  110       PRINT , ' '
  111       PRINT 201, ((A(I,J),J=1,MFP2),I=1,MFP1)
      C
  112       CALL LUDCMQ(A,MFP1,10)
      C
  113       MSP1=MS+1
  114       DO 95 I=MSP1,MFP1
  115         DO 90 J=1,I
  116           C(J)=A(J,MFP2)
  117   90    CONTINUE
  118         CALL SOLNQ(A,C,I,10)
  119         IM1=I-1
      C
```

```
      DO 50 I=2,MFP1
        A(MFP1,I)=0.0
        DO 40 J=1,N
          A(MFP1,I)=A(MFP1,I)+XN(J)
          XN(J)=XN(J)*X(J)
 40     CONTINUE
 50   CONTINUE
C
      DO 70 J=2,MFP1
        DO 60 I=1,MF
          A(I,J)=A(I+1,J-1)
 60     CONTINUE
 70   CONTINUE
C
      PRINT ,' '
      PRINT 201, ((A(I,J),J=1,MFP2),I=1,MFP1)
C
      CALL LUDCMQ(A,MFP1,10)
C
      MSP1=MS+1
      DO 95 I=MSP1,MFP1
        DO 90 J=1,I
          C(J)=A(J,MFP2)
 90     CONTINUE
        CALL SOLNQ(A,C,I,10)
        IM1=I-1
C
      PRINT 202,IM1,(C(J),J=1,I)
      PRINT ,' '
      EXECUTE COEF
C
      DO 300 K=1,I
300   B1(K)=C(K)
      CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
      CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
C
      PRINT ,' '
      BETA=0.0
      DO 94 IPT =1,N
         SUM=0.0
         DO 93 ICOEF=2,I
           JCOEF=I-ICOEF+2
           SUM=(SUM+C(JCOEF))*X(IPT)
 93      CONTINUE
         SUM=SUM+C(1)
         BETA=BETA+(Y(IPT)-SUM)**2
 94   CONTINUE
      BETA=BETA/(N-I)
      PRINT 203,BETA
      IF((KK.EQ.7).AND.(I.EQ.2))THEN
         PRINT 301,CE3,CL3
       ENDIF
      IF((KK.EQ.7).AND.(I.EQ.3))THEN
         PRINT 301,CE2,CL2
      ENDIF
      IF((KK.EQ.7).AND.(I.EQ.4))THEN
        PRINT 301,CE,CL
301   FORMAT(//45X,'  CD =',F10.5//,45X,'  CL =',F10.5)
      ENDIF
```

```
      IF((KK.EQ.7).AND.(I.EQ.5))THEN
      PRINT 301,CE1,CL1
      ENDIF
   95 CONTINUE
C
C
  999 CONTINUE
C
  200 FORMAT(//' DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1.'/
     |       '  REQUESTED MAXIMUM DEGREE TOO LARGE - '.
     |       'REDUCED TO  '.I3)
  201 FORMAT(5(3X,E13.6))
  202 FORMAT(/' FOR DEGREE OF '.I2.' COEFFICIENTS ARE'//
     |       ' '.5X.6(2X.E12.5))
  203 FORMAT(9X.' BETA IS '.F10.5//)
      PRINT 299.ISEQ
  299 FORMAT(///////.35X.'END OF RUN:SEQ '.5A1////)
      STOP
C
      REMOTE BLOCK COEF
      DO 66 L=1.I
        N1=I-L+1
        CP(N1)=C(L)
   66  CONTINUE
C
C
      DO 55 K=1.N
        FV=CP(1)
        DO 49 J=2.I
   49     FV=(FV*X(K))+CP(J)
        PRINT 1.X(K).FV
   55 CONTINUE
      END BLOCK
      END
C
      SUBROUTINE LUDCMO(A.N.NDIM)
      REAL A(NDIM.NDIM).SUM
      INTEGER N.I.J.JM1.IM1.K
C
      DO 30 I=1.N
      DO 30 J=2.N
        SUM=0.0
        IF(J.LE.I)THEN
          JM1=J-1
          DO 10 K=1.JM1
            SUM=SUM+A(I.K)*A(K.J)
   10     CONTINUE
          A(I.J)=A(I.J)-SUM
        ELSE
          IM1=I-1
          IF(IM1.NE.0)THEN
            DO 20 K=1.IM1
              SUM=SUM+A(I.K)*A(K.J)
   20       CONTINUE
          ENDIF
C
   25     IF(ABS(A(I.I)).LT. 1.0E-10)THEN
            PRINT 100.I
            RETURN
          ELSE
           A(I.J)=(A(I.J)-SUM)/A(I.I)
          ENDIF
        ENDIF
   30 CONTINUE
      RETURN
C
  100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE'.
     |       ' FOUND FOR DIVISION IN ROW '.I3)
      END
C
      SUBROUTINE SOLNO(A.B.N.NDIM)
      REAL A(NDIM.NDIM).B(NDIM).SUM
      INTEGER N.I.IM1.K.J.NMJP1.NMJP2
C
C
      B(1)=B(1)/A(1.1)
      DO 20 I=2.N
        IM1=I-1
        SUM=0.0
        DO 10 K=1.IM1
          SUM=SUM+A(I.K)*B(K)
   10   CONTINUE
        B(I)=(B(I)-SUM)/A(I.I)
   20 CONTINUE
C
      DO 40 J=2.N
```

```
197             ELSE
198               A(I,J)=(A(I,J)-SUM)/A(I,I)
199             ENDIF
200           ENDIF
201    30 CONTINUE
202       RETURN
          C
203   100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE'.
     1        ' FOUND FOR DIVISION IN ROW ',I3)
204       END
          C
205       SUBROUTINE SOLNQ(A,B,N,NDIM)
206       REAL A(NDIM,NDIM),B(NDIM),SUM
207       INTEGER N,I,IM1,K,J,NMJP1,NMJP2
          C
          C
208       B(1)=B(1)/A(1,1)
209       DO 20 I=2,N
210         IM1=I-1
211         SUM=0.0
212         DO 10 K=1,IM1
213           SUM=SUM+A(I,K)*B(K)
214    10   CONTINUE
215         B(I)=(B(I)-SUM)/A(I,I)
216    20 CONTINUE
          C
217       DO 40 J=2,N
218         NMJP2=N-J+2
219         NMJP1=N-J+1
220         SUM=0.0
221         DO 30 K=NMJP2,N
222           SUM=SUM+A(NMJP1,K)*B(K)
223    30   CONTINUE
224         B(NMJP1)=B(NMJP1)-SUM
225    40 CONTINUE
226       RETURN
227       END
228       SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
229       REAL C1(100),B1(100)
          C
230       C1(1)=B1(1)
231       DO 5 K=2,J
232         C1(K)=B1(K)*(57.3**(K-1))
233    5 CONTINUE
          C
234       ALPHA=0.0
235       DO 10 I=1,2
236         IF(I.EQ.1)THEN
237           XF1=XL/57.3
238         ELSE
239           XF1=XF/57.3
240         ENDIF
          C
241         T1=C1(1)*SIN(XF1)
242           TB1=COS(XF1)+(XF1*SIN(XF1))
243         T2=T1+(C1(2)*TB1)
244         IF(J.EQ.2)THEN
245           TT5=0.5*T2
246         ELSE
```

-0.10961E 02 0.29356E-01

260.00 -3.3282
264.93 -3.1835
269.95 -3.0361
274.90 -2.8908
279.98 -2.7417
280.00 -2.7411
284.93 -2.5964
289.95 -2.4490
294.90 -2.3037
300.00 -2.1540
304.93 -2.0093
309.95 -1.8619

COS IS -0.23871

SIN IS 1.07027

BETA IS 0.08446

FOR DEGREE OF 2 COEFFICIENTS ARE

0.74893E 02 -0.57455E 00 0.10590E-02

260.00 -2.9038
264.93 -2.9958
269.95 -3.0367
274.90 -3.0246
279.98 -2.9584
280.00 -2.9580
284.93 -2.8412
289.95 -2.6694
294.90 -2.4477
300.00 -2.1651
304.93 -1.8395
309.95 -1.4550

COS IS -0.24258

SIN IS 1.08253

BETA IS 0.00384

FOR DEGREE OF 3 COEFFICIENTS ARE

0.50174E 02 -0.23041E 00 -0.44174E-03 0.20936E-05

260.00 -2.7956
264.93 -2.9415
269.95 -3.0291
274.90 -3.0536
279.98 -3.0132
280.00 -3.0129

284.93 -2.9085
289.95 -2.7348
294.90 -2.4955
300.00 -2.1767
304.93 -1.7971
309.95 -1.3371

COS IS -0.24399

SIN IS 1.08591

BETA IS 0.00529

FOR DEGREE OF 4 COEFFICIENTS ARE

0.16267E 01 0.75734E-01 -0.27532E-03 -0.19694E-05 0.63485E-08

260.00 -2.8976
264.93 -2.9796
269.95 -3.0215
274.90 -3.0181
279.98 -2.9646
280.00 -2.9643
284.93 -2.8602
289.95 -2.6974

260.00 -3.1632

COS IS 0.23453

SIN IS 0.51767

BETA IS 0.06150

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.53957E 01 0.14171E 00 -0.89978E-03 0.24201E-05 -0.35701E-08

220.00	-0.3633
224.93	-0.6420
229.95	-0.9433
234.90	-1.2584
239.98	-1.6009
240.00	-1.6023
244.93	-1.9541
245.02	-1.9607
246.02	-2.0345
248.02	-2.1846
249.95	-2.3326
254.90	-2.7267
260.00	-3.1554

COS IS 0.23453

SIN IS 0.51766

BETA IS 0.06976

0

SECTION--6

X	Y
260.00	-2.8434
264.93	-2.9391
269.95	-3.0253
274.90	-3.1613
279.98	-2.9364
280.00	-3.0340
284.93	-2.8386
289.95	-2.6459
294.90	-2.4598
300.00	-2.1777
304.93	-1.8085
309.95	-1.4258

0.120000E 02	0.341442E 04	0.974293E 06	0.278800E 09	0.800056E 11
-0.312957E 02	0.341442E 04	0.974293E 06	0.278800E 09	0.800056E 11
0.230228E 14	-0.882338E 04	0.974293E 06	0.278800E 09	0.800056E 11
0.230228E 14	0.664337E 16	-0.249385E 07	0.278800E 09	0.800056E 11
0.230228E 14	0.664337E 16	0.192218E 19	-0.706637E 09	0.800056E 11
0.230228E 14	0.664337E 16	0.192218E 19	0.557638E 21	-0.200732E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

```
240.00   -1.6516
244.93   -1.9930
245.02   -1.9992
246.02   -2.0684
248.02   -2.2069
249.95   -2.3405
254.90   -2.6832
260.00   -3.0363

         COS  IS    0.23447

         SIN  IS    0.51687

         BETA IS    0.05459


FOR DEGREE OF  2 COEFFICIENTS ARE

      -0.77540E 01   0.12095E 00  -0.39714E-03

220.00   -0.3667
224.93   -0.6415
229.95   -0.9412
234.90   -1.2563
239.98   -1.5999
240.00   -1.6013
244.93   -1.9545
245.02   -1.9611
246.02   -2.0352
248.02   -2.1857
249.95   -2.3339
254.90   -2.7277
260.00   -3.1537

         COS  IS    0.23446

         SIN  IS    0.51759

         BETA IS    0.05515


FOR DEGREE OF  3 COEFFICIENTS ARE

      -0.38061E 01   0.64440E-01  -0.13207E-03  -0.40872E-06

220.00   -0.3735
224.93   -0.6447
229.95   -0.9412
234.90   -1.2540
239.98   -1.5964
240.00   -1.5978
244.93   -1.9512
245.02   -1.9579
246.02   -2.0322
248.02   -2.1835
249.95   -2.3327
254.90   -2.7305


260.00   -3.1632

         COS  IS    0.23453

         SIN  IS    0.51767

         BETA IS    0.06150


FOR DEGREE OF  4 COEFFICIENTS ARE

      -0.53957E 01   0.14171E 00  -0.89978E-03   0.24201E-05  -0.35701E-08

220.00   -0.3633
224.93   -0.6420
229.95   -0.9433
234.90   -1.2584
239.98   -1.6009
240.00   -1.6023
244.93   -1.9541
245.02   -1.9607
246.02   -2.0345
248.02   -2.1846
249.95   -2.3326
254.90   -2.7267
260.00   -3.1554
```

```
  154.90   -0.6029
  159.98   -0.6024
  160.00   -0.6024
  164.93   -0.6013
  169.95   -0.5999
  174.90   -0.5982
  179.98   -0.5962
  180.00   -0.5962
  184.93   -0.5942
  189.95   -0.5922
  194.90   -0.5902
  199.98   -0.5882
  200.00   -0.5882
  204.93   -0.5864
  209.95   -0.5846
  214.90   -0.5831
  219.98   -0.5816
  220.00   -0.5816

          COS  IS    0.38233

          SIN  IS   -0.00194

          BETA IS    0.00146

0
 SECTION--5
    X         Y
  220.00   -0.5991
  224.93   -0.6040
  229.95   -0.7473
  234.90   -1.1111
  239.98   -1.4437
  240.00   -1.4393
  244.93   -1.7648
  245.02   -1.9890
  246.02   -2.2410
  248.02   -2.4910
  249.95   -2.6648
  254.90   -2.8203
  260.00   -2.8434

    0.130000E 02    0.313860E 04    0.759353E 06    0.184097E 09    0.447222E 11
   -0.227588E 02    0.313860E 04    0.759353E 06    0.184097E 09    0.447222E 11
    0.108856E 14   -0.560537E 04    0.759353E 06    0.184097E 09    0.447222E 11
    0.108856E 14    0.265466E 16   -0.138252E 07    0.184097E 09    0.447222E 11
    0.108856E 14    0.265466E 16    0.648597E 18   -0.341450E 09    0.447222E 11
    0.108856E 14    0.265466E 16    0.648597E 18    0.158754E 21   -0.844416E 11

 FOR DEGREE OF  1 COEFFICIENTS ARE

          0.14965E 02  -0.69235E-01

  220.00   -0.2669
  224.93   -0.6083
  229.95   -0.9558
  234.90   -1.2985
  239.98   -1.6502
```

```
 189.95   -0.5934
 194.90   -0.5916
 199.98   -0.5895
 200.00   -0.5895
 204.93   -0.5874
 209.95   -0.5851
 214.90   -0.5826
 219.98   -0.5799
 220.00   -0.5799

          COS  IS    0.38237

          SIN  IS   -0.00185

          BETA IS    0.00130


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.38463E 00  -0.16621E-01   0.91262E-04  -0.16226E-06

 140.00   -0.5989
 144.93   -0.6013
 149.95   -0.6028
 154.90   -0.6033
 159.98   -0.6031
 160.00   -0.6031
 164.93   -0.6022
 169.95   -0.6007
 174.90   -0.5988
 179.98   -0.5966
 180.00   -0.5966
 184.93   -0.5943
 189.95   -0.5918
 194.90   -0.5894
 199.98   -0.5872
 200.00   -0.5872
 204.93   -0.5853
 209.95   -0.5839
 214.90   -0.5829
 219.98   -0.5827
 220.00   -0.5827

          COS  IS    0.38230

          SIN  IS   -0.00199

          BETA IS    0.00137


FOR DEGREE OF  4 COEFFICIENTS ARE

        0.79855E 00  -0.28190E-01   0.20703E-03  -0.65896E-06   0.77610E-09

 140.00   -0.6003
 144.93   -0.6020
 149.95   -0.6029


 154.90   -0.6029
 159.98   -0.6024
 160.00   -0.6024
 164.93   -0.6013
 169.95   -0.5999
 174.90   -0.5982
 179.98   -0.5962
 180.00   -0.5962
 184.93   -0.5942
 189.95   -0.5922
 194.90   -0.5902
 199.98   -0.5882
 200.00   -0.5882
 204.93   -0.5864
 209.95   -0.5846
 214.90   -0.5831
 219.98   -0.5816
 220.00   -0.5816

          COS  IS    0.38233

          SIN  IS   -0.00194

          BETA IS    0.00146
```

220.00 -0.5991

0.210000E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
-0.124747E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	-0.226494E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	-0.418649E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	-0.787047E 08	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	0.387782E 20	-0.150312E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.64772E 00 0.29520E-03

140.00	-0.6064
144.93	-0.6049
149.95	-0.6035
154.90	-0.6020
159.98	-0.6005
160.00	-0.6005
164.93	-0.5990
169.95	-0.5975
174.90	-0.5961
179.98	-0.5946
180.00	-0.5946
184.93	-0.5931
189.95	-0.5916
194.90	-0.5902
199.98	-0.5887
200.00	-0.5887
204.93	-0.5872
209.95	-0.5857
214.90	-0.5843
219.98	-0.5828
220.00	-0.5828

COS IS 0.38217

SIN IS -0.00191

BETA IS 0.00124

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.54153E 00 -0.89604E-03 0.32806E-05

140.00	-0.6027
144.93	-0.6025
149.95	-0.6021
154.90	-0.6016
159.98	-0.6009
160.00	-0.6009
164.93	-0.6001
169.95	-0.5991
174.90	-0.5979
179.98	-0.5965
180.00	-0.5965
184.93	-0.5950

COS IS 0.22883

SIN IS -0.47532

BETA IS 0.06018

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.10469E 03 0.13548E 01 0.85128E-02 -0.18612E-03 0.67304E-06

100.00	-2.8969
104.93	-2.2372
106.02	-2.1305
109.95	-1.8447
110.50	-1.8156
114.02	-1.6801
114.90	-1.6577
118.02	-1.6038
119.98	-1.5827
120.00	-1.5826
124.93	-1.5272
129.95	-1.3801
134.90	-1.0303
139.98	-0.3289
140.00	-0.3253

COS IS 0.24490

SIN IS -0.49268

BETA IS 0.20830

0

SECTION--4

X	Y
140.00	-0.6346
144.93	-0.5621
149.95	-0.5590
154.90	-0.6074
159.98	-0.6115
160.00	-0.6551
164.93	-0.5929
169.95	-0.5801
174.90	-0.6181
179.98	-0.5785
180.00	-0.6663
184.93	-0.5706
189.95	-0.5689
194.90	-0.5524
199.98	-0.5362
200.00	-0.6327
204.93	-0.5929
209.95	-0.6024
214.90	-0.6071
219.98	-0.5468

220.00 -0.5991

0.210000E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
-0.124747E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	-0.226494E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	-0.418649E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	-0.787047E 08	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	0.387782E 20	-0.150312E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.64772E 00 0.29520E-03

140.00	-0.6064
144.93	-0.6049
149.95	-0.6035
154.90	-0.6020
159.98	-0.6005
160.00	-0.6005
164.93	-0.5990
169.95	-0.5975
174.90	-0.5961
179.98	-0.5946
180.00	-0.5946
184.93	-0.5931
189.95	-0.5916
194.90	-0.5902

```
134.90   -0.7969
139.98   -0.5452
140.00   -0.5442

         COS  IS    0.22802

         SIN  IS   -0.47461

         BETA IS    0.05512


FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.29429E 01  -0.26062E-01   0.31168E-03

100.00   -2.4322
104.93   -2.2458
106.02   -2.2026
109.95   -2.0405
110.50   -2.0170
114.02   -1.8624
114.90   -1.8226
118.02   -1.6774
119.98   -1.5831
120.00   -1.5821
124.93   -1.3342
129.95   -1.0663
134.90   -0.7866
139.98   -0.4838
140.00   -0.4826

         COS  IS    0.22960

         SIN  IS   -0.47606

         BETA IS    0.05723


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.41541E 01  -0.21062E 00   0.18986E-02  -0.45106E-05

100.00   -2.4321
104.93   -2.2528
106.02   -2.2099
109.95   -2.0463
110.50   -2.0224
114.02   -1.8636
114.90   -1.8225
118.02   -1.6725
119.98   -1.5753
120.00   -1.5743
124.93   -1.3207
129.95   -1.0521
134.90   -0.7804
139.98   -0.4978
140.00   -0.4967
```

```
 64.93   -2.2829
 69.95   -2.5509
 74.90   -2.7661
 79.98   -2.9179
 84.93   -2.9814
 89.95   -2.9433
 96.25   -2.7240
 99.98   -2.4918
100.00   -2.4903

        COS  IS   -0.23097

        SIN  IS   -1.03075

        BETA IS    0.02739

SECTION--3
   X         Y
400.00   -2.1593
104.93   -1.9954
106.02   -2.7490
109.95   -1.8983
110.50   -2.2450
114.02   -1.9790
114.90   -1.8296
118.02   -1.7410
119.98   -1.6687
120.00   -1.5089
124.93   -1.1188
129.95   -0.8382
134.90   -0.6624
139.98   -0.5910
140.00   -0.6346

  0.150000E 02    0.178808E 04    0.215363E 06    0.262097E 08    0.322273E 10
 -0.236191E 02    0.178808E 04    0.215363E 06    0.262097E 08    0.322273E 10
  0.400289E 12   -0.270579E 04    0.215363E 06    0.262097E 08    0.322273E 10
  0.400289E 12    0.502083E 14   -0.312393E 06    0.262097E 08    0.322273E 10
  0.400289E 12    0.502083E 14    0.635705E 16   -0.363624E 08    0.322273E 10
  0.400289E 12    0.502083E 14    0.635705E 16    0.812088E 18   -0.426871E 10

FOR DEGREE OF  1 COEFFICIENTS ARE

       -0.74811E 01   0.49549E-01

100.00   -2.5262
104.93   -2.2819
106.02   -2.2279
109.95   -2.0332
110.50   -2.0059
114.02   -1.8315
114.90   -1.7879
118.02   -1.6333
119.98   -1.5362
120.00   -1.5352
124.93   -1.2910
129.95   -1.0422

134.90   -0.7969
139.98   -0.5452
140.00   -0.5442

        COS  IS    0.22802

        SIN  IS   -0.47461

        BETA IS    0.05512

FOR DEGREE OF  2 COEFFICIENTS ARE

       -0.29429E 01  -0.26062E-01   0.31168E-03

100.00   -2.4322
104.93   -2.2498
106.02   -2.2026
109.95   -2.0405
110.50   -2.0170
114.02   -1.8624
114.90   -1.8226
118.02   -1.6774
119.98   -1.5831
120.00   -1.5821
124.93   -1.3342
```

FOR DEGREE OF 2 COEFFICIENTS ARE

0.69994E 01 -0.23416E 00 0.13862E-02

49.95	-1.2385
54.90	-1.6782
59.98	-2.0588
60.00	-2.0601
64.93	-2.3608
69.95	-2.5977
74.90	-2.7629
79.98	-2.8619
84.93	-2.8894
89.95	-2.8480
96.25	-2.6972
99.98	-2.5560
100.00	-2.5552

COS IS -0.23273

SIN IS -1.02500

BETA IS 0.02785

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.22492E 01 0.15382E 00 -0.38861E-02 0.23238E-04

49.95	-1.3658
54.90	-1.6721
59.98	-1.9894
60.00	-1.9906
64.93	-2.2841
69.95	-2.5507
74.90	-2.7649
79.98	-2.9165
84.93	-2.9804
89.95	-2.9434
96.25	-2.7247
99.98	-2.4918
100.00	-2.4904

COS IS -0.23098

SIN IS -1.03075

BETA IS 0.02428

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.30959E 01 0.19983E 00 -0.48040E-02 0.31217E-04 -0.25545E-07

49.95	-1.3691
54.90	-1.6712
59.98	-1.9875
60.00	-1.9888

COS IS 0.08540

SIN IS -0.04630

BETA IS 0.00075

0

SECTION--2

X	Y
49.95	-1.3255
54.90	-1.7330
59.98	-2.0231
60.00	-1.9790
64.93	-2.2224
69.95	-2.5410
74.90	-2.8410
79.98	-2.9128
84.93	-2.8721
89.95	-2.9584
96.25	-2.8509
99.98	-2.7463
100.00	-2.1593

0.130000E 02	0.985699E 03	0.783864E 05	0.650114E 07	0.558554E 09
-0.311647E 02	0.985699E 03	0.783864E 05	0.650114E 07	0.558554E 09
0.493801E 11	-0.244417E 04	0.783864E 05	0.650114E 07	0.558554E 09
0.493801E 11	0.446535E 13	-0.199415E 06	0.650114E 07	0.558554E 09
0.493801E 11	0.446535E 13	0.410992E 15	-0.168366E 08	0.558554E 09
0.493801E 11	0.446535E 13	0.410992E 15	0.383528E 17	-0.146288E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.71006E 00 -0.22252E-01

49.95	-1.8216
54.90	-1.9317
59.98	-2.0447
60.00	-2.0452
64.93	-2.1549
69.95	-2.2666
74.90	-2.3767
79.98	-2.4898
84.93	-2.5999
89.95	-2.7116
96.25	-2.8518
99.98	-2.9348
100.00	-2.9353

COS IS -0.22735

SIN IS -0.98062

BETA IS 0.13976

FOR DEGREE OF 2 COEFFICIENTS ARE

0.69994E 01 -0.23416E 00 0.13862E-02

49.95	-1.2385
54.90	-1.6782
59.98	-2.0588
60.00	-2.0601
64.93	-2.3608
69.95	-2.5977
74.90	-2.7629
79.98	-2.8619
84.93	-2.8894
89.95	-2.8400
96.25	-2.6972
99.98	-2.5560
100.00	-2.5552

COS IS -0.23273

SIN IS -1.02500

BETA IS 0.02785

FOR DEGREE OF 3 COEFFICIENTS ARE

```
 19.98    0.5095
 20.00    0.5086
 24.93    0.2790
 29.95    0.0121
 34.90   -0.2838
 39.98   -0.6212
 42.02   -0.7663
 46.91   -1.1365
 49.95   -1.3827

        COS  IS    0.08726

        SIN  IS   -0.04478

        BETA IS    0.00244


FOR DEGREE OF  3 COEFFICIENTS ARE

      0.94910E 00   0.11227E-01  -0.18851E-02   0.14941E-04

  4.93    0.9604
  9.95    0.8889
 14.90    0.7473
 19.98    0.5400
 20.00    0.5391
 24.93    0.2889
 29.95   -0.0042
 34.90   -0.3201
 39.98   -0.6605
 42.02   -0.7992
 46.91   -1.1303
 49.95   -1.3315

        COS  IS    0.08262

        SIN  IS   -0.04609

        BETA IS    0.00116


FOR DEGREE OF  4 COEFFICIENTS ARE

      0.11256E 01  -0.33919E-01   0.13935E-02  -0.73965E-04   0.80349E-06

  4.93    0.9838
  9.95    0.8611
 14.90    0.7245
 19.98    0.5423
 20.00    0.5414
 24.93    0.3104
 29.95    0.0191
 34.90   -0.3130
 39.98   -0.6770
 42.02   -0.8220
 46.91   -1.1435
 49.95   -1.3081
```

```
 RUN:SEQ
188:5
 ----------
0
 SECTION--1
   X          Y
    4.93     0.9808
    9.95     0.8696
   14.90     0.7194
   19.98     0.5304
   20.00     0.5438
   24.93     0.3225
   29.95     0.0226
   34.90    -0.3210
   39.98    -0.6518
   42.02    -0.8690
   46.91    -1.1029
   49.95    -1.3255

  0.120000E 02    0.338400E 03    0.119407E 05    0.471208E 06    0.197934E 08
 -0.281103E 00    0.338400E 03    0.119407E 05    0.471208E 06    0.197934E 08
  0.863967E 09   -0.137326E 03    0.119407E 05    0.471208E 06    0.197934E 08
  0.863967E 09    0.386842E 11   -0.778169E 04    0.471208E 06    0.197934E 08
  0.863967E 09    0.386842E 11    0.176363E 13   -0.381274E 06    0.197934E 08
  0.863967E 09    0.386842E 11    0.176363E 13    0.814980E 14   -0.180838E 08

FOR DEGREE OF  1 COEFFICIENTS ARE

        0.14984E 01  -0.53966E-01

    4.93     1.2324
    9.95     0.9614
   14.90     0.6943
   19.98     0.4202
   20.00     0.4191
   24.93     0.1530
   29.95    -0.1179
   34.90    -0.3850
   39.98    -0.6591
   42.02    -0.7692
   46.91    -1.0331
   49.95    -1.1972

         COS  IS    0.09300

         SIN  IS   -0.04906

         BETA IS    0.01839


FOR DEGREE OF  2 COEFFICIENTS ARE

        0.11100E 01  -0.16827E-01  -0.66218E-03

    4.93     1.0110
    9.95     0.8770
   14.90     0.7123

   19.98     0.5095
   20.00     0.5086
   24.93     0.2790
   29.95     0.0121
   34.90    -0.2838
   39.98    -0.6212
   42.02    -0.7663
   46.91    -1.1365
   49.95    -1.3827

         COS  IS    0.08726

         SIN  IS   -0.04478

         BETA IS    0.00244


FOR DEGREE OF  3 COEFFICIENTS ARE

        0.94910E 00   0.11227E-01  -0.18851E-02   0.14941E-04

    4.93     0.9604
    9.95     0.8889
   14.90     0.7473
   19.98     0.5400
   20.00     0.5391
```

```
247               TB2=(2.*XF1)*COS(XF1)
248               TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
249             T3=T2+(C1(3)*TB3)
250             ENDIF
251             IF(J.EQ.3)THEN
252               TT5=0.5*T3
253             ENDIF
254             IF((J.NE.2).AND.(J.NE.3))THEN
255                TB4=((3.*(XF1**2))-6.)*COS(XF1)
256                TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257             T4=T3+(C1(4)*TB5)
258             ENDIF
259             IF(J.EQ.4)THEN
260                TT5=0.5*T4
261             ENDIF
262             IF(J.EQ.5)THEN
263               T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
264               T6=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
265               T7=((T5+T6)*C1(5))
266               T8=T4+T7
267               TT5=0.5*T8
268             ENDIF
269             IF(I.EQ.1)THEN
270               SUM2=TT5
271             ENDIF
272             IF(I.EQ.2)THEN
273               SUM1=TT5
274             ENDIF
275       10 CONTINUE
        C
276          ALPHA=SUM2-SUM1
277          PRINT ,' '
278          PRINT 66,ALPHA
279       66 FORMAT(9X,' COS  IS ',F10.5)
280          IF(J.EQ.2)THEN
281            CE3=CE3+ALPHA
282          ENDIF
283          IF(J.EQ.3)THEN
284            CE2=CE2+ALPHA
285          ENDIF
286          IF(J.EQ.4)THEN
287            CE=CE+ALPHA
288          ENDIF
289          IF(J.EQ.5)THEN
290            CE1=CE1+ALPHA
291          ENDIF
292          RETURN
293          END
294          SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
295          REAL C1(100),B1(100)
        C
296          C1(1)=B1(1)
297          DO 5 K=2,J
298            C1(K)=B1(K)*(57.3**(K-1))
299        5 CONTINUE
        C
300          ALPHA=0.0
301          DO 10 I=1,2
302             IF(I.EQ.1)THEN
303               XF1=XL/57.3
304             ELSE
305               XF1=XF/57.3
306             ENDIF
        C
307             T1=C1(1)*(-COS(XF1))
308                TB1=SIN(XF1)-(XF1*COS(XF1))
309             T2=T1+(C1(2)*TB1)
310             IF(J.EQ.2)THEN
311                TT5=0.5*T2
312             ELSE
313                TB2=(2.*XF1)*SIN(XF1)
314                TB3=TB2+((2.-(XF1**2))*COS(XF1))
315             T3=T2+(C1(3)*TB3)
316             ENDIF
317             IF(J.EQ.3)THEN
318                TT5=0.5*T3
319             ENDIF
320             IF((J.NE.2).AND.(J.NE.3))THEN
321                TB4=((3.*(XF1**2))-6.)*SIN(XF1)
322                TB5=TB4+(((6.*XF1)-(XF1**3))*COS(XF1))
323             T4=T3+(C1(4)*TB5)
324             ENDIF
325             IF(J.EQ.4)THEN
326                TT5=0.5*T4
327             ENDIF
328             IF(J.EQ.5)THEN
                  T5=((4.*(XF1**3))-(24.*XF1))*SIN(XF1)
```

```
  284.93   -2.9085
  289.95   -2.7348
  294.90   -2.4955
  300.00   -2.1767
  304.93   -1.7971
  309.95   -1.3371

          COS  IS   -0.24399

          SIN  IS    1.08591

          BETA IS    0.00529


 FOR DEGREE OF  4 COEFFICIENTS ARE

        0.16267E 01   0.75734E-01  -0.27532E-03  -0.19694E-05   0.63405E-08

  260.00   -2.8976
  264.93   -2.9796
  269.95   -3.0215
  274.90   -3.0181
  279.98   -2.9646
  280.00   -2.9643
  284.93   -2.8602
  289.95   -2.6974
  294.90   -2.4771
  300.00   -2.1836
  304.93   -1.8317
  309.95   -1.4002

          COS  IS   -0.24343

          SIN  IS    1.08374

          BETA IS    0.00506


0
 SECTION-7
    X         Y
  309.95   -1.4258
  314.90   -1.1091
  319.98   -0.6623
  320.00   -0.7666
  324.93   -0.3804
  329.95   -0.0443
  334.90    0.2482
  339.98    0.5085
  340.00    0.4654
  344.93    0.7019
  349.95    0.8582
  354.90    0.9487
  359.98    0.9937

    0.130000E 02    0.434435E 04    0.145479E 07    0.488166E 09    0.164143E 12
    0.336103E 00    0.434435E 04    0.145479E 07    0.488166E 09    0.164143E 12
    0.553042E 14    0.264441E 03    0.145479E 07    0.488166E 09    0.164143E 12
```

```
  0.553042E 14    0.186710E 17    0.139033E 06    0.488166E 09    0.164143E 12
  0.553042E 14    0.186710E 17    0.631595E 19    0.633965E 08    0.164143E 12
  0.553042E 14    0.186710E 17    0.631595E 19    0.214073E 22    0.268674E 11

FOR DEGREE OF  1 COEFFICIENTS ARE

       -0.16965E 02   0.50843E-01

 309.95   -1.2061
 314.90   -0.9544
 319.98   -0.6961
 320.00   -0.6951
 324.93   -0.4445
 329.95   -0.1892
 334.90    0.0624
 339.98    0.3207
 340.00    0.3217
 344.93    0.5724
 349.95    0.8276
 354.90    1.0793
 359.98    1.3376

        COS  IS    0.05899

        SIN  IS    0.06002

        BETA IS    0.03154

                                                CD =   0.53059

                                                CL =   0.14095

FOR DEGREE OF  2 COEFFICIENTS ARE

       0.40378E 03  -0.24668E 01   0.37584E-02

 309.95    0.2720
 314.90   -0.3135
 319.98   -0.7231
 320.00   -0.7244
 324.93   -0.9358
 329.95   -0.9631
 334.90   -0.8047
 339.98   -0.4504
 340.00   -0.4485
 344.93    0.0811
 349.95    0.8083
 354.90    1.7109
 359.98    2.8289

        COS  IS    0.01991

        SIN  IS    0.07910

        BETA IS    1.18737

                                                CD =   0.47831

                                                CL =   0.13153

FOR DEGREE OF  3 COEFFICIENTS ARE

       -0.32500E 02  -0.28570E-02   0.73895E-03  -0.13105E-05

 309.95   -1.4192
 314.90   -1.0475
 319.98   -0.6914
 320.00   -0.6900
 324.93   -0.3701
 329.95   -0.0714
 334.90    0.1957
 339.98    0.4404
 340.00    0.4413
 344.93    0.6491
 349.95    0.8299
 354.90    0.9767
 359.98    1.0939

        COS  IS    0.06483
```

CD = 0.47031

CL = 0.13153

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.32500E 02 -0.28570E-02 0.73895E-03 -0.13105E-05

309.95	-1.4192
314.90	-1.0475
319.98	-0.6914
320.00	-0.6900
324.93	-0.3701
329.95	-0.0714
334.90	0.1957
339.98	0.4404
340.00	0.4413
344.93	0.6491
349.95	0.8299
354.90	0.9767
359.98	1.0939

COS IS 0.06483

SIN IS 0.05681

BETA IS 0.00375

CD = 0.51814

CL = 0.10625

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.18050E 02 -0.42054E-01 0.17407E-03 0.15676E-05 -0.36601E-08

309.95	-1.4655
314.90	-1.0732
319.98	-0.6972
320.00	-0.6958
324.93	-0.3591
329.95	-0.0471
334.90	0.2277
339.98	0.4733
340.00	0.4742
344.93	0.6747
349.95	0.8380
354.90	0.9561
359.98	1.0303

COS IS 0.06646

SIN IS 0.05631

BETA IS 0.00173

CD = 0.53922

CL = 0.08604

END OF RUN:SEQ 188:5

APPENDIX B

STEADY PRESSURE DATA PLOTS

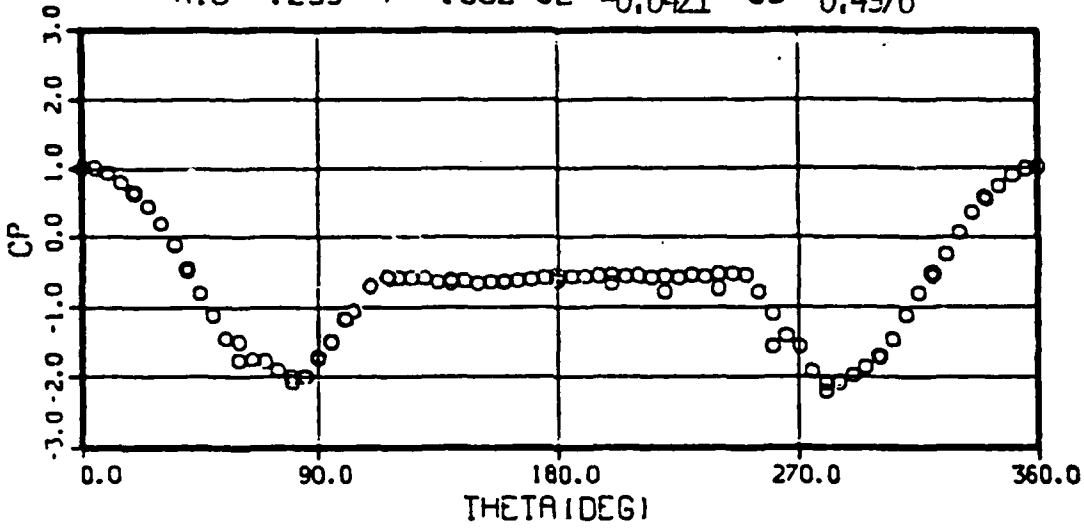
FOR

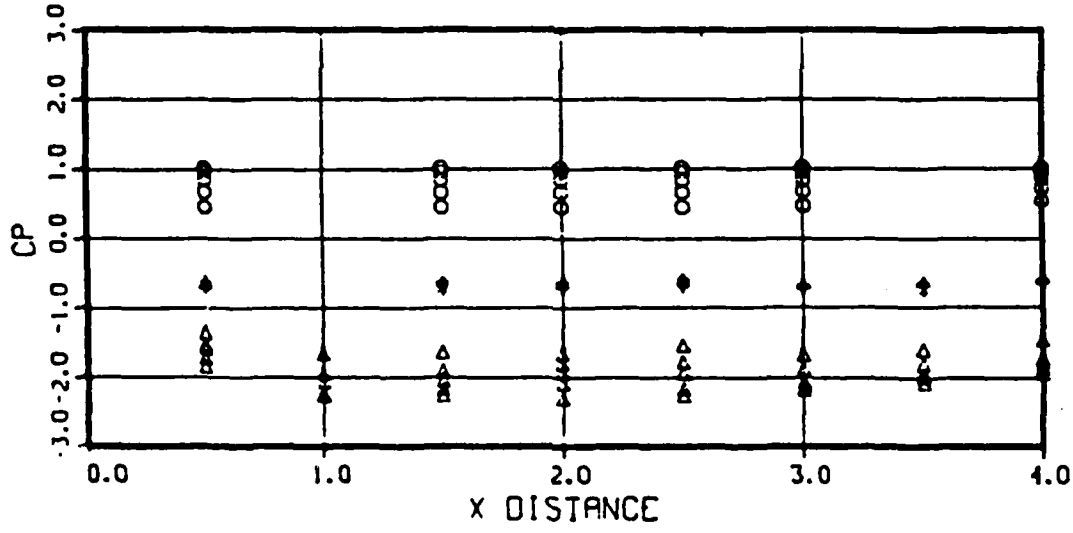
SMOOTH & ROUGH CYLINDERS

TESTS

SMOOTH CYLINDER

RUN 005 QIU-387.8 +/- 3.48 RNDIU-7.760 +/-.122
PIU- 9994. +/- 41.40 VIU-268.48 +/- 1.624
MIU- .235 +/- .002 CL- -0.0421 CD- 0.4976

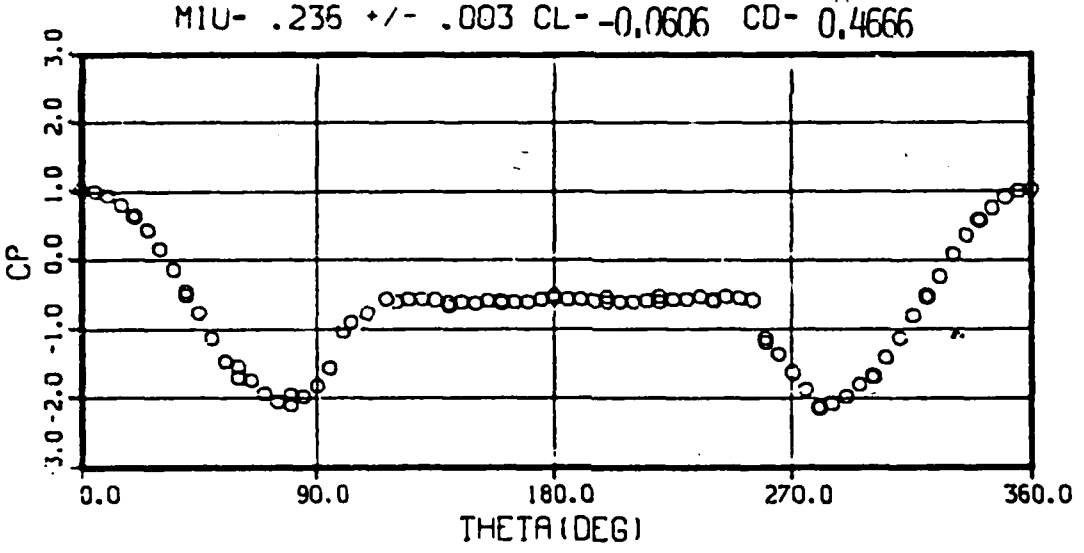


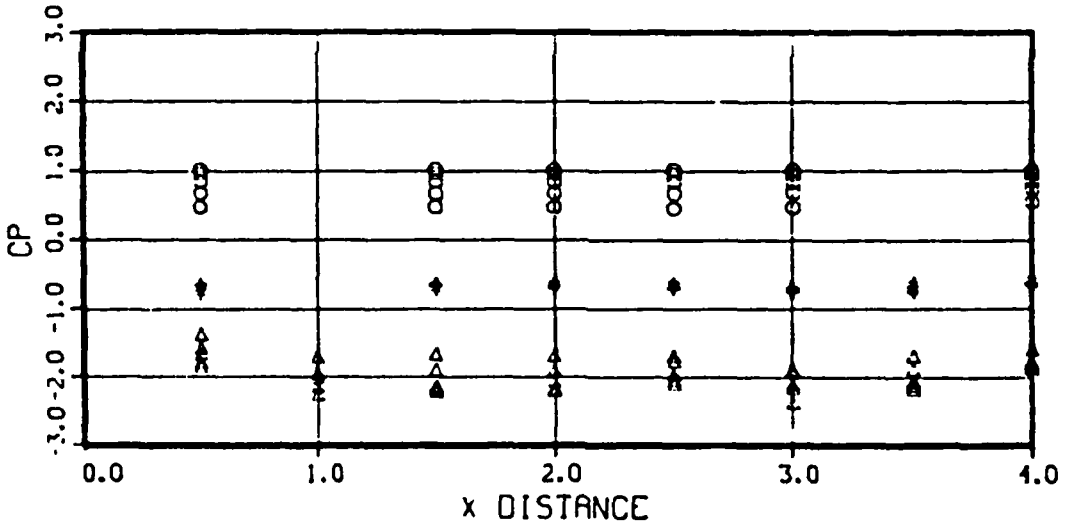


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 006 QIU-343.7 +/- 7.70 RNDIU-6.798 +/-.082
PIU- 8775. +/- 38.20 VIU-270.50 +/- 2.860
MIU- .236 +/- .003 CL- -0.0606 CD- 0.4666

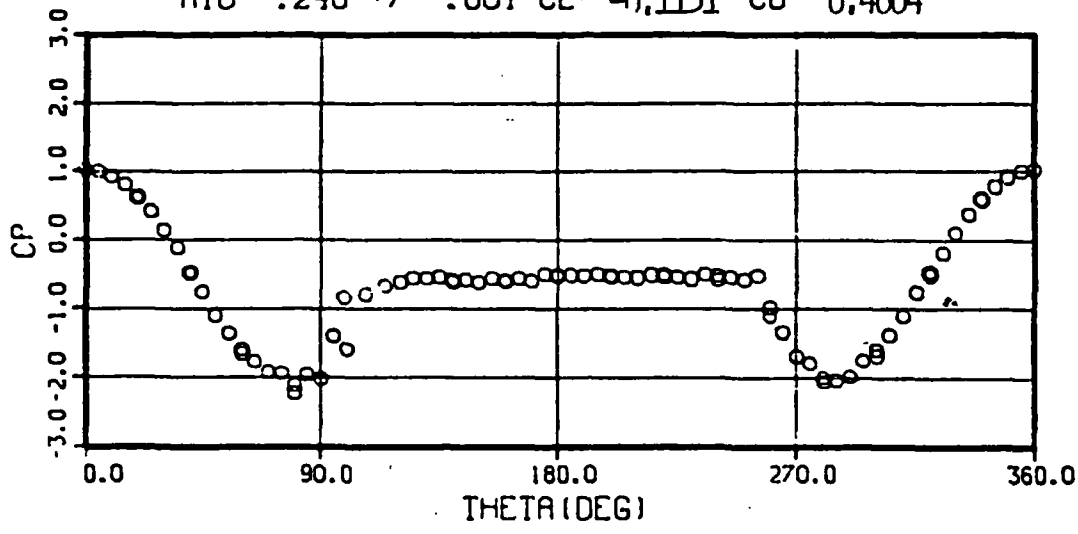


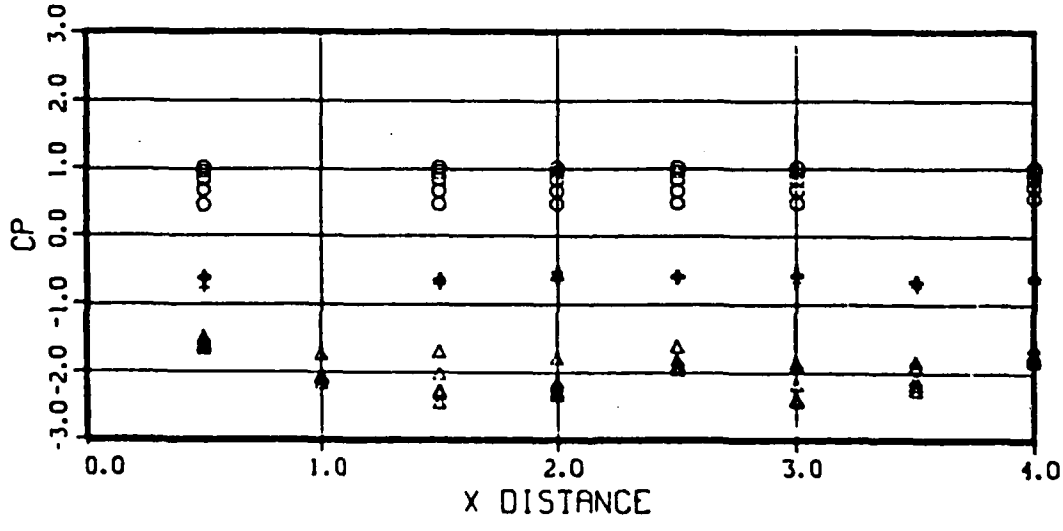


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 007 01U-305.1 +/- 3.36 RND1U-5.907 +/-.034
P1U- 7549. +/- 17.00 V1U-275.39 +/- 2.566
M1U- .240 +/- .001 CL- -0.1131 CD- 0.4604

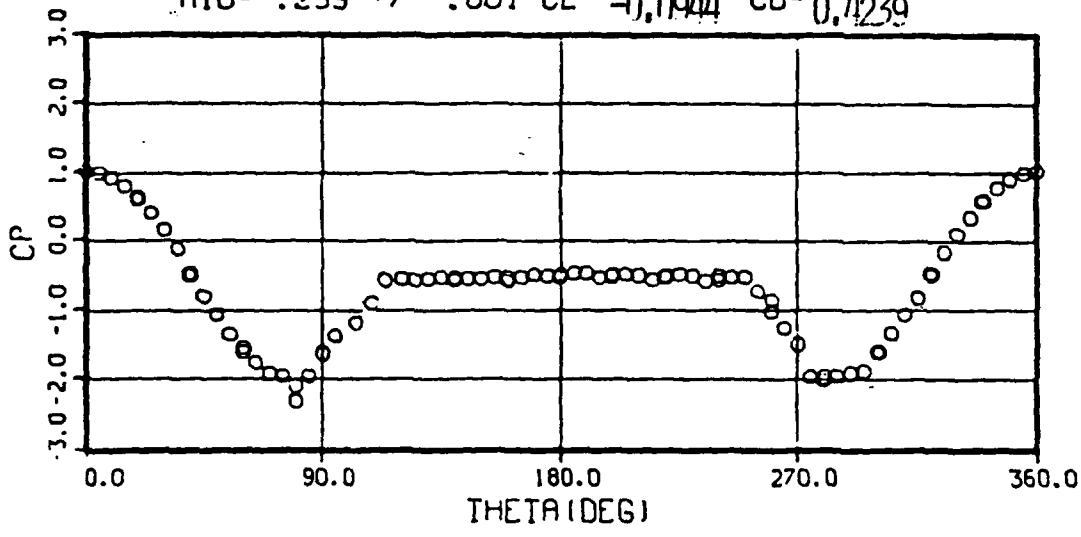


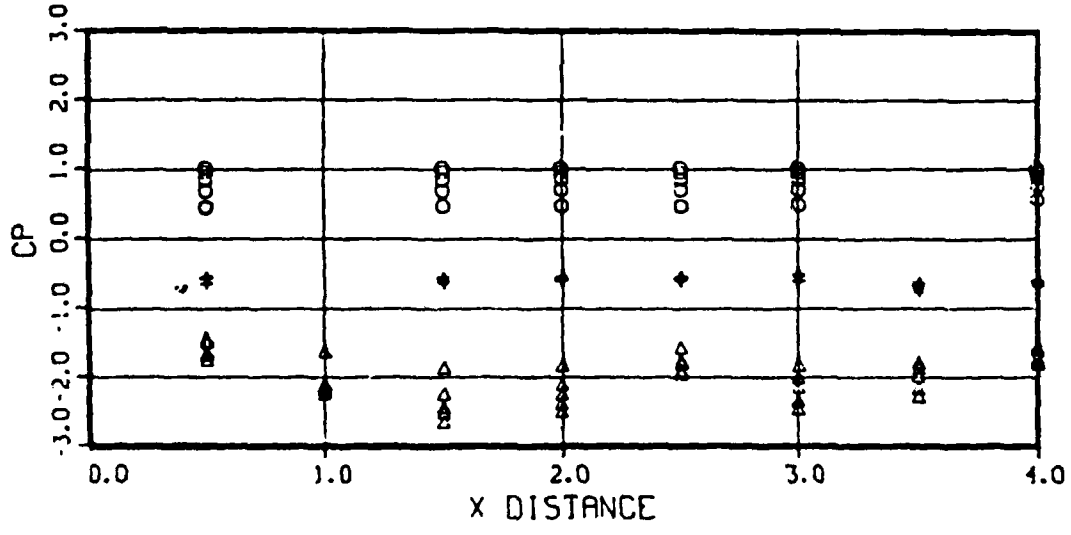


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 008 D1U-254.0 +/- 2.24 RHD1U-4.929 +/-.023
P1U- 6331. +/- 1.80 V1U-274.53 +/- 1.190
M1U- .239 +/- .001 CL- -0.0944 CD- 0.1239

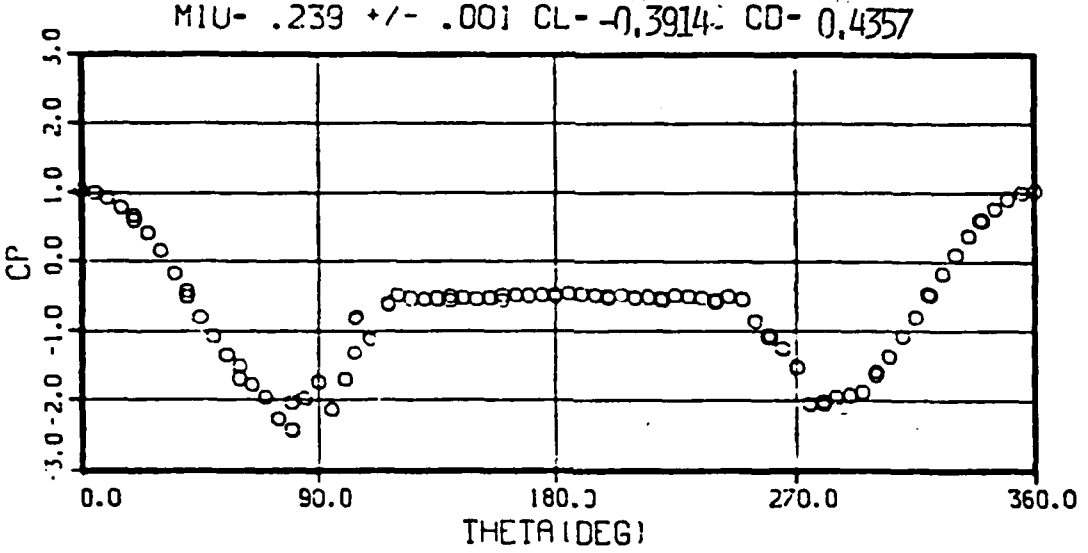


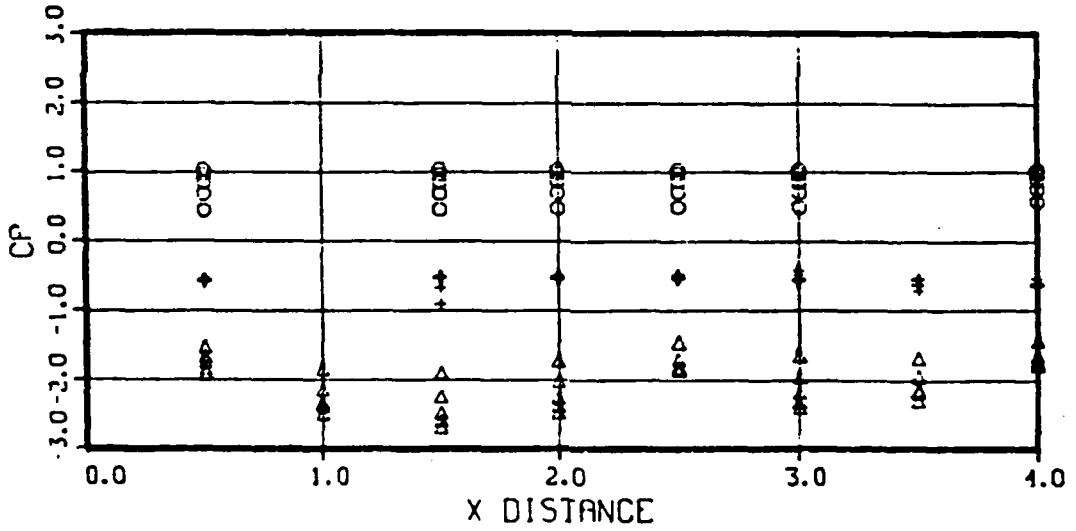


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 009 QIU-200.8 +/- 1.26 RNDIU-3.934 +/-.030
PIU- 5020. +/- 31.60 VIU-273.23 +/- .896
MIU- .239 +/- .001 CL- -0.3914 CD- 0.4357

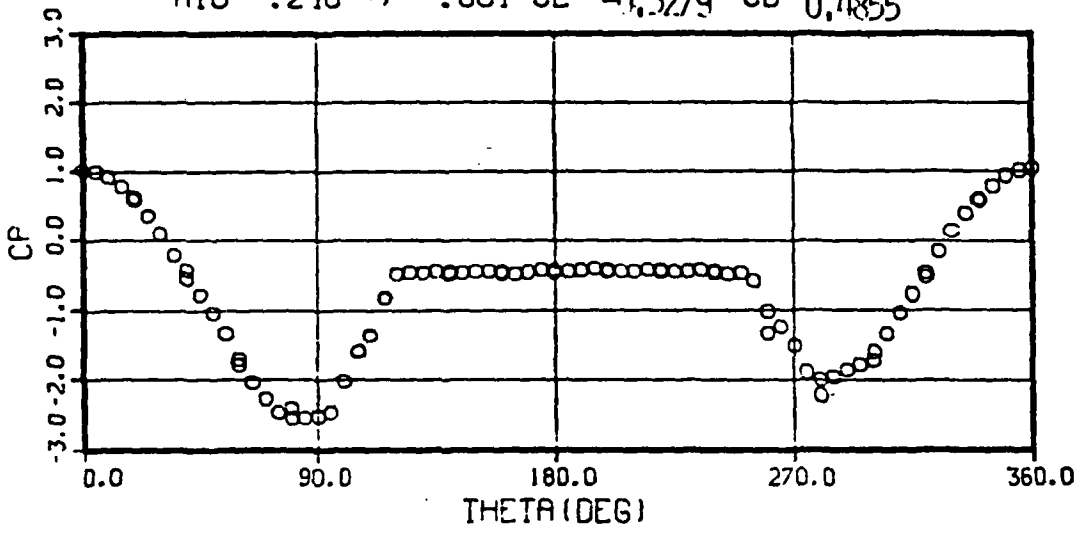


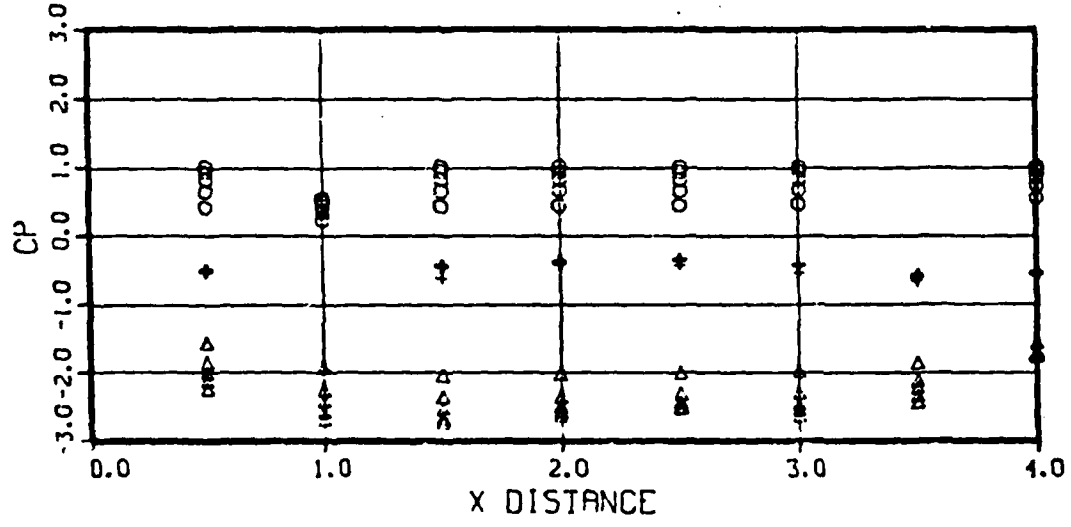


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 012 Q1U-151.2 +/- .70 RND1U-2.987 +/-.030
P1U- 3737. +/- 10.60 V1U-273.30 +/- .784
M1U- .240 +/- .001 CL- -0.3279 CD- 0.1855

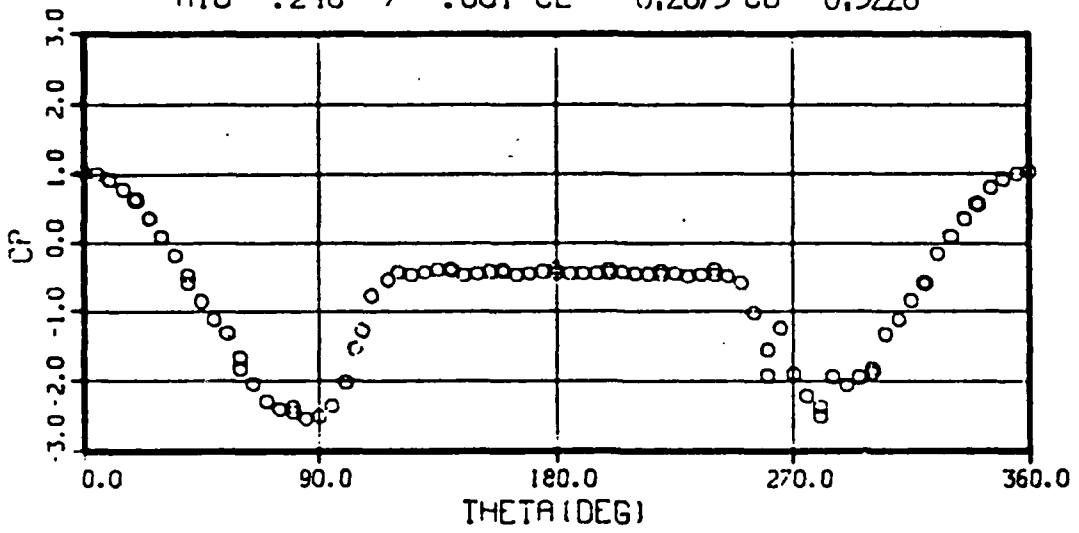


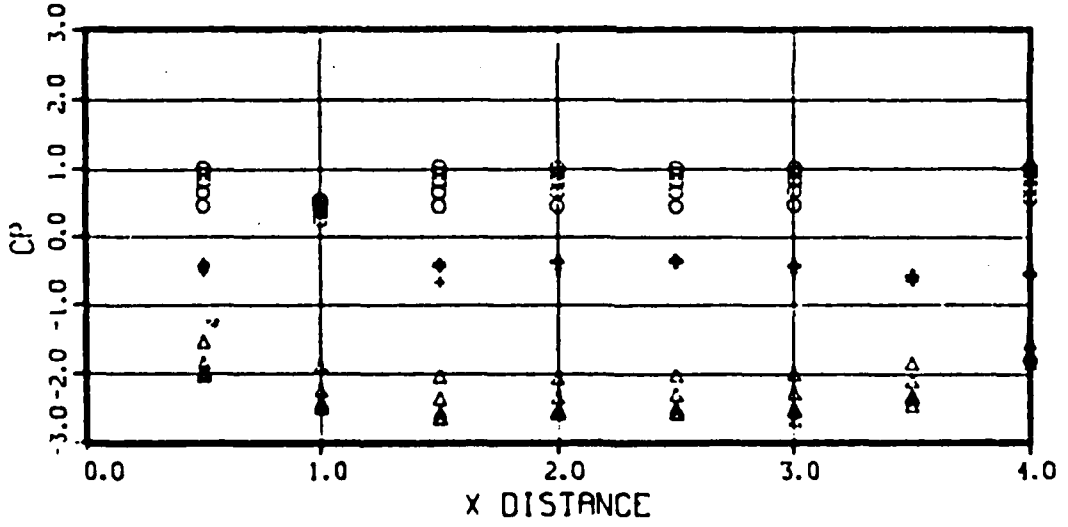


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 013 01U-127.7 +/- .84 RND1U-2.523 +/-.008
P1U- 3170. +/- 6.00 V1U-272.80 +/- 1.044
M1U- .240 +/- .001 CL- -0.2873 CD- 0.3228

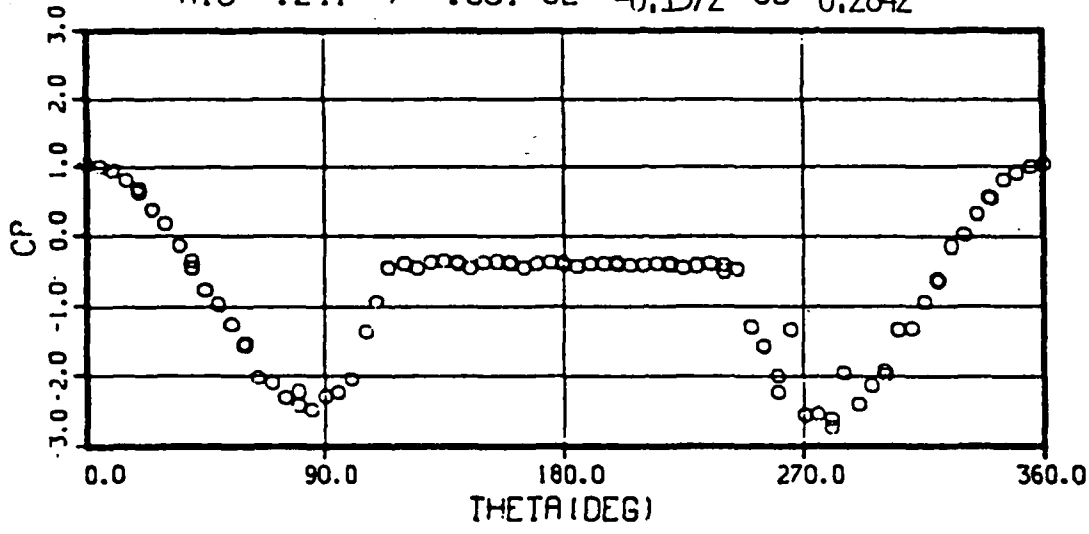


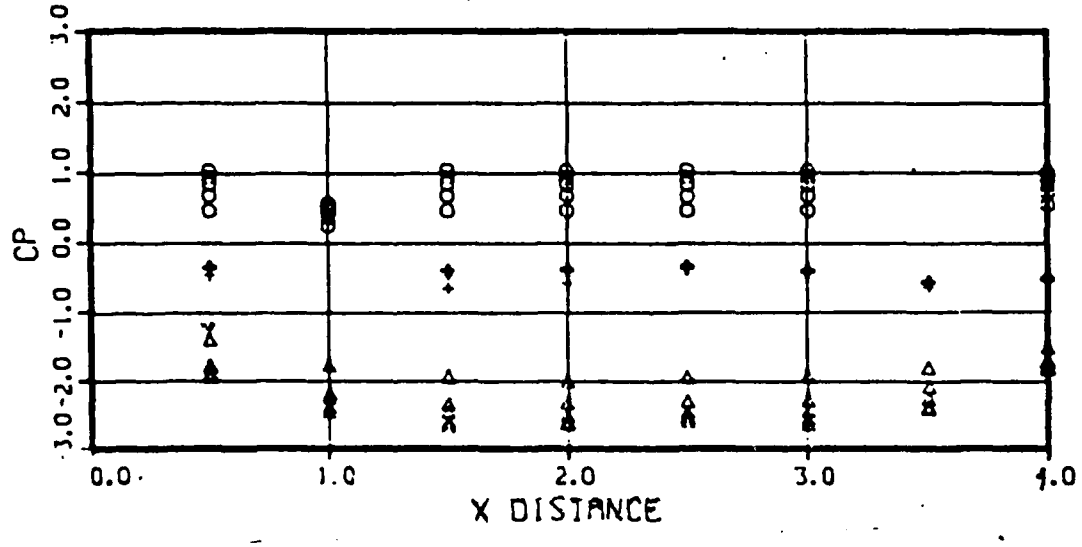


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 014 Q1U-100.9 +/- .56 RND1U-1.991 +/-.018
P1U- 2485. +/- 6.60 V1U-273.79 +/- .260
M1U- .241 +/- .001 CL- -0.1372 CD- 0.2842

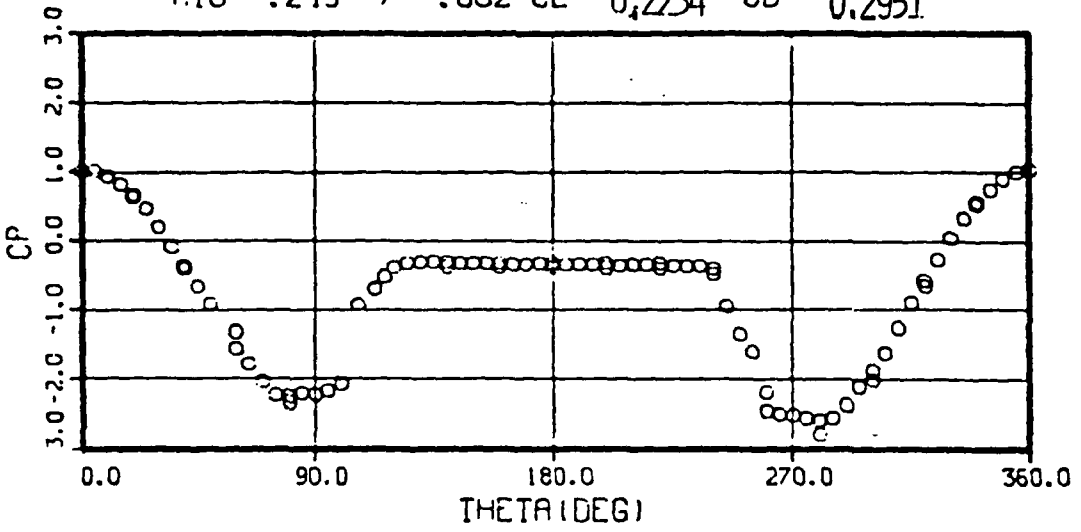


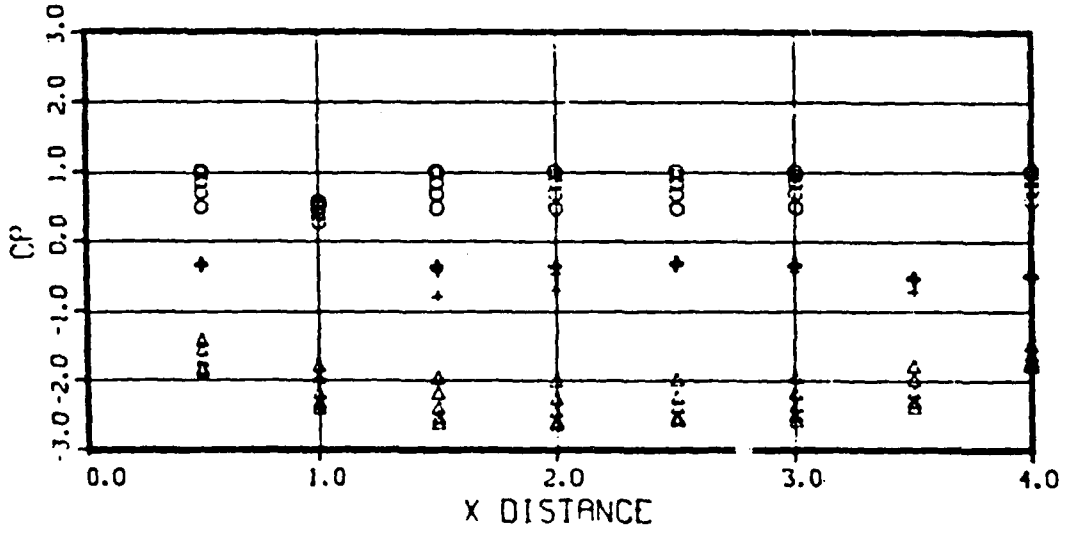


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 015 Q1U- 77.0 +/- 1.12 RND1U-1.510 +/-.010
P1U- 1872. +/- 1.80 V1U-275.60 +/- 2.016
M1U- .243 +/- .002 CL- 0.2234 CD- 0.2951

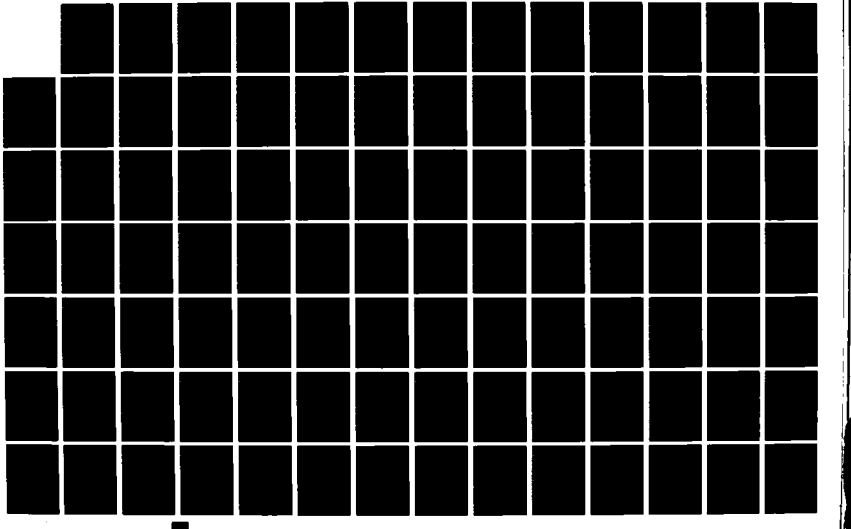


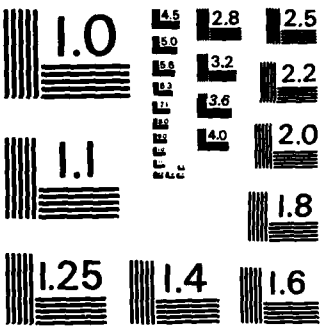


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

AD-A160 351 ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER AROUND SMOOTH & ROUGH..(U) ALABAMA A AND M UNIV NORMAL DEPT OF PHYSICS S S MURTY ET AL. JUL 85 2/3

UNCLASSIFIED N00014-83-K-0351 F/G 20/4 NL

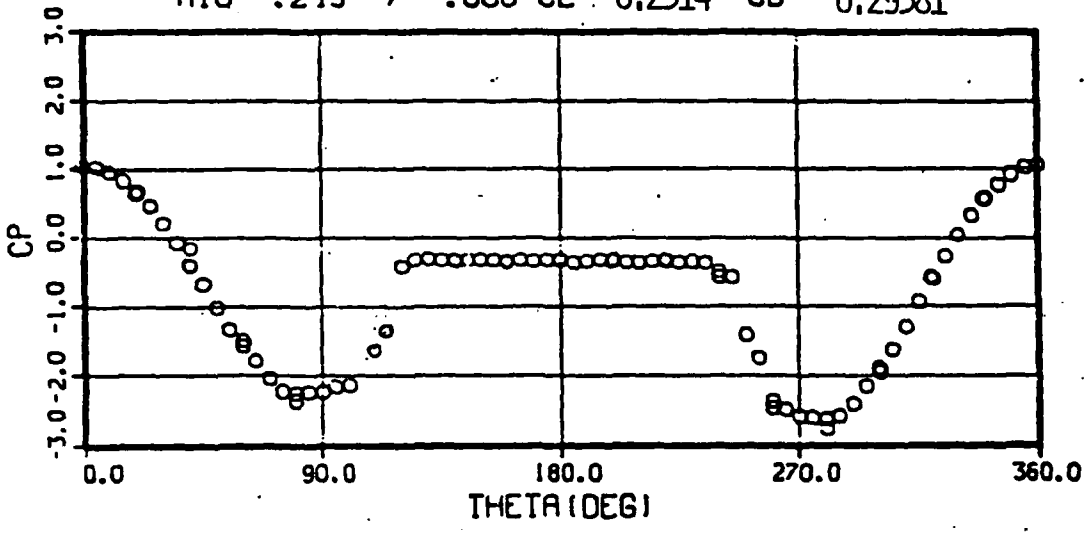


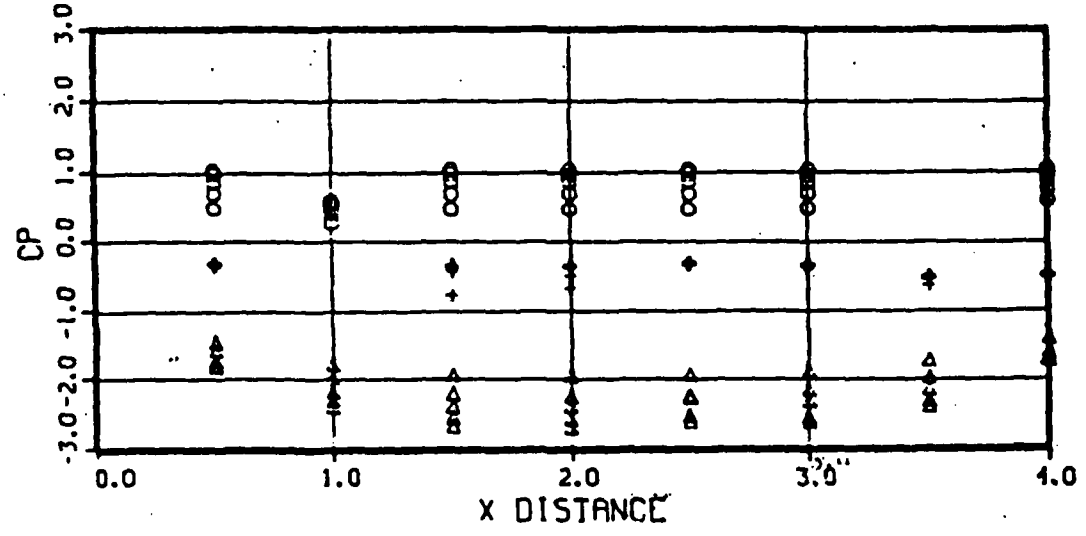


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

SMOOTH CYLINDER

RUN 016 Q1U- 64.6 +/- .00 RND1U-1.266 +/-.001
P1U- 1566. +/- 3.20 V1U-275.61 +/- .098
M1U- .243 +/- .000 CL- 0.2314 CD- 0.29381

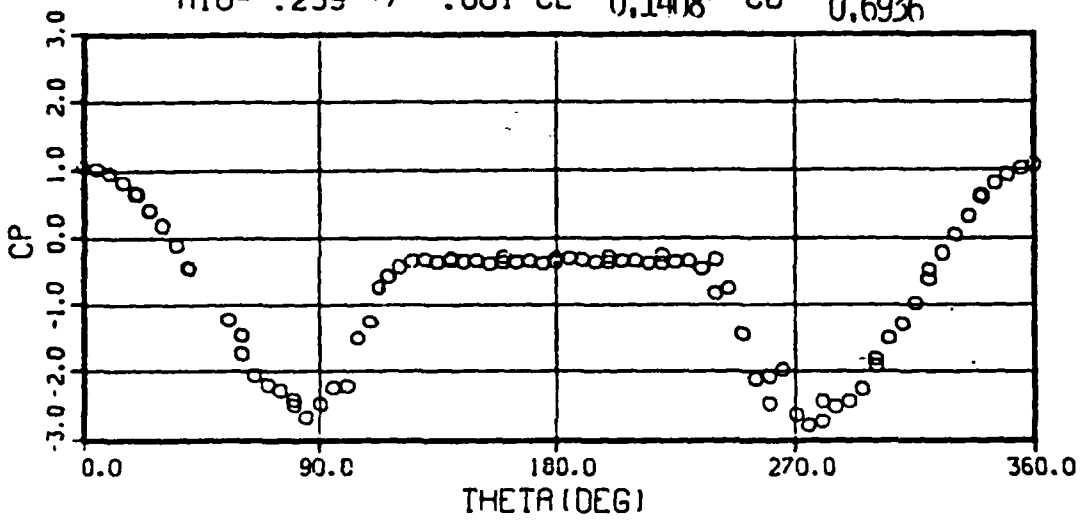


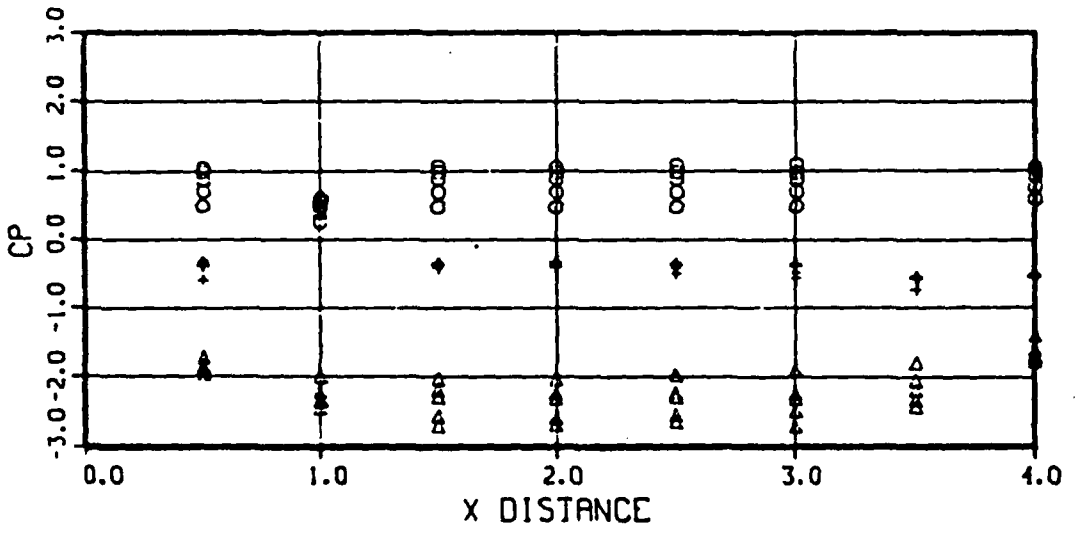


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 017 QIU- 50.4 +/- .00 RNDIU-1.004 +/-.001
PIU- 1255. +/- 9.20 VIU-271.75 +/- .446
MIU- .239 +/- .001 CL- 0.1408 CD- 0.6936

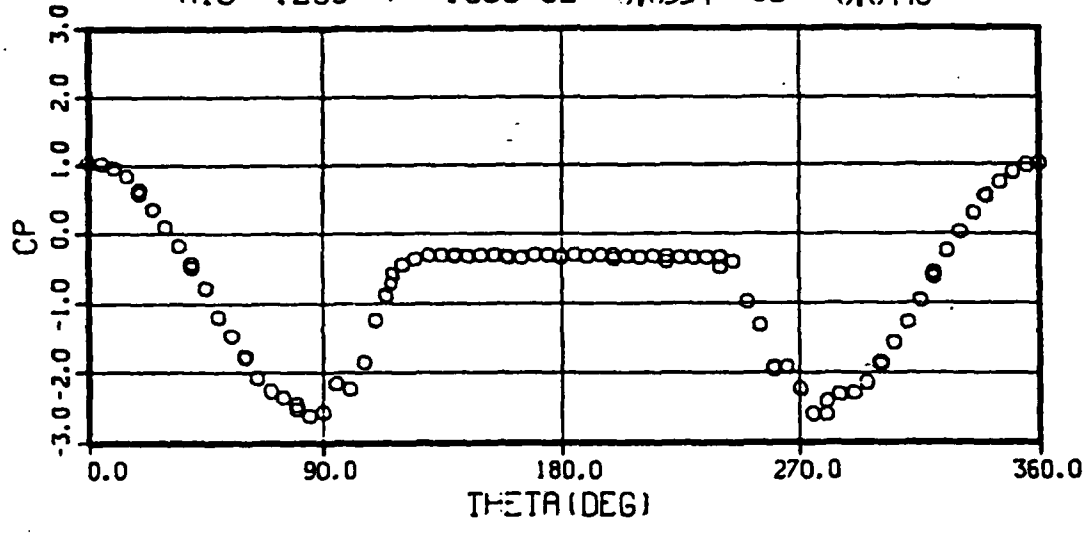


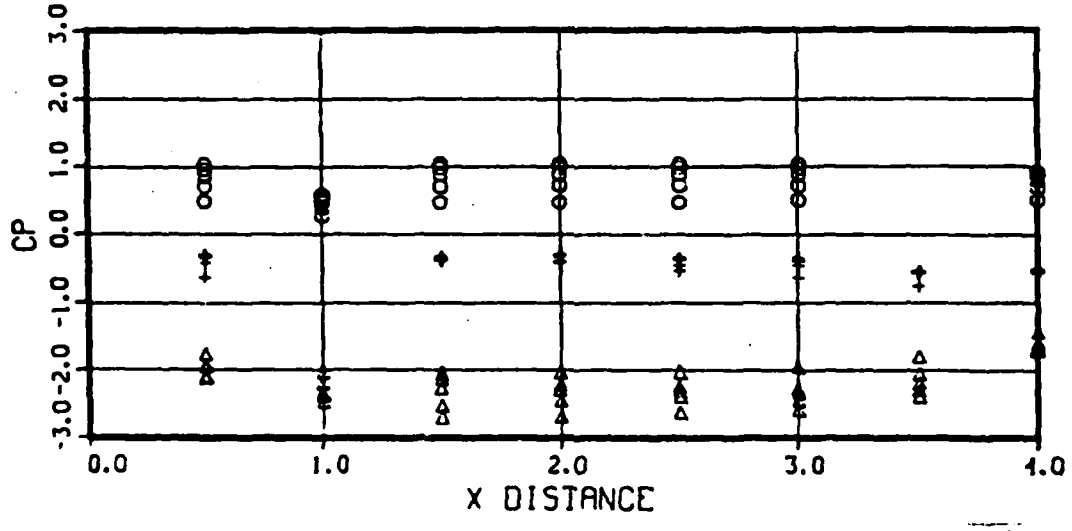


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 018 QIU- 44.7 +/- .00 RNDIU- .891 +/-.000
PIU- 1115. +/- 2.20 VIU-271.61 +/- .192
MIU- .239 +/- .000 CL- 0.0554 CD- 0.6448

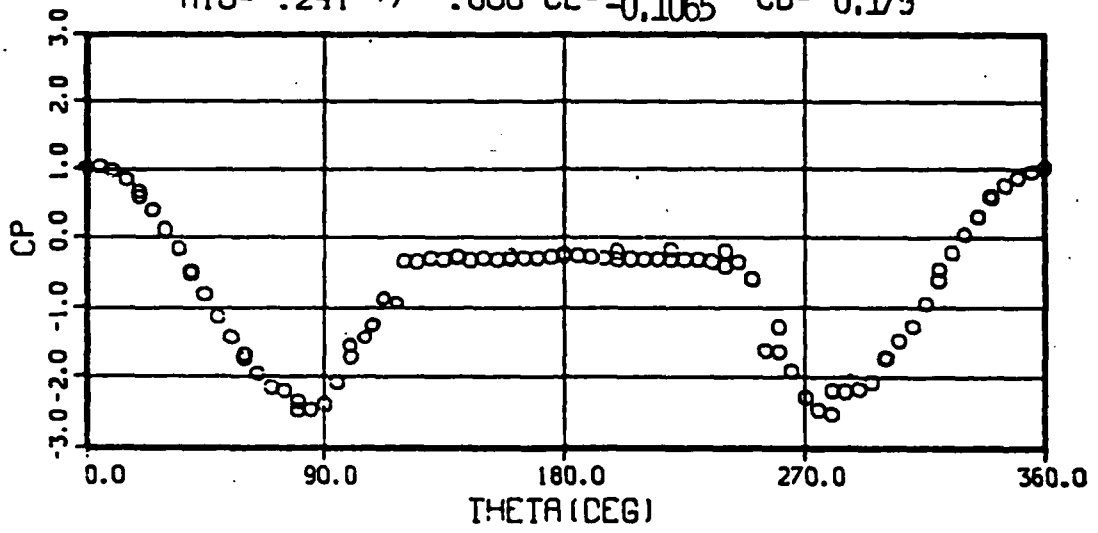


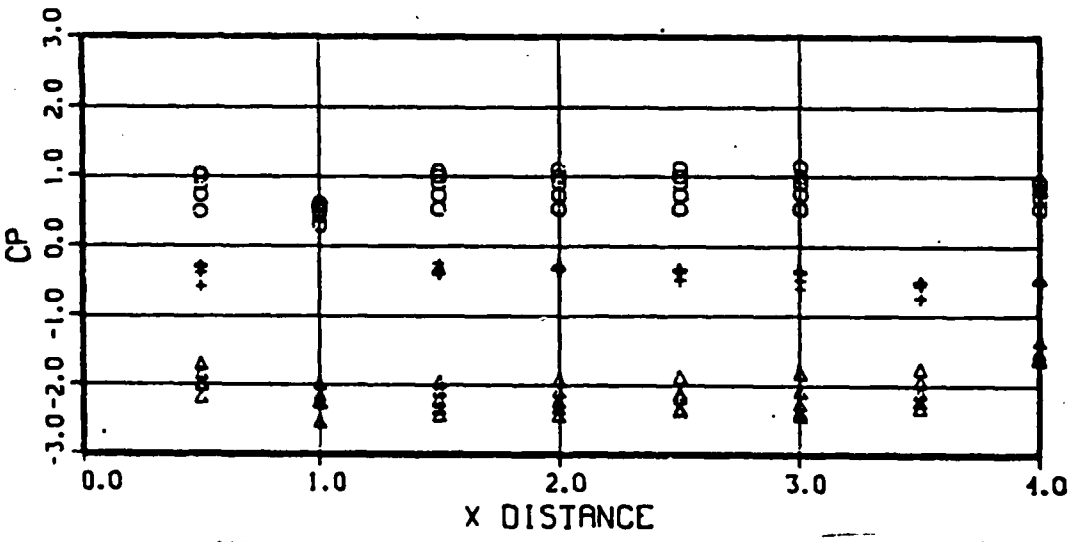


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 019 O1U- 40.7 +/- .20 RNDIU- .807 +/-.003
P1U- 1000. +/- 3.00 V1U-273.44 +/- .620
M1U- .241 +/- .000 CL--0.1065 CD- 0.179

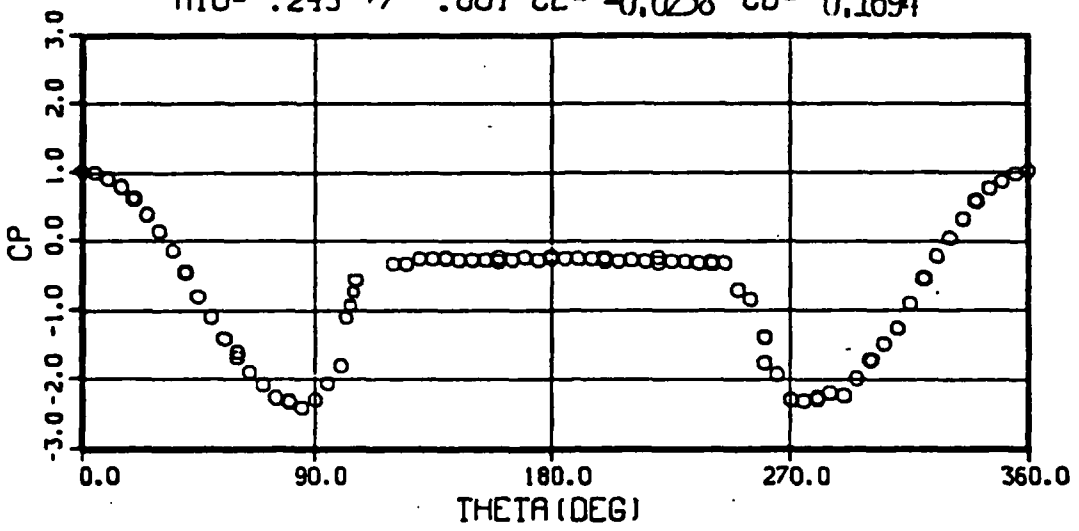


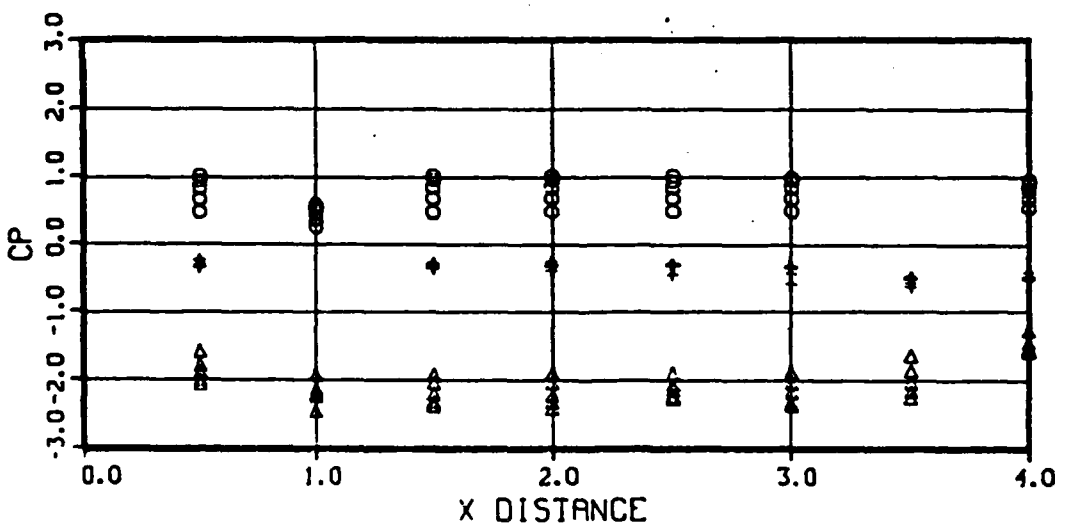


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 020 Q1U- 35.3 +/- .06 RND1U- .695 +/-.001
P1U- 855. +/- 4.00 V1U-274.96 +/- .586
M1U- .243 +/- .001 CL- -0.0238 CD- 0.1694

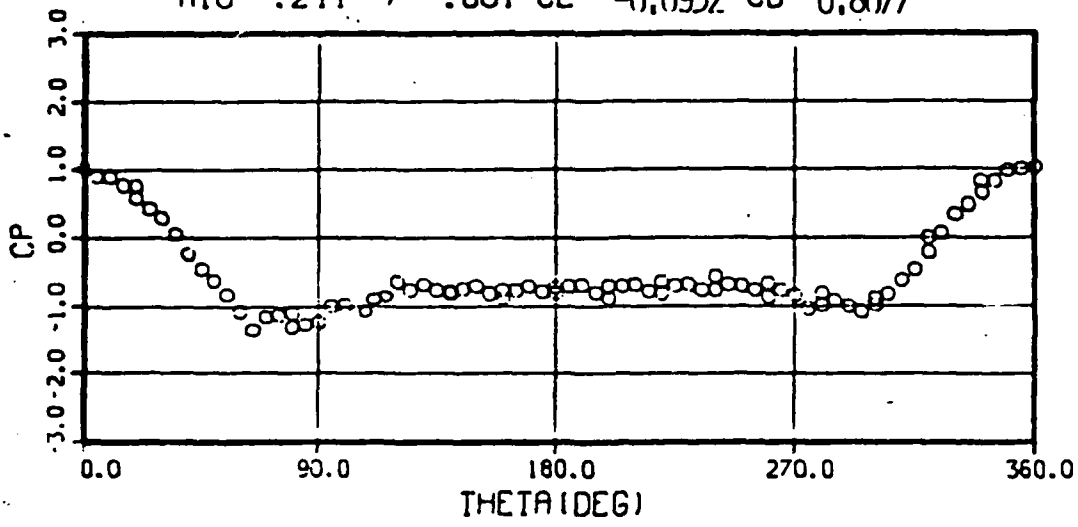


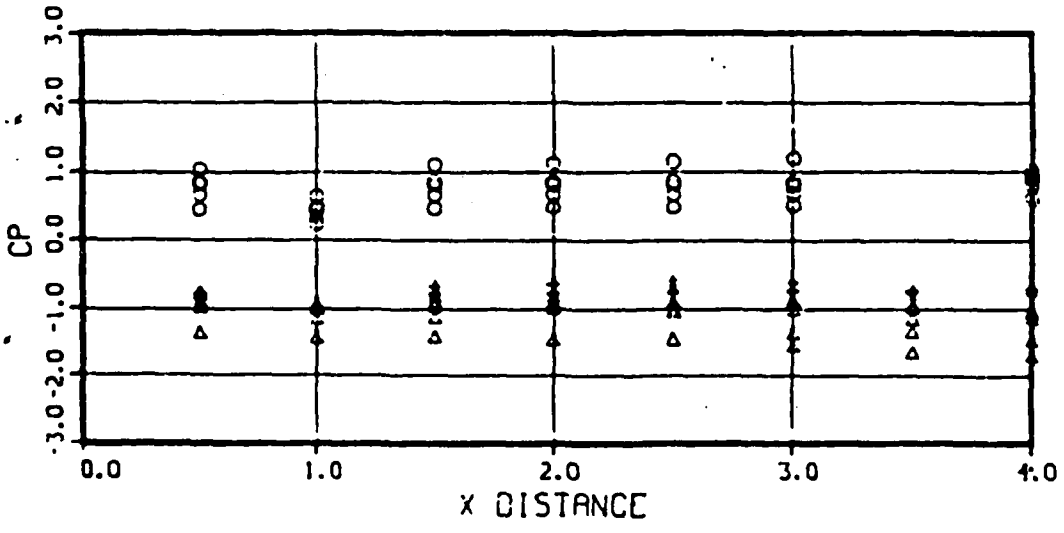


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 021 Q1U- 20.7 +/- .46 RND1U- .407 +/-.005
P1U- 495. +/- 6.20 V1U-275.97 +/- 1.664
M1U- .244 +/- .001 CL- -0.0932 CD- 0.8077

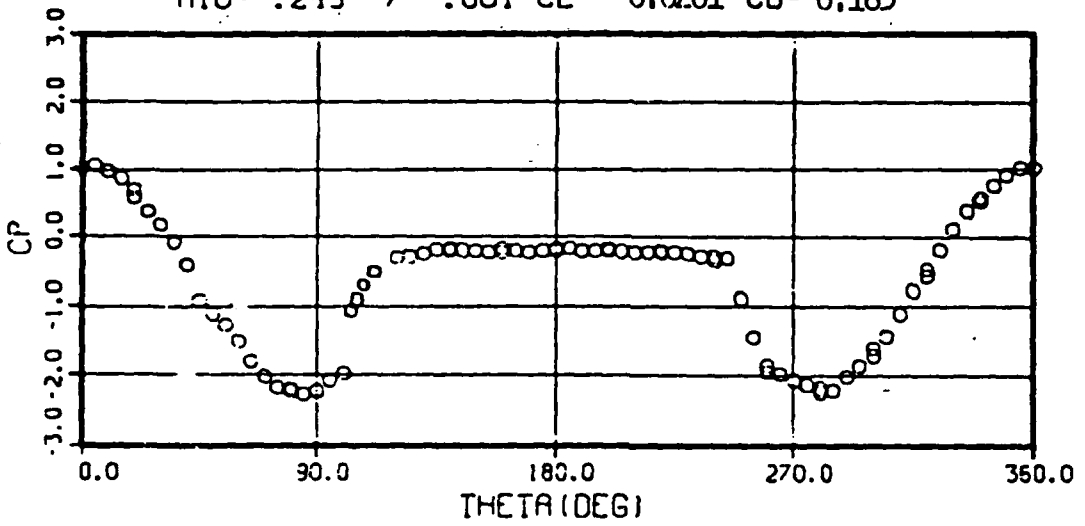


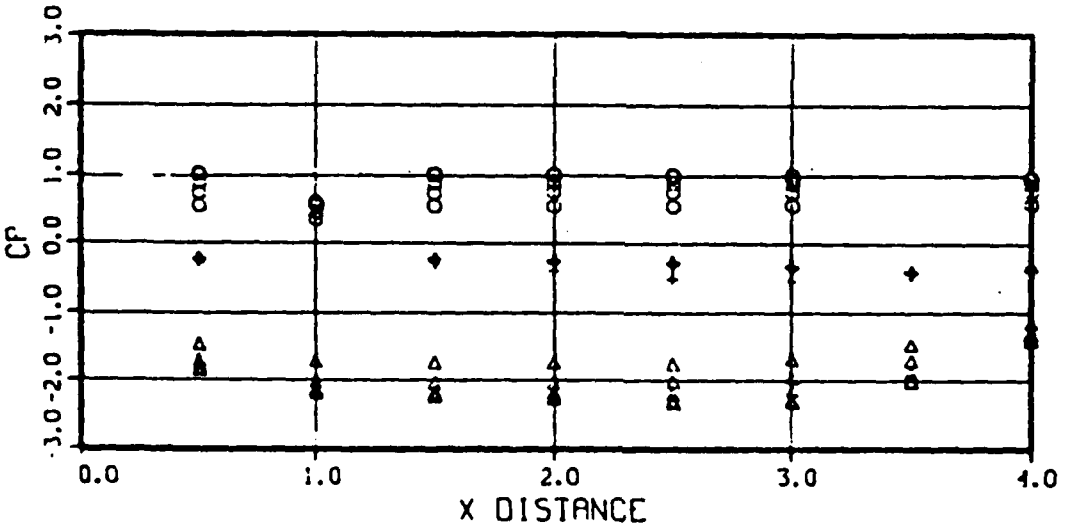


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 022 O1U- 25.8 +/- .00 RND1U- .507 +/-.003
P1U- 621. +/- 2.20 V1U-275.84 +/- .652
M1U- .243 +/- .001 CL- -0.0261 CD- 0.183

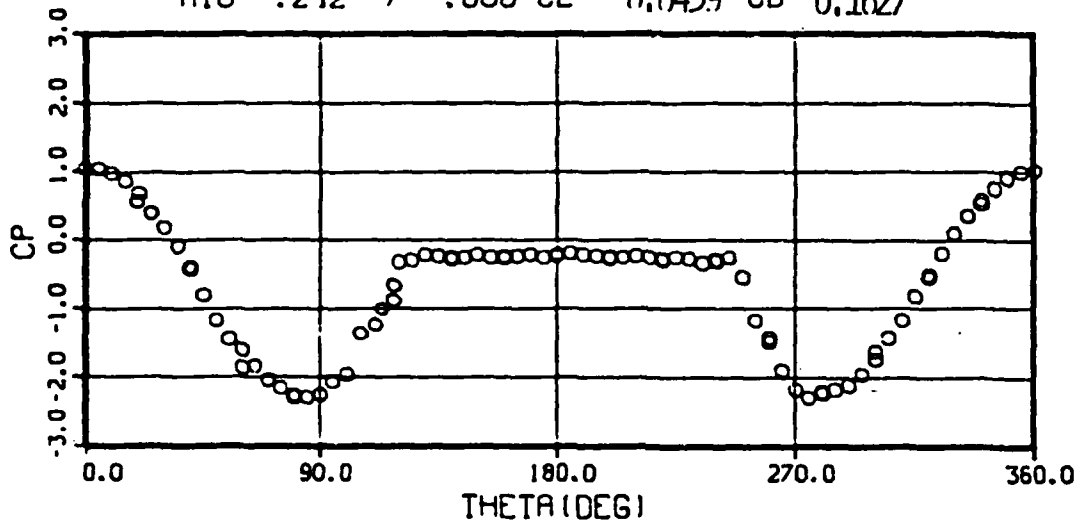


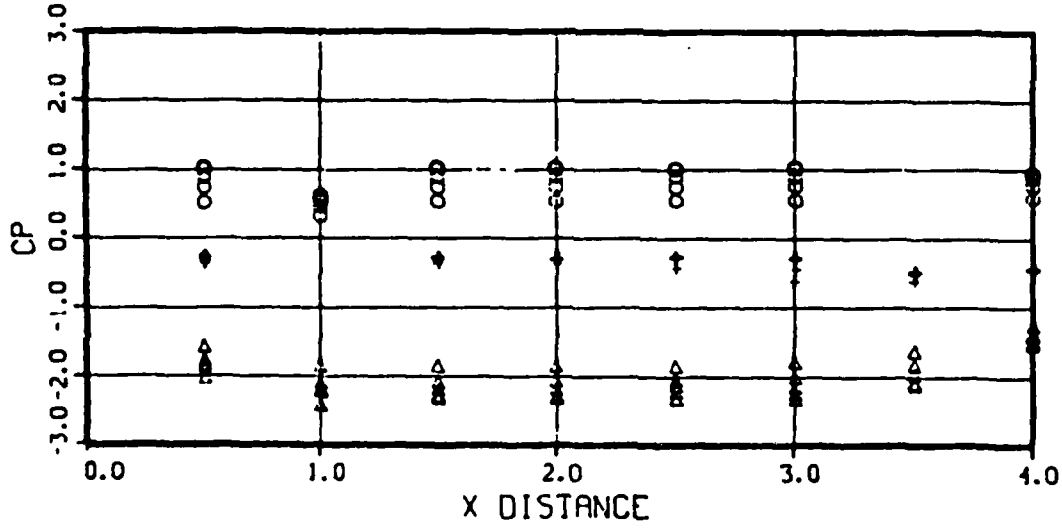


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 023 Q1U- 30.7 +/- .00 RND1U- .606 +/-.003
P1U- 748. +/- 1.60 V1U-274.45 +/- .358
M1U- .242 +/- .000 CL- -0.0439 CD- 0.1627

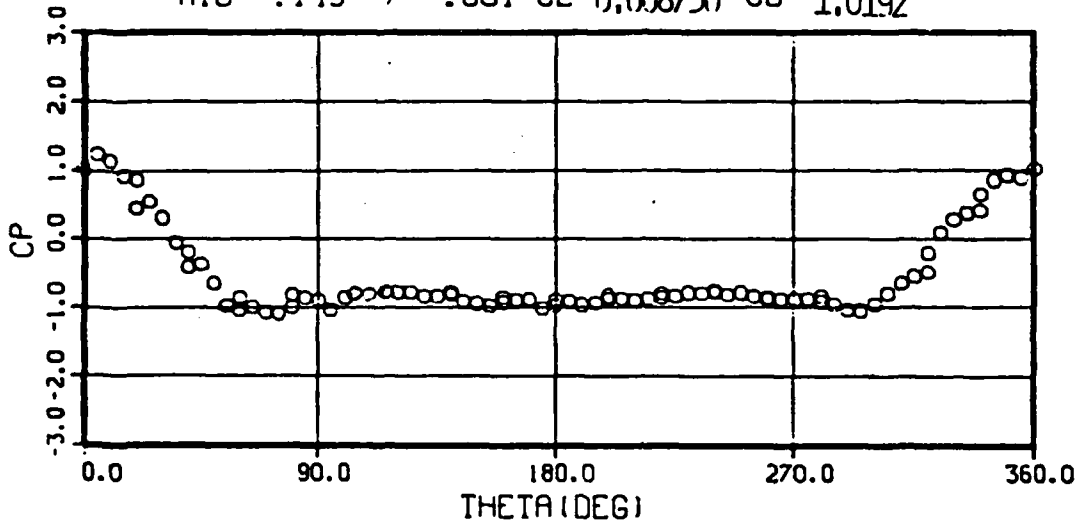


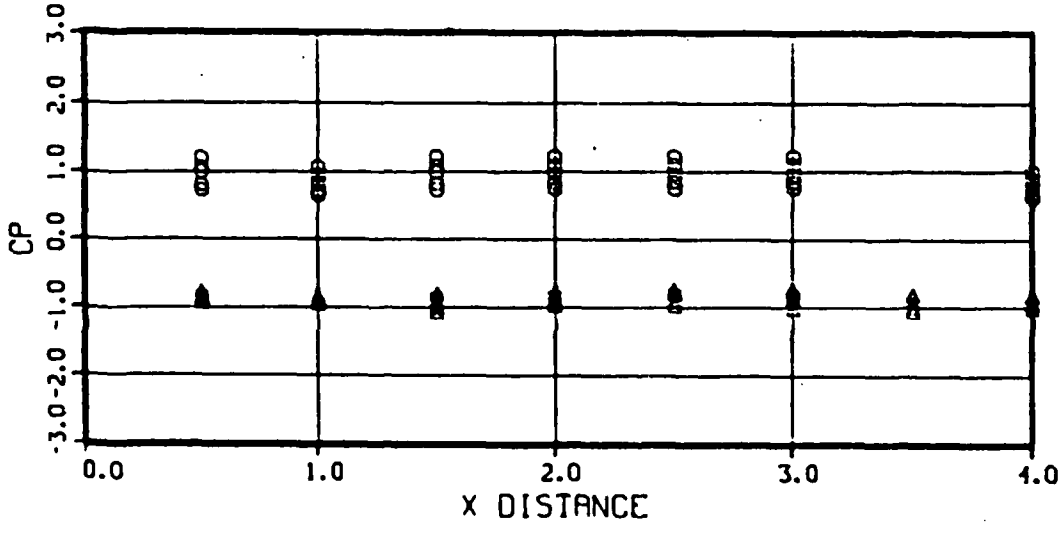


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 033 O1U- 9.0 +/- .00 RNDIU- .304 +/-.002
P1U- 614. +/- 2.40 V1U-162.43 +/- .350
M1U- .145 +/- .001 CL-0.008750 CD- 1.0192

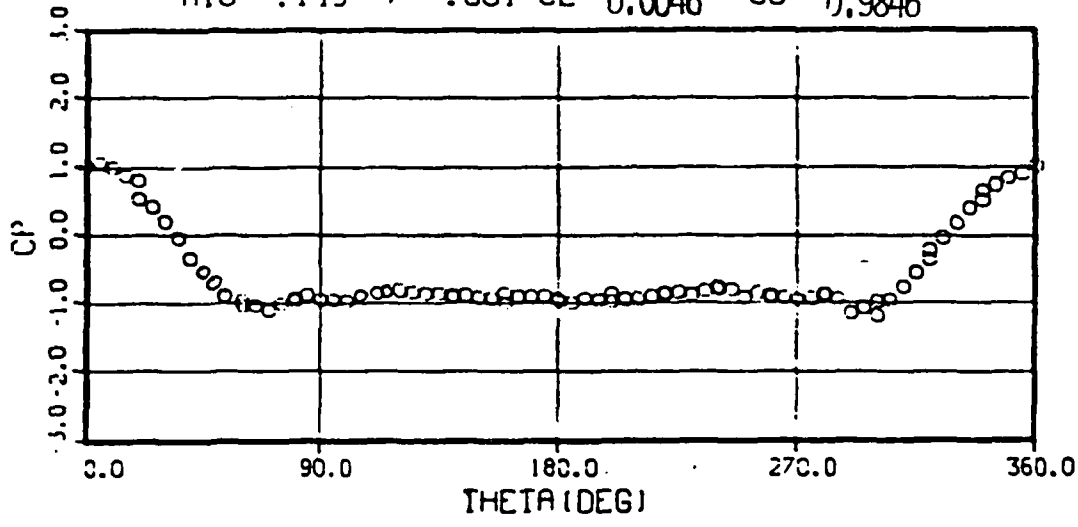


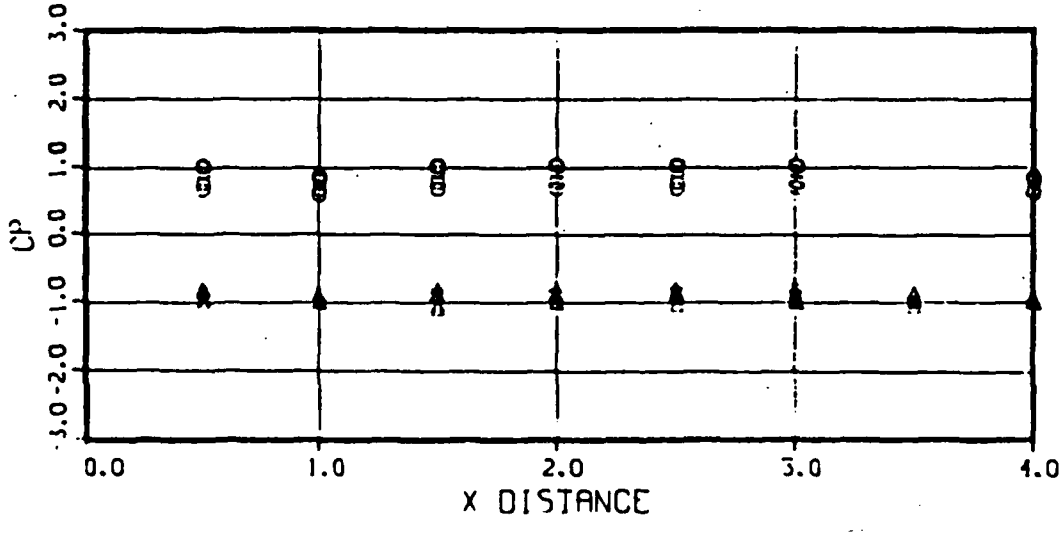


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 034 QIU- 9.: +/- .12 RNOIU- .309 +/-.003
PIU- 623. +/- 4.80 VIU-162.53 +/- .260
MIU- .145 +/- .001 CL- 0.0046 CD- 0.9846

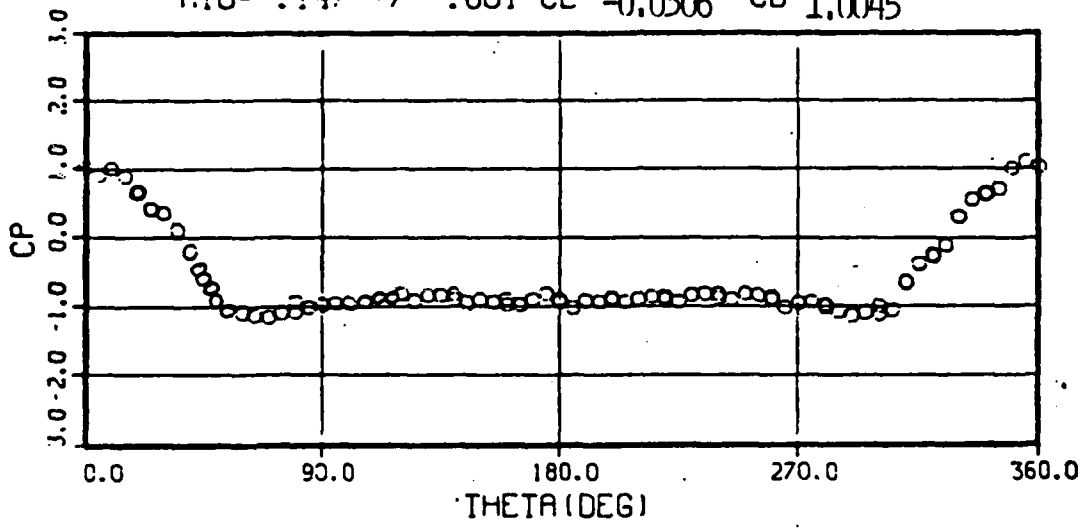


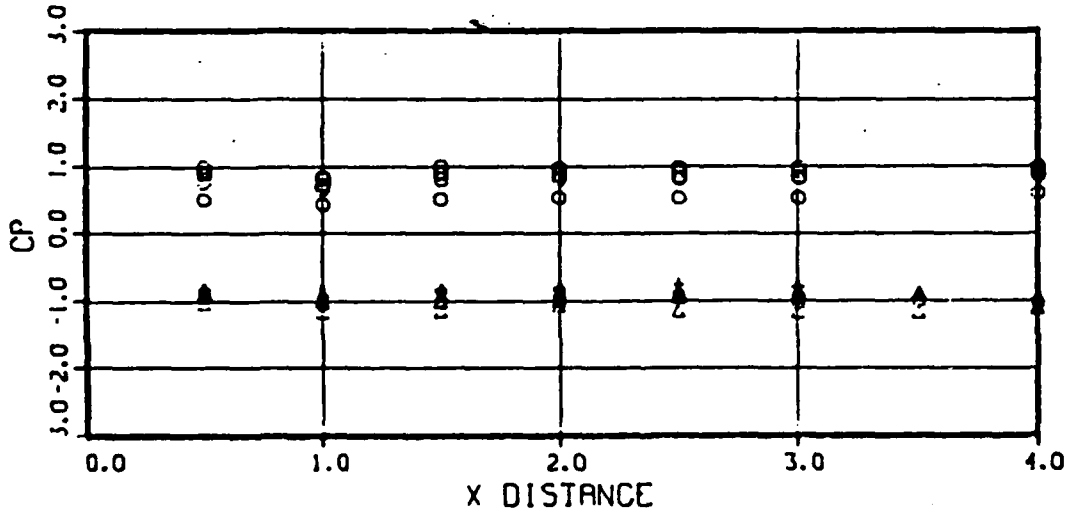


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 035 C1U- 9.8 +/- .12 RND1U- .325 +/-.003
P1U- 648. +/- 5.80 V1U-164.90 +/- .334
M1U- .147 +/- .001 CL--0.0306 CD-1.0045

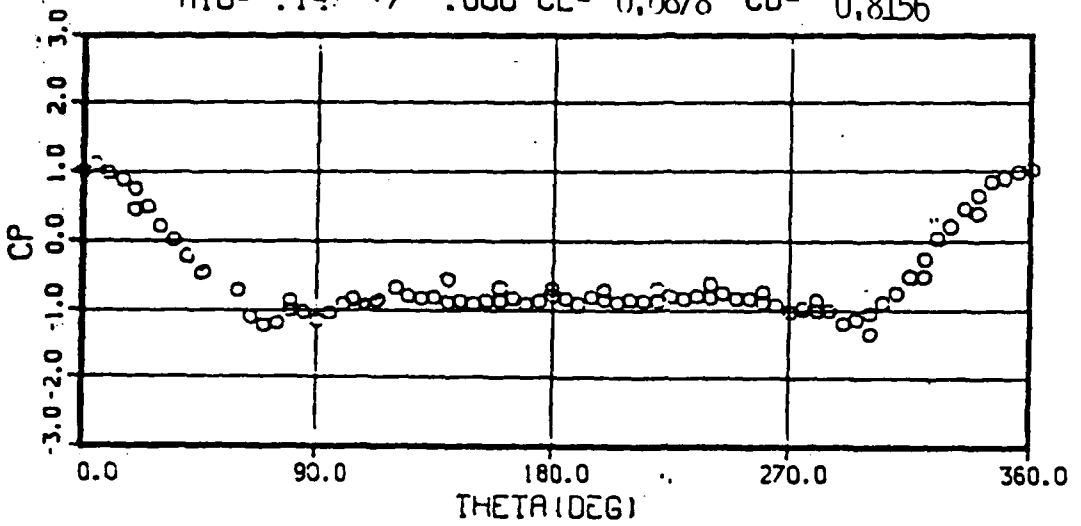


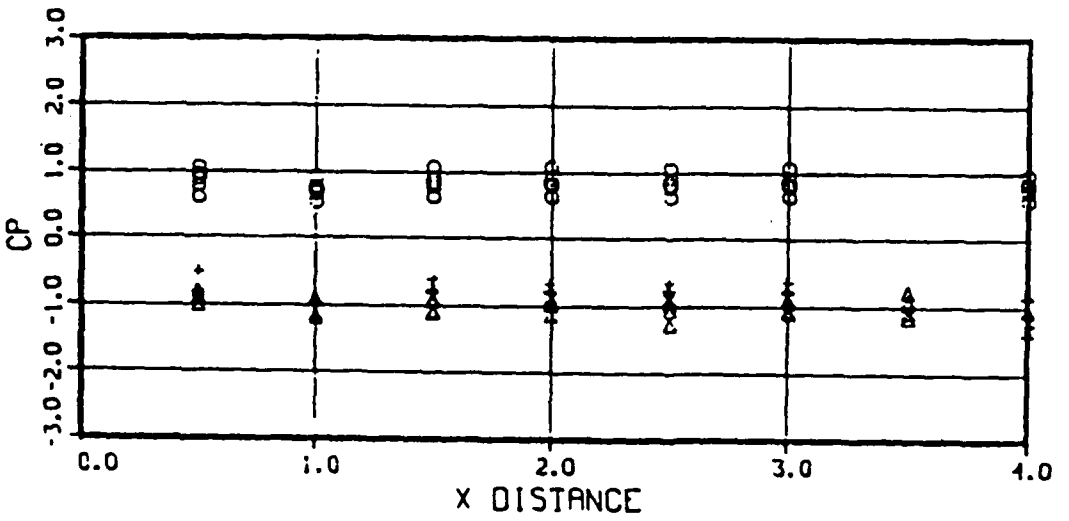


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 036 OIU- 10.6 +/- .06 RNDIU- .354 +/-.002
PIU- 704. +/- 2.60 VIU-155.28 +/- .234
MIU- .147 +/- .000 CL- 0.0878 CD- 0.8156

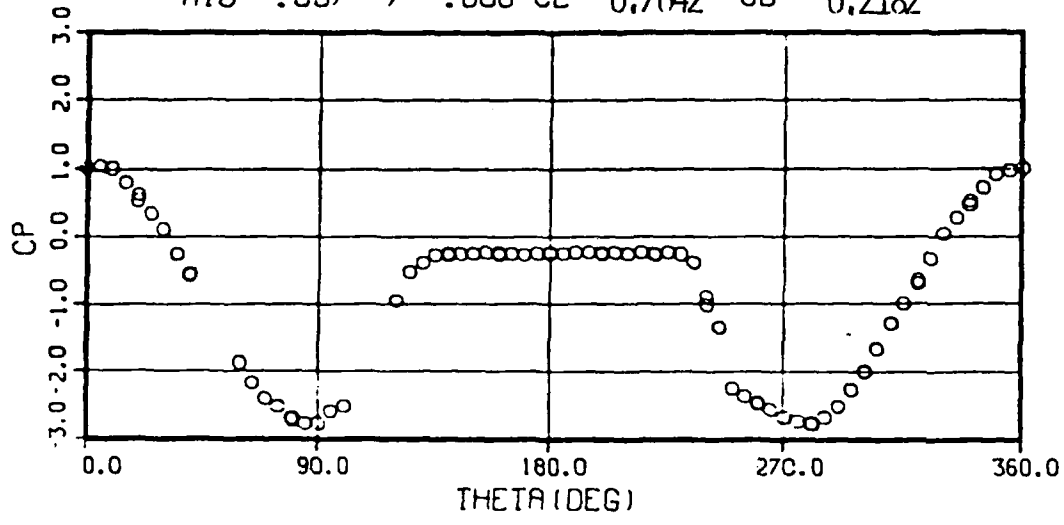


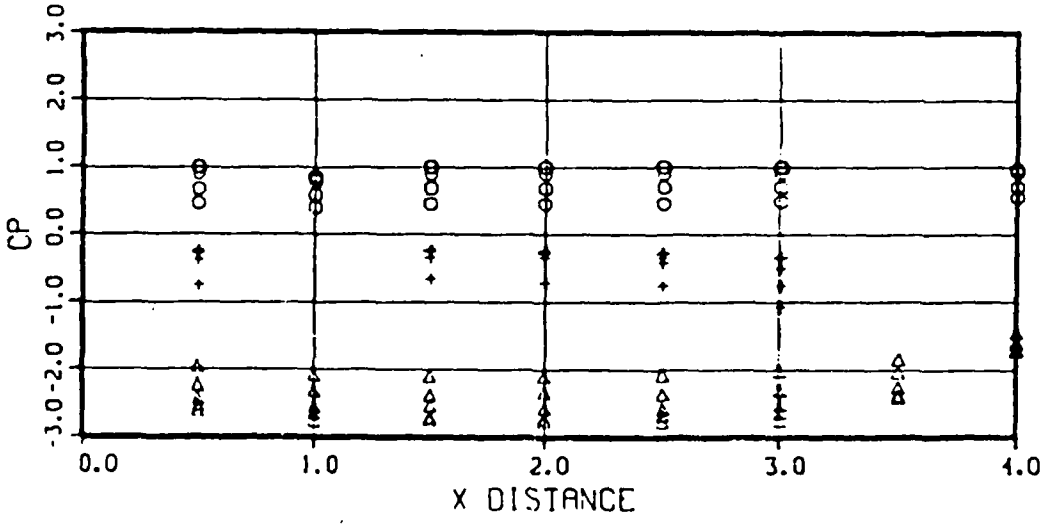


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 053 01U- 6.5 +/- .00 RND1U- .469 +/-.000
P1U- 2094. +/- .00 V1U- 75.29 +/- .008
M1U- .067 +/- .000 CL- 0.7642 CD- 0.2182

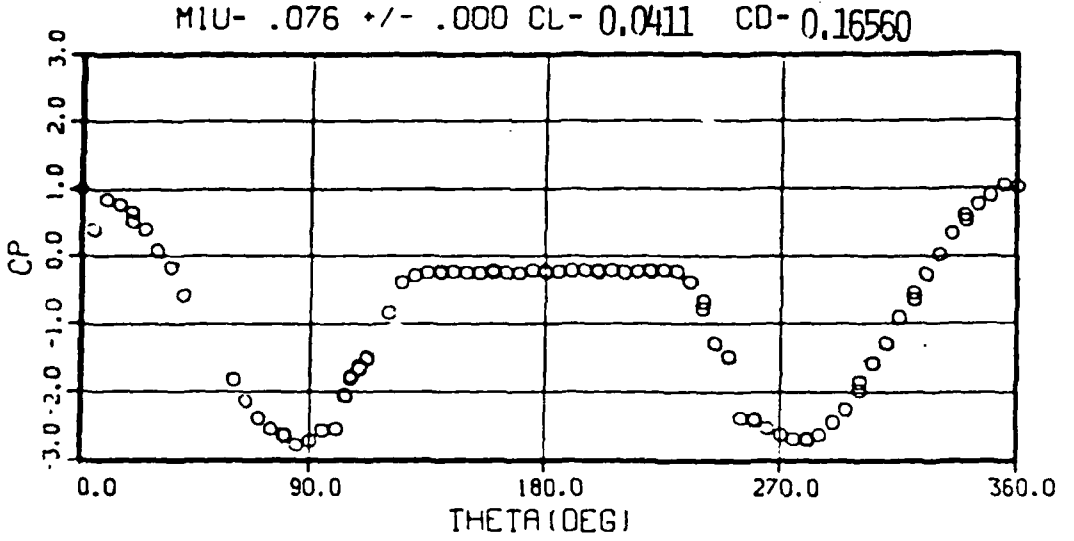


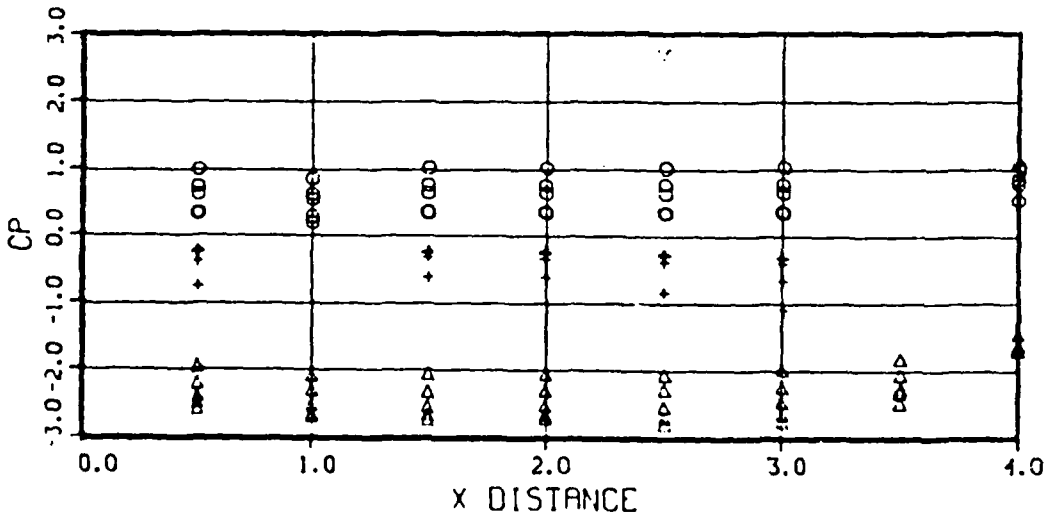


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 052 01U- 8.4 +/- .00 RND1U- .533 +/-.000
P1U- 2092. +/- .00 V1U- 85.66 +/- .000
M1U- .076 +/- .000 CL- 0.0411 CD- 0.16560

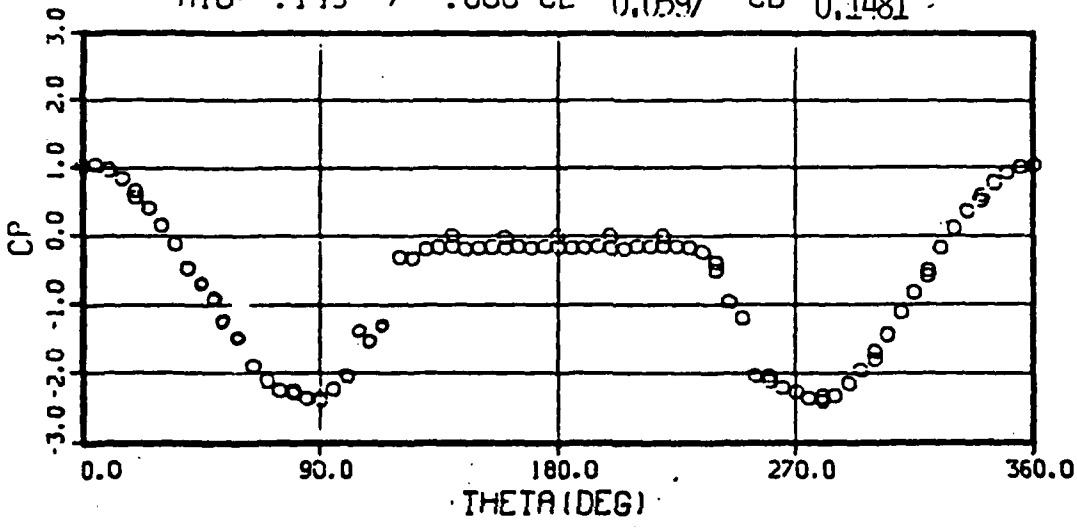


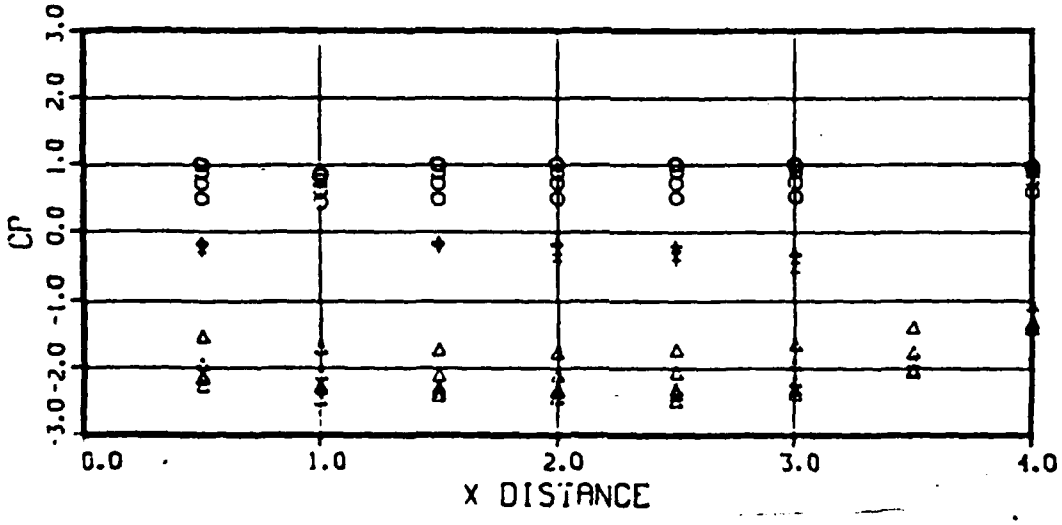


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

PUN 044 O1U- 14.3 +/- .06 RND1U- .471 +/-.002
P1U- 928. +/- 2.20 V1U-167.35 +/- .216
M1U- .149 +/- .000 CL- 0.0597 CD- 0.1481

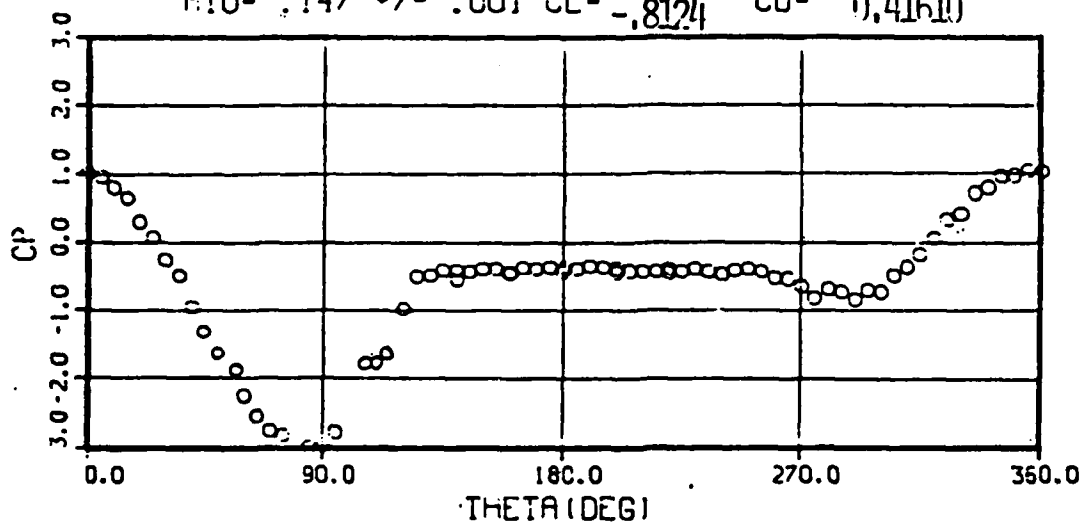


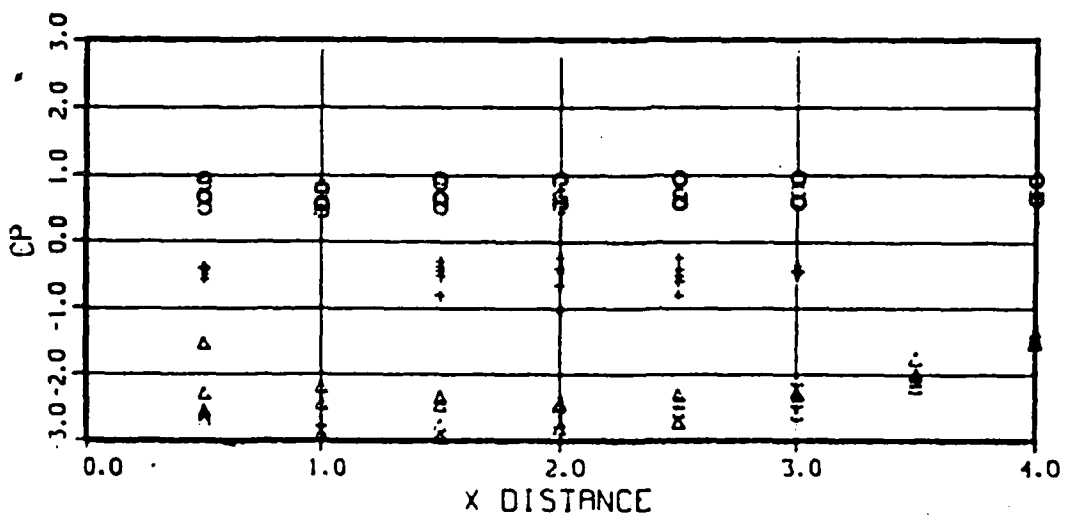


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 043 01U- 12.9 +/- .18 RND1U- .429 +/-.004
P1U- 849. +/- 3.80 V1U-165.64 +/- .996
M1U- .147 +/- .001 CL- -.8124 CD- 0.41610

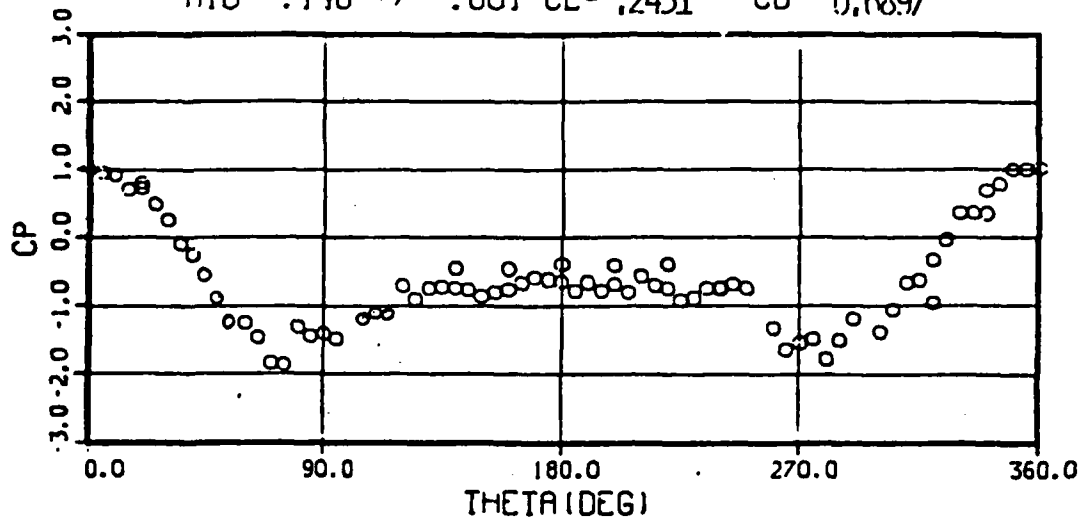


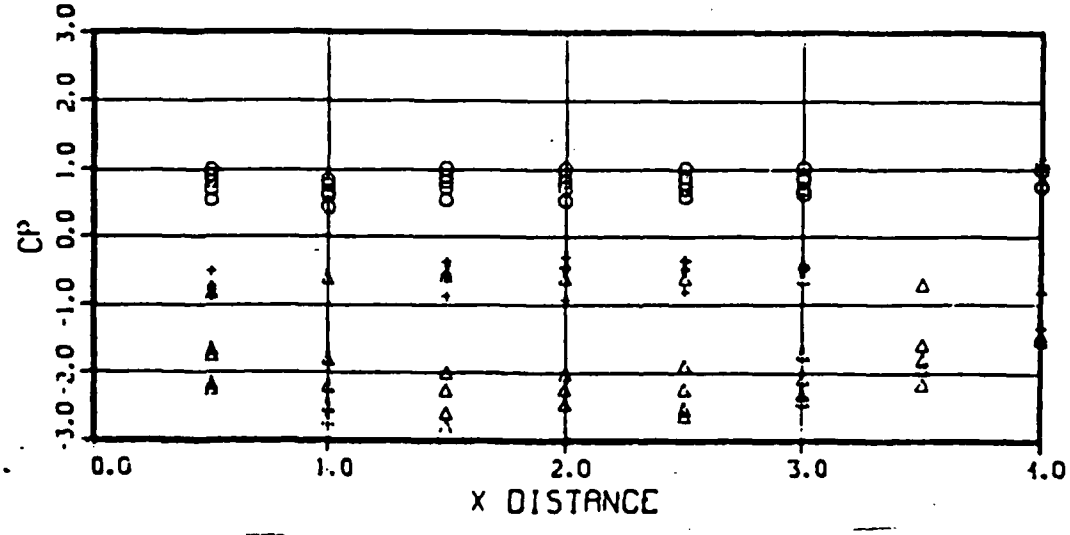


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 042 U1U- 12.8 +/- .26 RNU1U- .421 +/-.005
P1U- 830. +/- 4.20 V1U-166.32 +/- 1.198
M1U- .148 +/- .001 CL- .2451 CD- 0.6897

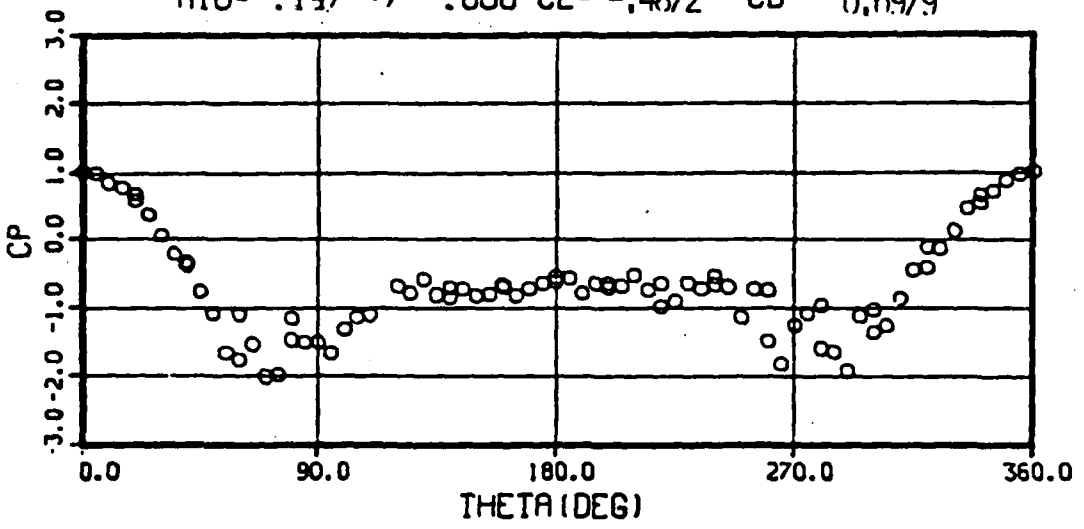


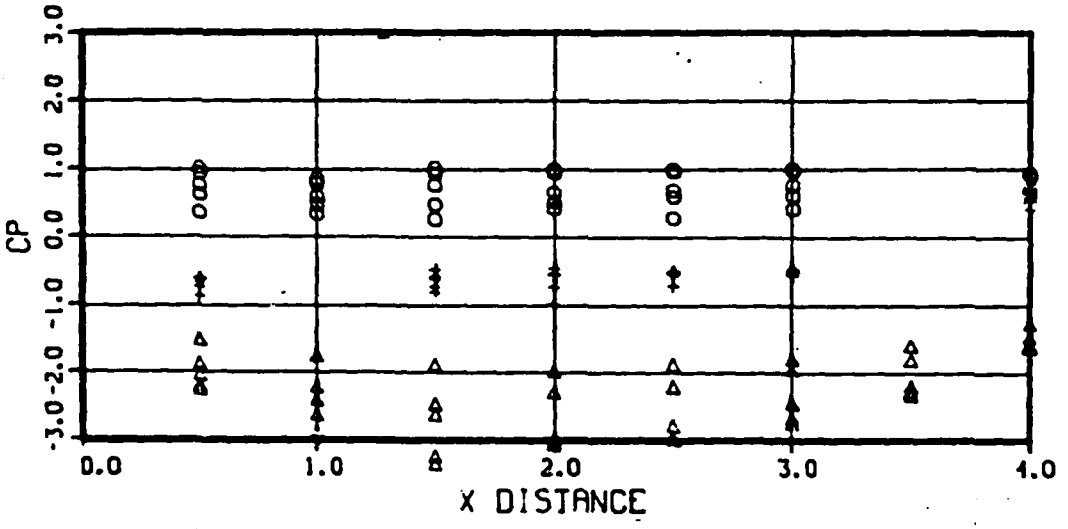


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 041 D1U- 12.5 +/- .06 RND1U- .414 +/-.003
P1U- 820. +/- 4.80 V1U-165.47 +/- .312
M1U- .147 +/- .000 CL- -.4872 CD- 0.6979

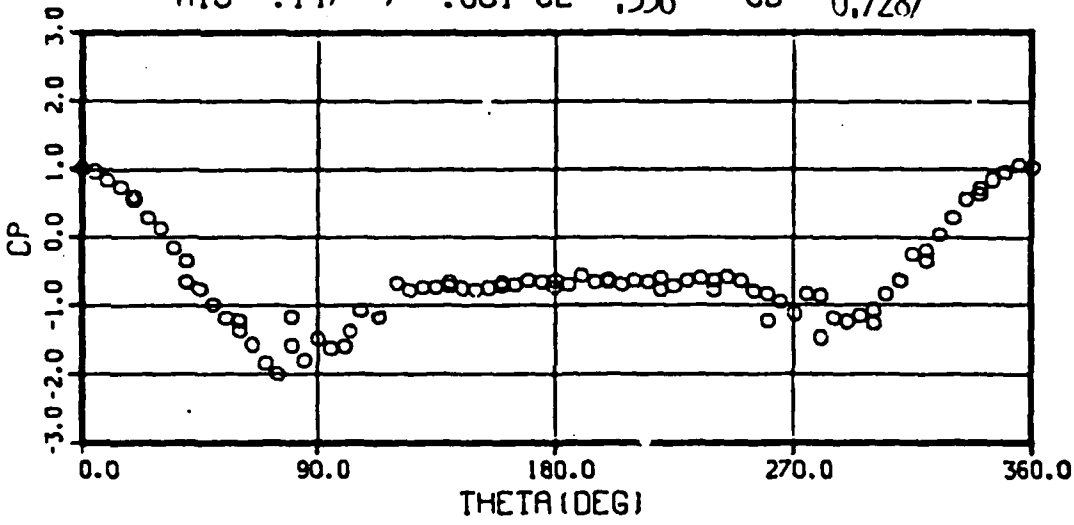


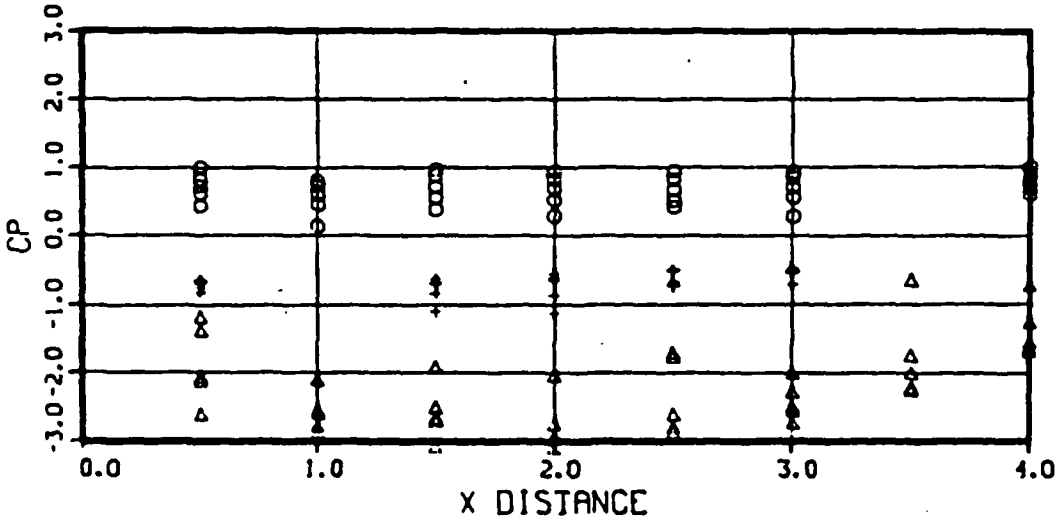


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 040 QIU- 12.3 +/- .18 RNDIU- .408 +/-.003
PIU- 811. +/- 3.80 VIU-165.30 +/- .980
MIU- .147 +/- .001 CL- .336 CD- 0.7287

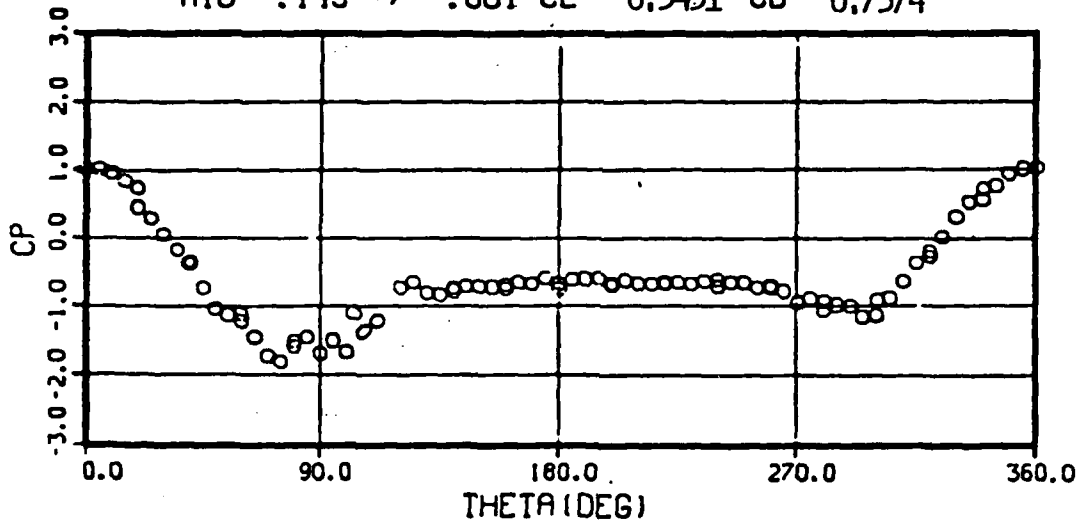


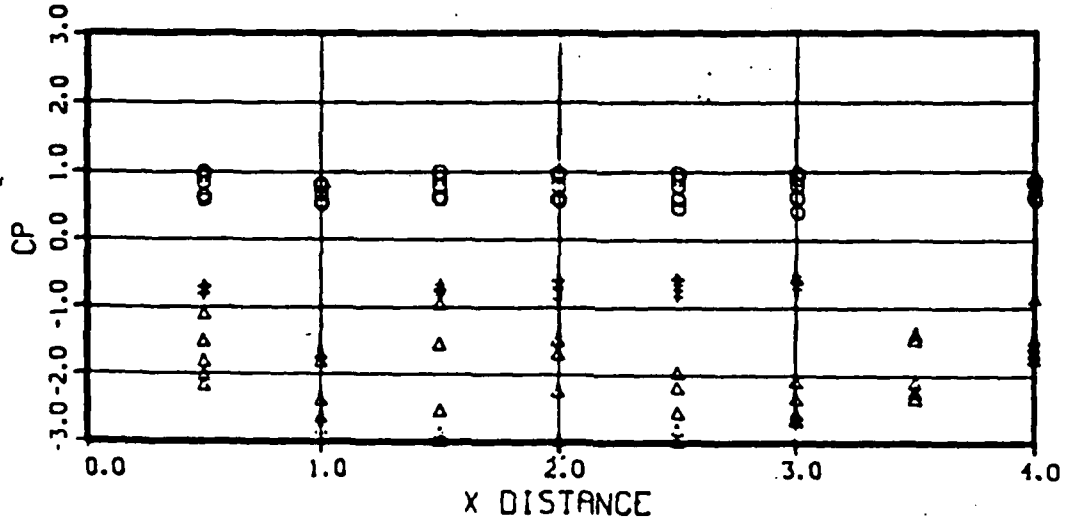


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 039 O1U- 12.1 +/- .00 RND1U- .400 +/-.002
P1U- 792. +/- 3.80 V1U-165.95 +/- .314
M1U- .148 +/- .001 CL- -0.3431 CD- 0.7574

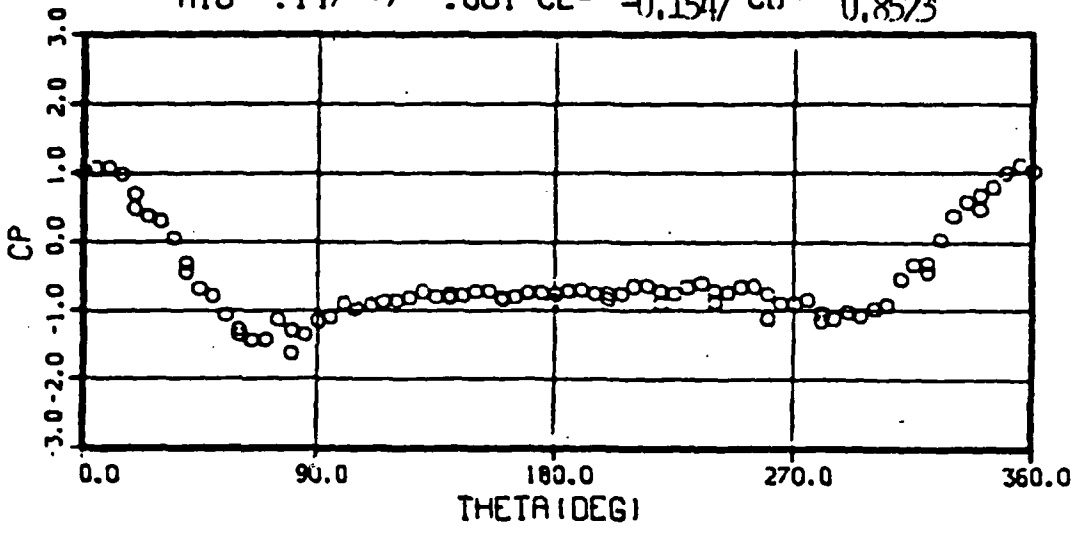


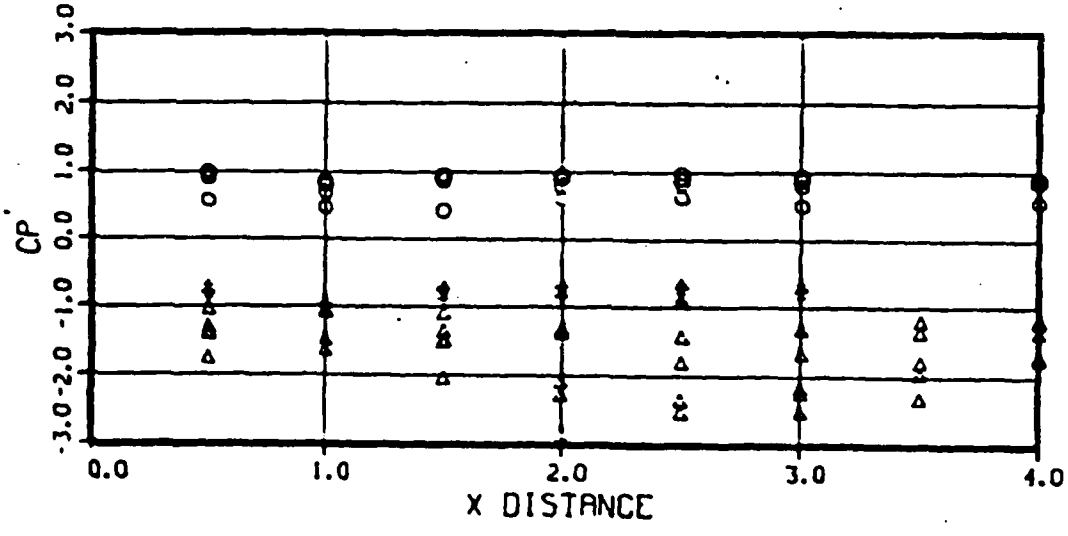


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 038 D1U- 11.6 +/- .10 RND1U- .386 +/-.003
P1U- 769. +/- 4.60 V1U-164.93 +/- .574
M1U- .147 +/- .001 CL- -0.1547 CD- 0.8523

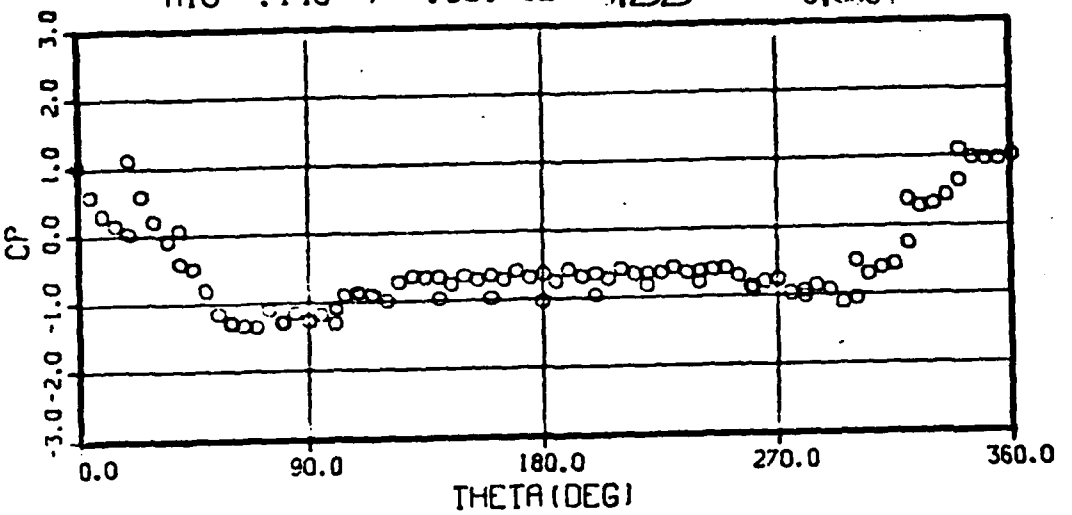


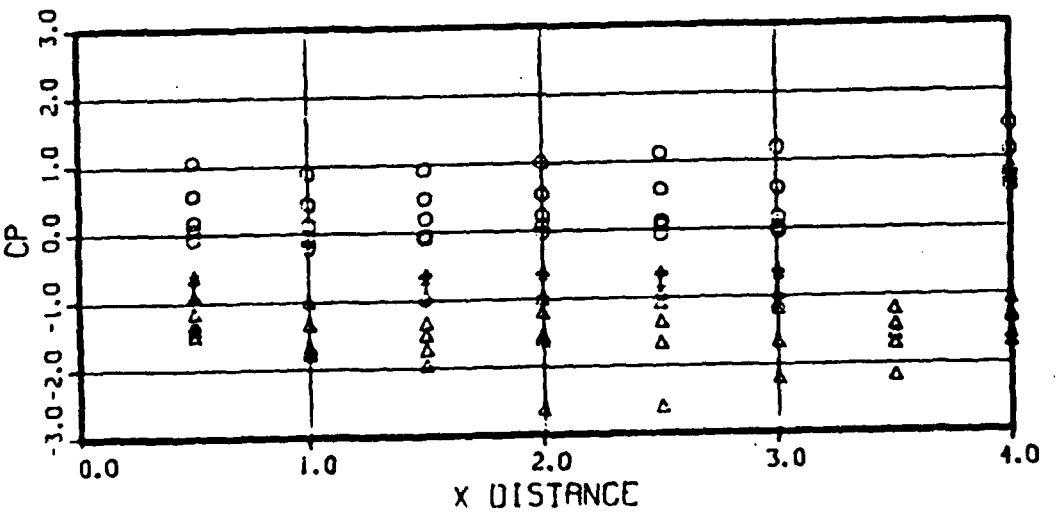


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 049 QIU- 11.4 +/- .12 RNDIU- .384 +/-.003
PIU- 767. +/- 8.20 VIU-163.47 +/- 1.246
MIU- .146 +/- .001 CL- -0.2523 CD- 0.8064

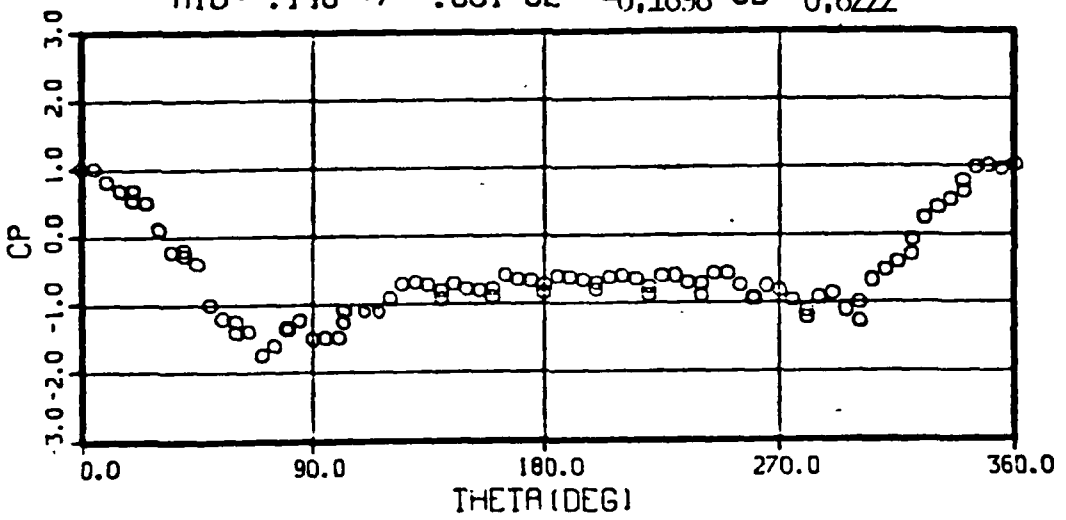


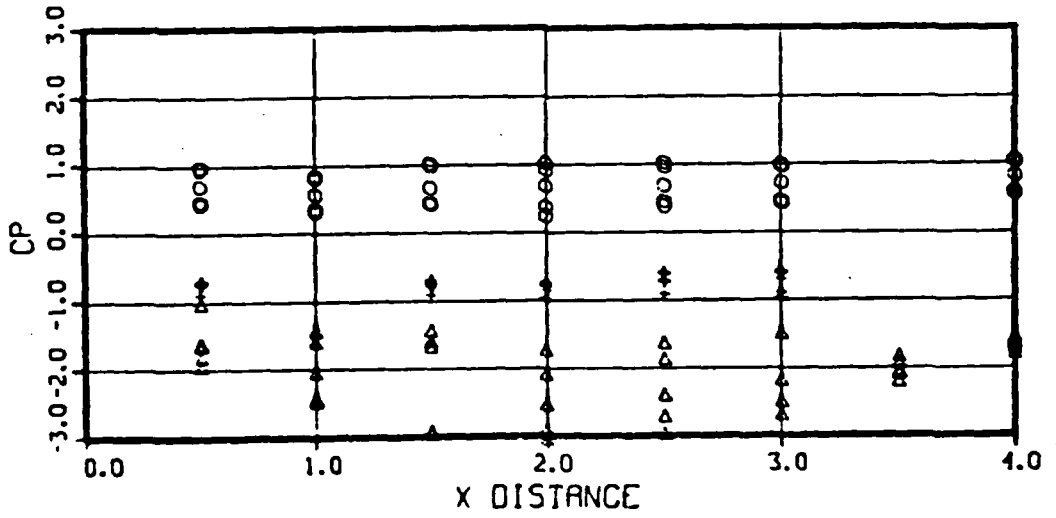


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 048 Q1U- 11.8 +/- .08 RND1U- .395 +/-.002
P1U- 785. +/- 2.40 V1U-164.22 +/- .388
M1U- .146 +/- .001 CL- -0.1898 CD- 0.8222

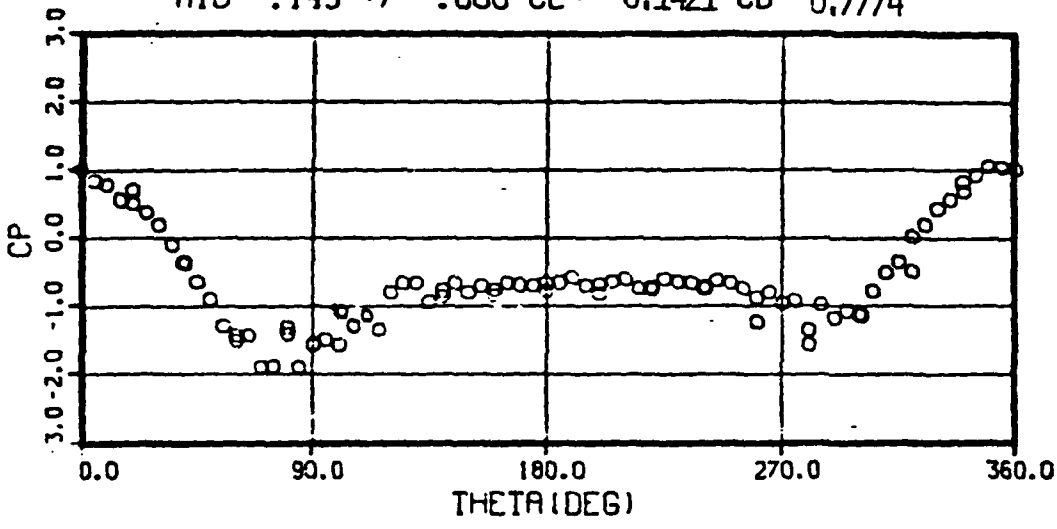


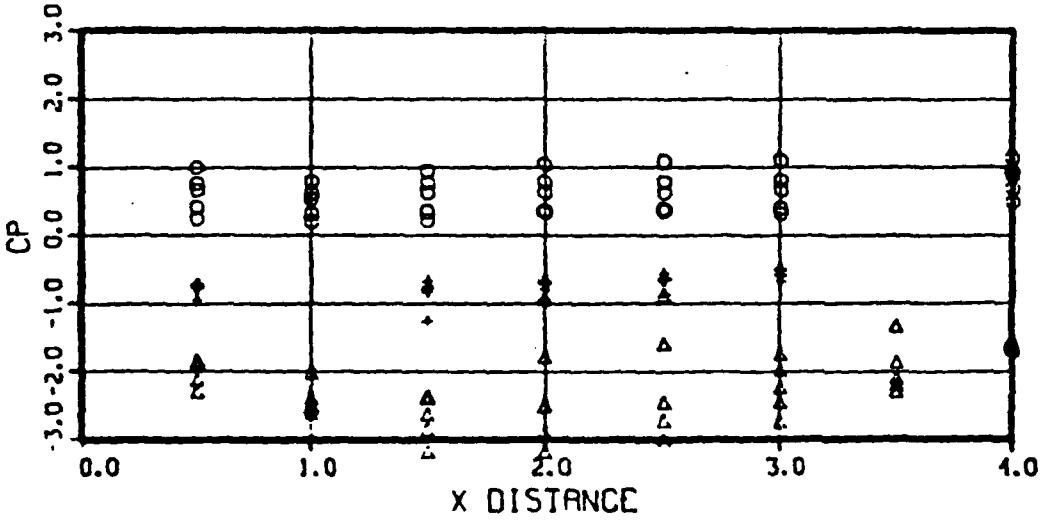


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 047 Q1U- 11.9 +/- .08 RND1U- .403 +/-.002
P1U- 807. +/- 2.20 V1U-162.86 +/- .172
M1U- .145 +/- .000 CL- -0.1421 CD- 0.7774

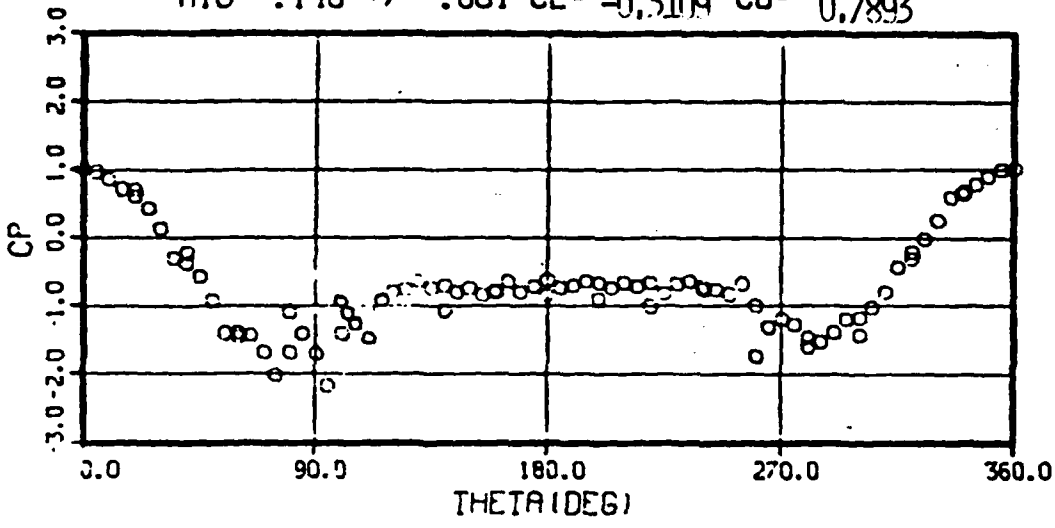


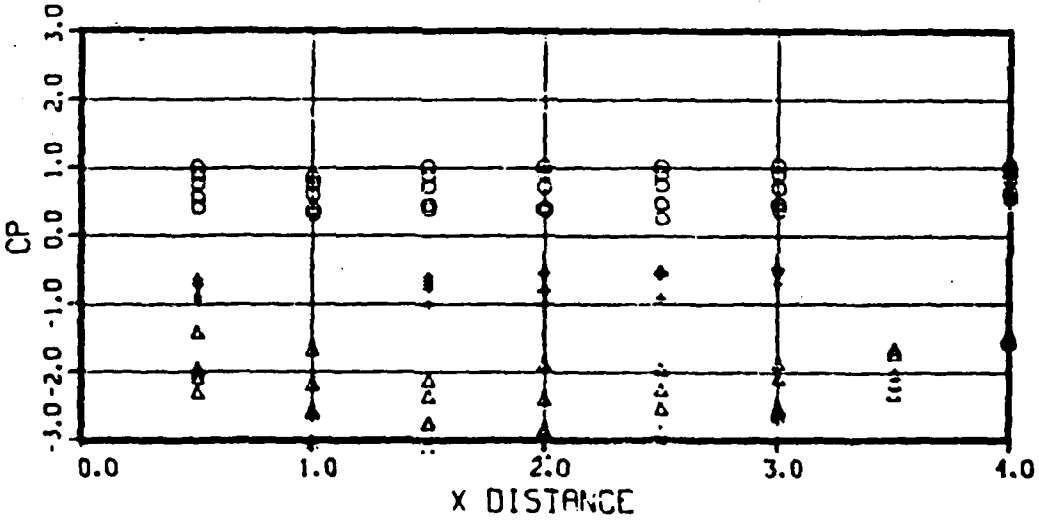


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 046 QIU- 12.3 +/- .10 RNDIU- .415 +/-.002
PIU- 828. +/- 3.40 VIU-163.43 +/- .352
MIU- .146 +/- .001 CL- -0.3109 CD- 0.7893

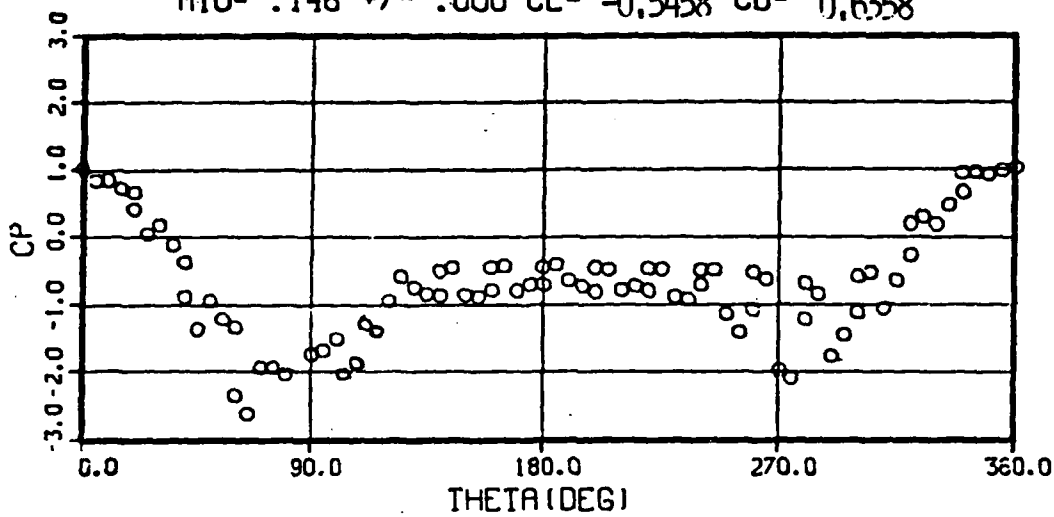


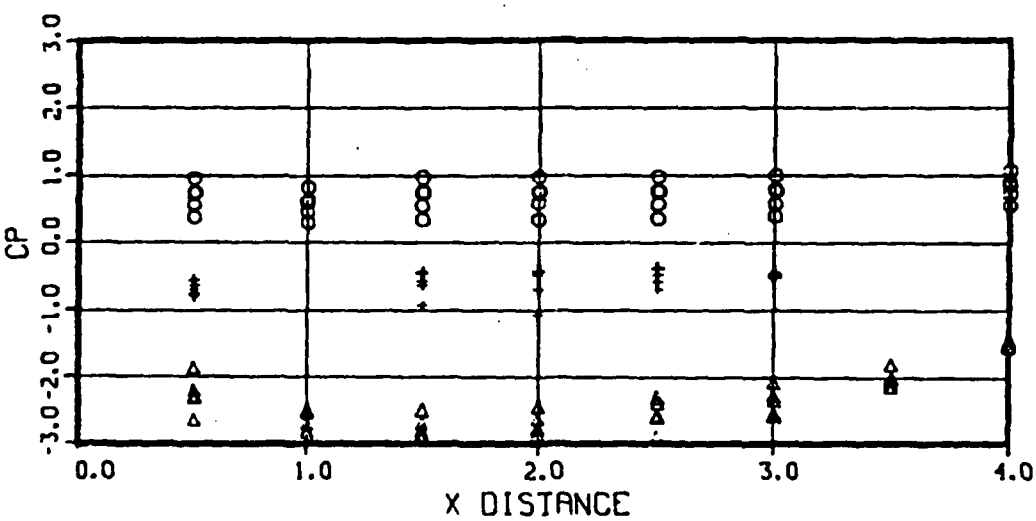


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 045 O1U- 12.5 +/- .00 RND1U- .422 +/-.000
P1U- 842. +/- 2.60 V1U-163.54 +/- .198
M1U- .146 +/- .000 CL- -0,5458 CD- 0,6358

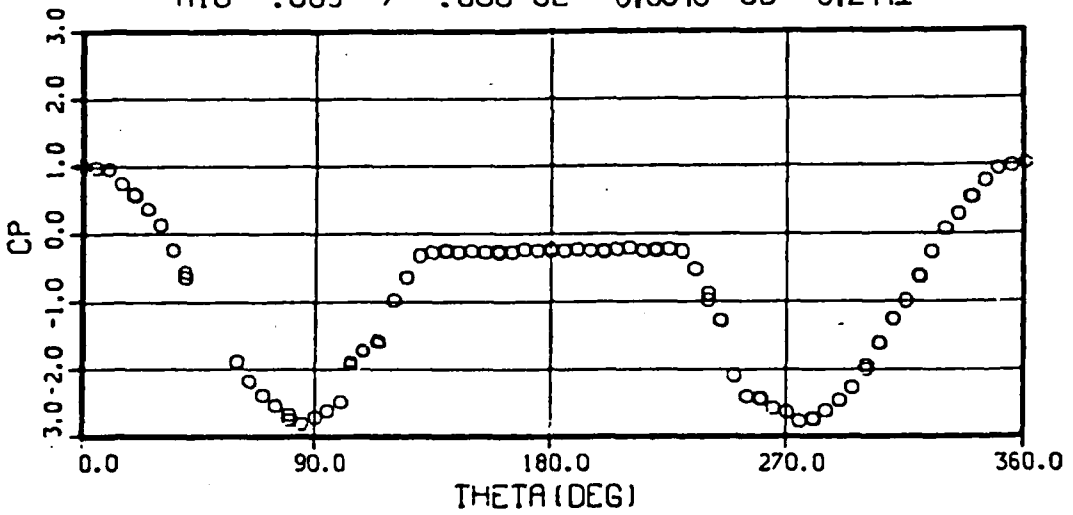


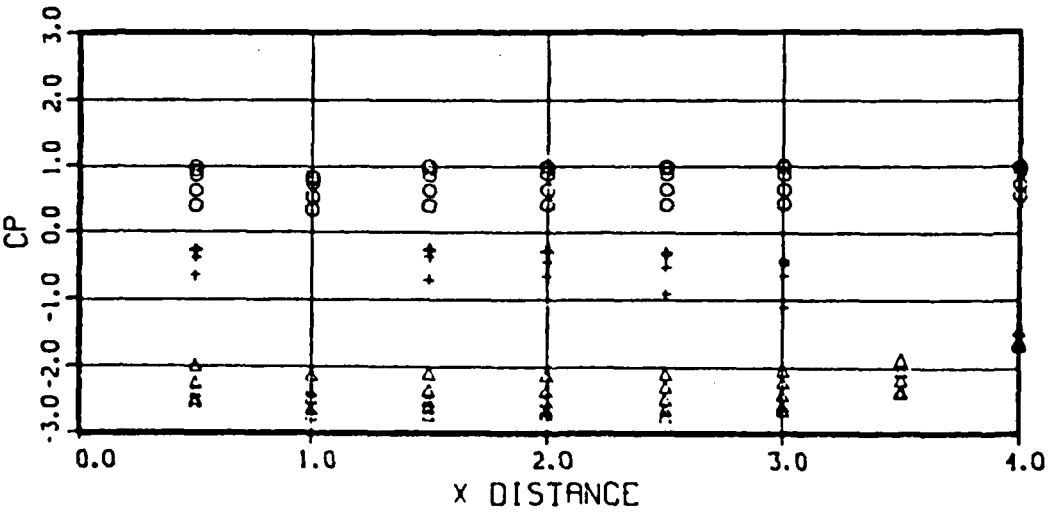


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 054 Q1U- 5.8 +/- .00 RND1U- .444 +/-.000
P1U- 2094. +/- .00 V1U- 71.18 +/- .006
M1U- .063 +/- .000 CL- 0.0848 CD- 0.2441

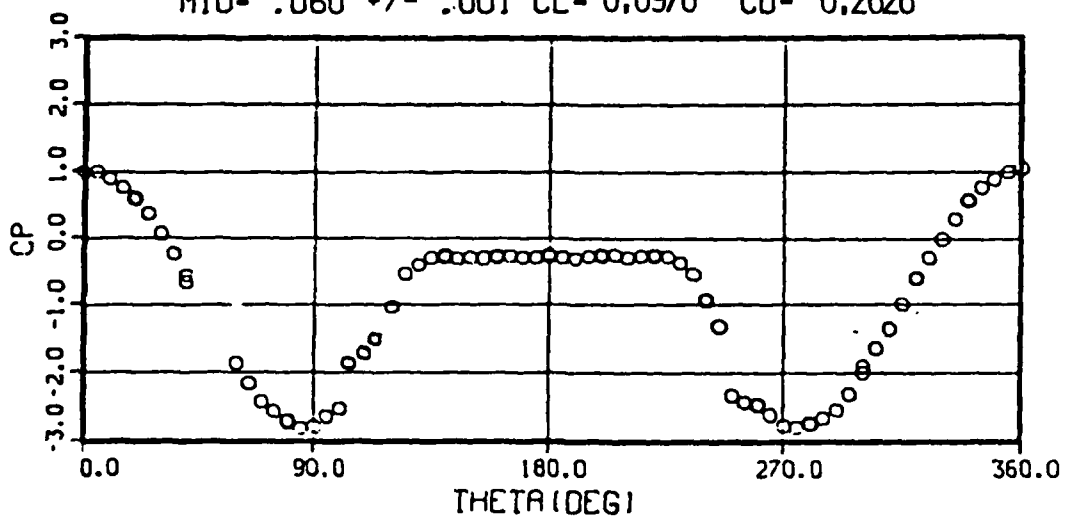


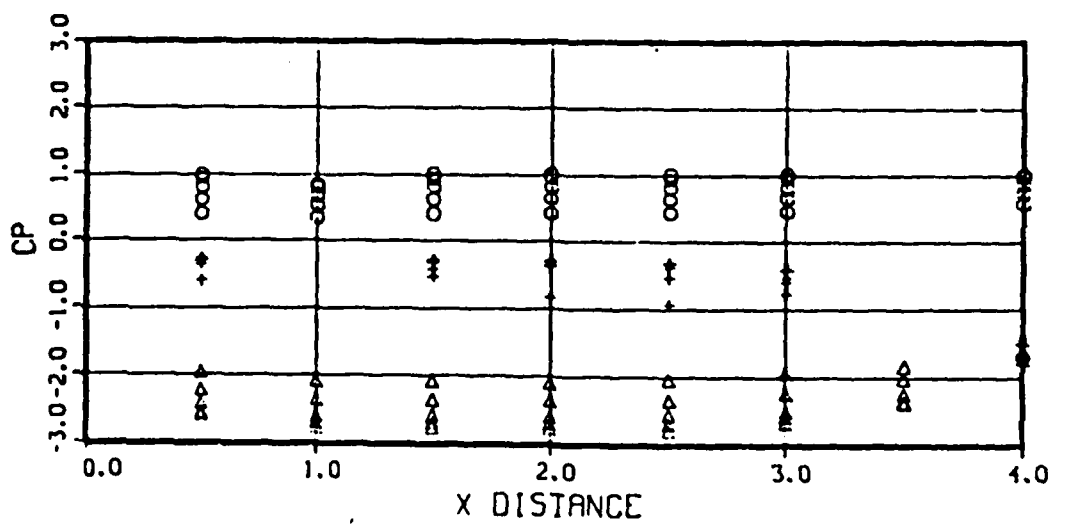


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 055 Q1U- 5.3 +/- .08 RND1U- .427 +/-.002
P1U- 2095. +/- .00 V1U- 68.41 +/- .392
M1U- .060 +/- .001 CL- 0.0976 CD- 0.2626

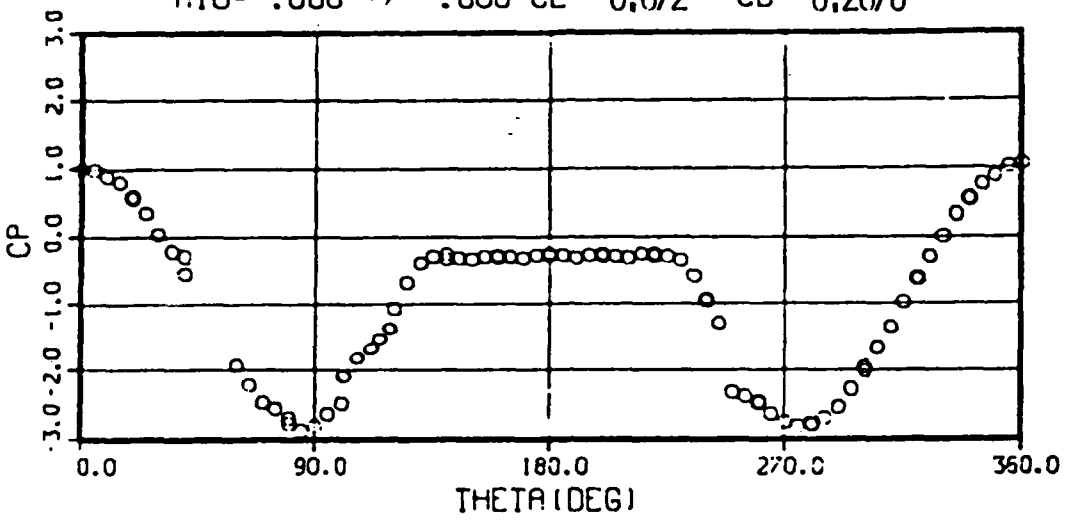


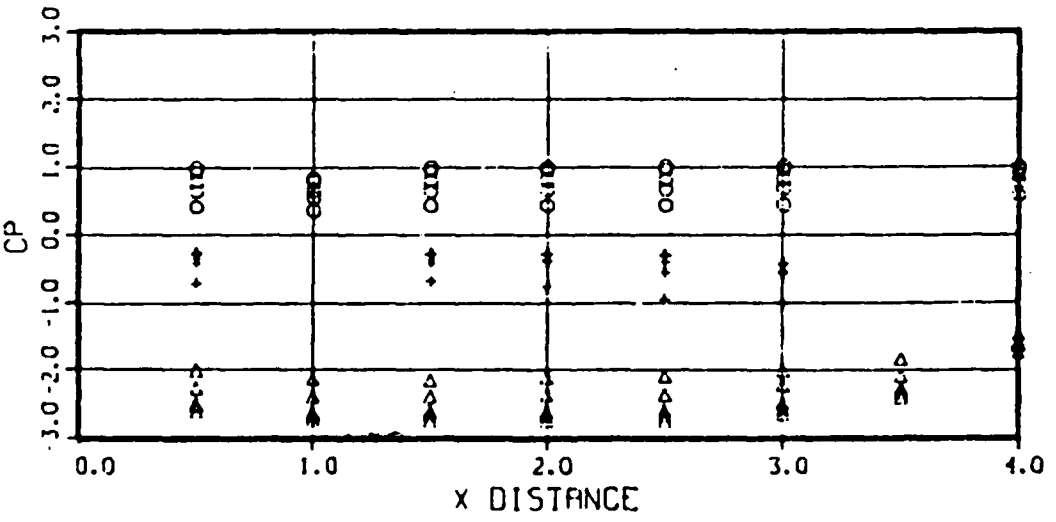


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 056 01U- 5.3 +/- .00 RND1U- .423 +/-.000
P1U- 2095. +/- .00 V1U- 67.81 +/- .006
M1U- .060 +/- .000 CL- 0.072 CD- 0.2676

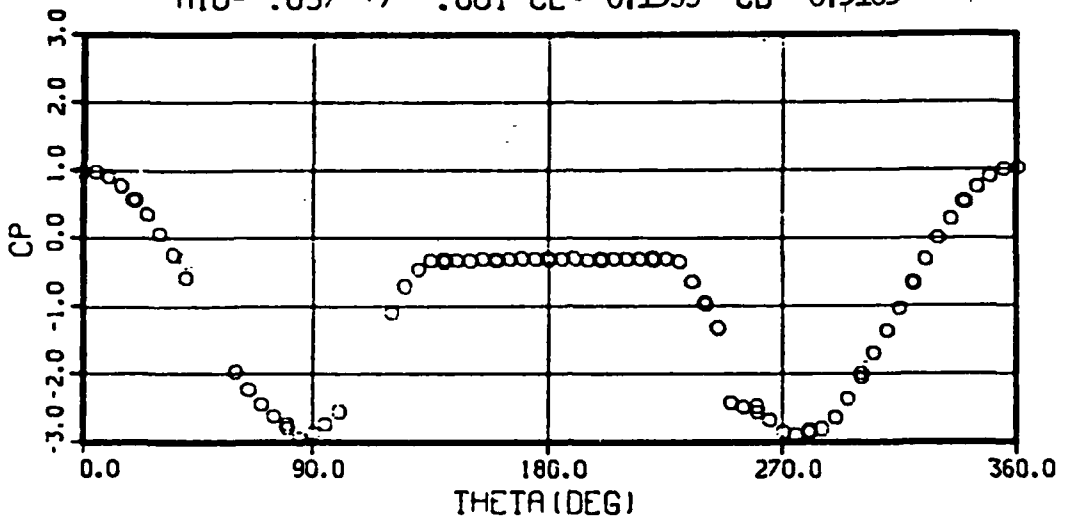


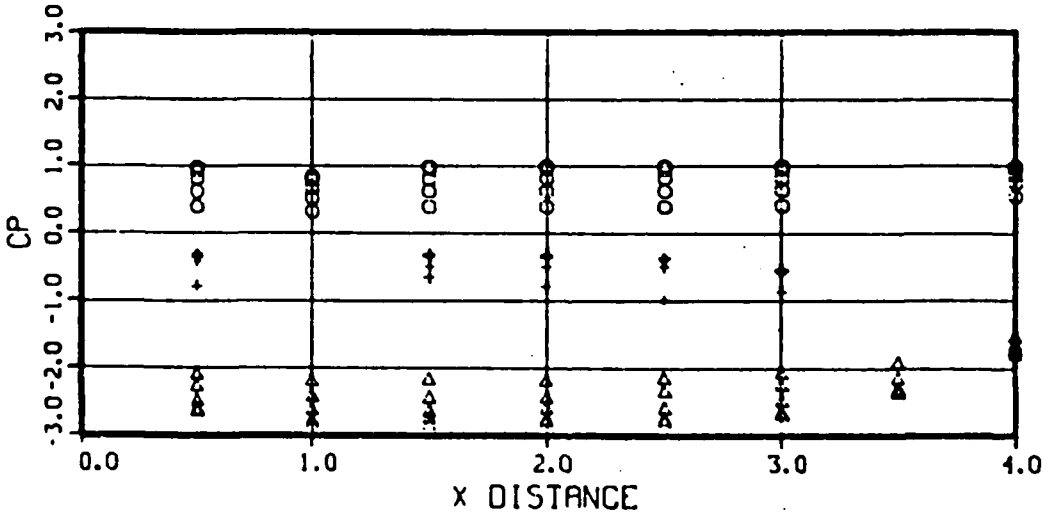


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 057 QIU- 4.8 +/- .08 RNDIU- .406 +/-.002
PIU- 2095. +/- .00 VIU- 64.88 +/- .410
MIU- .057 +/- .001 CL- 0.1599 CD- 0.3105

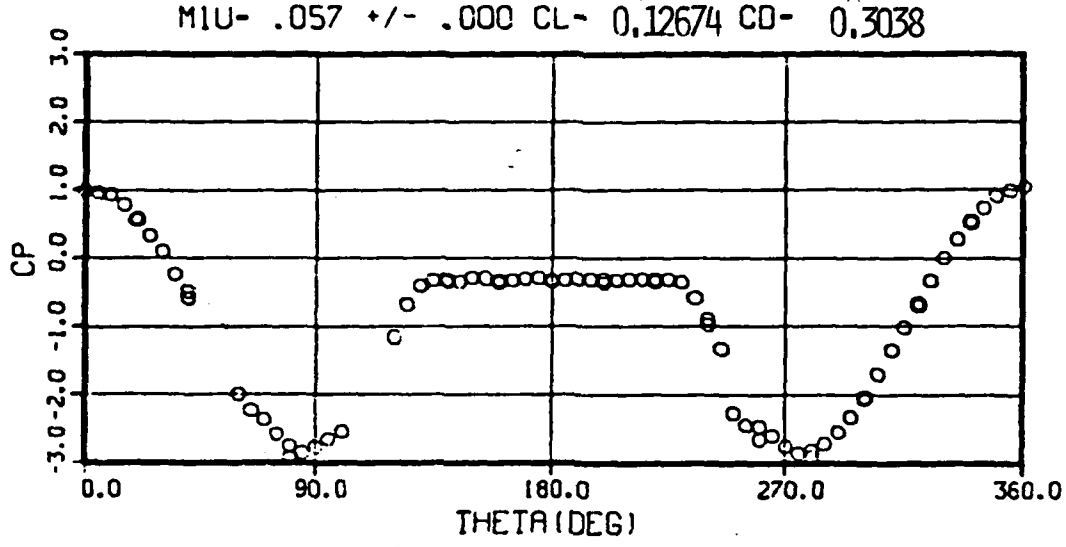


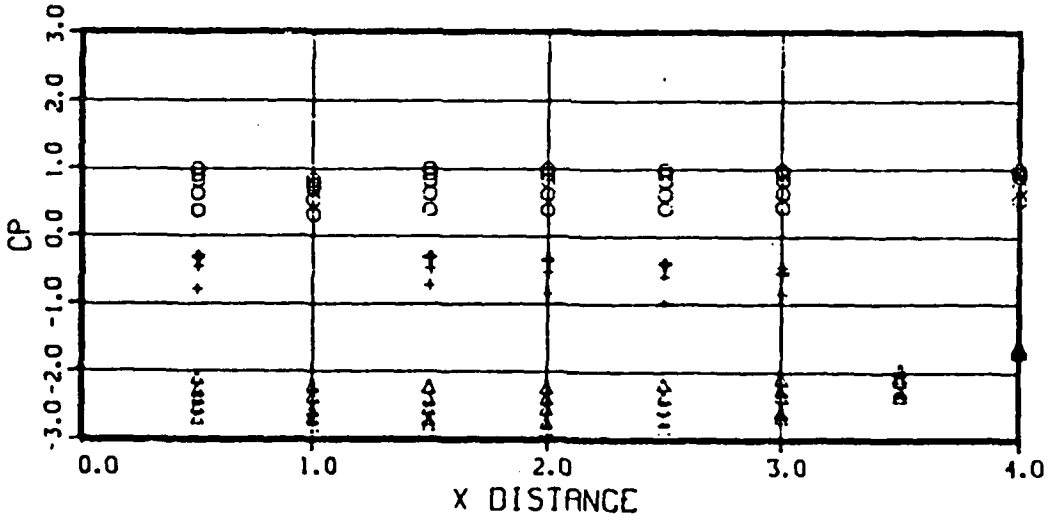


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 058 O1U- 4.8 +/- .06 RND1U- .404 +/-.002
P1U- 2095. +/- .00 V1U- 64.56 +/- .320
M1U- .057 +/- .000 CL- 0.12674 CD- 0.3038

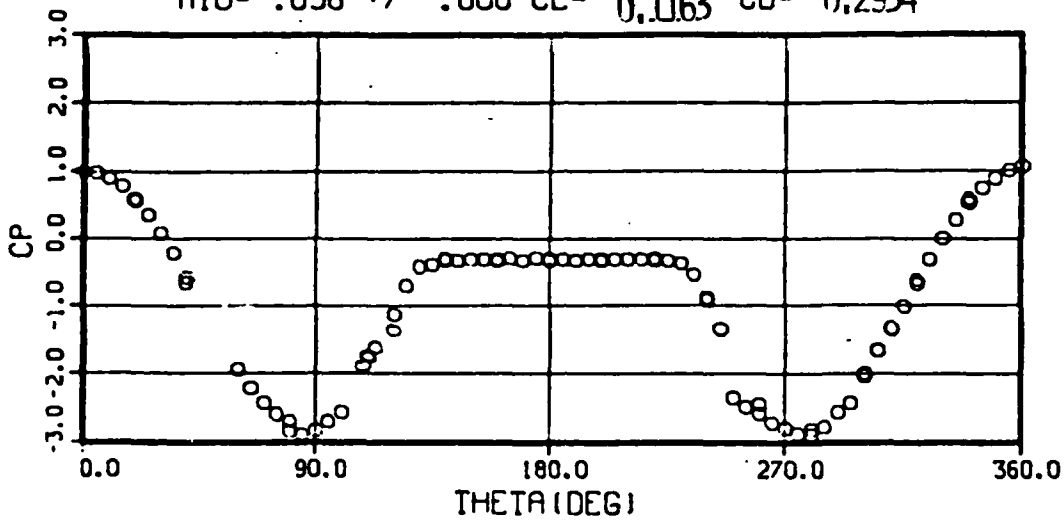


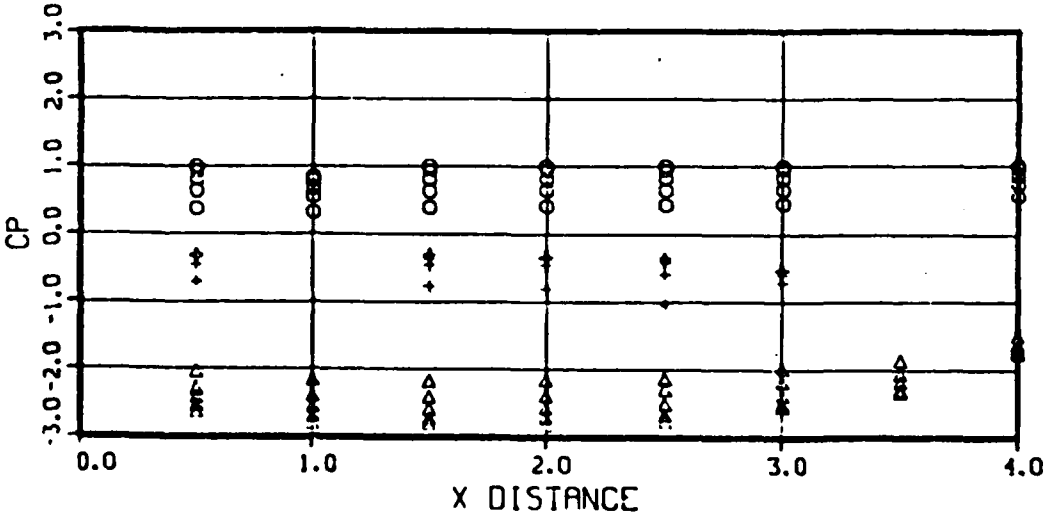


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 059 01U- 4.6 +/- .00 RND1U- .395 +/-.000
P1U- 2096. +/- .00 V1U- 63.19 +/- .006
M1U- .056 +/- .000 CL- 0.1163 CD- 0.2954

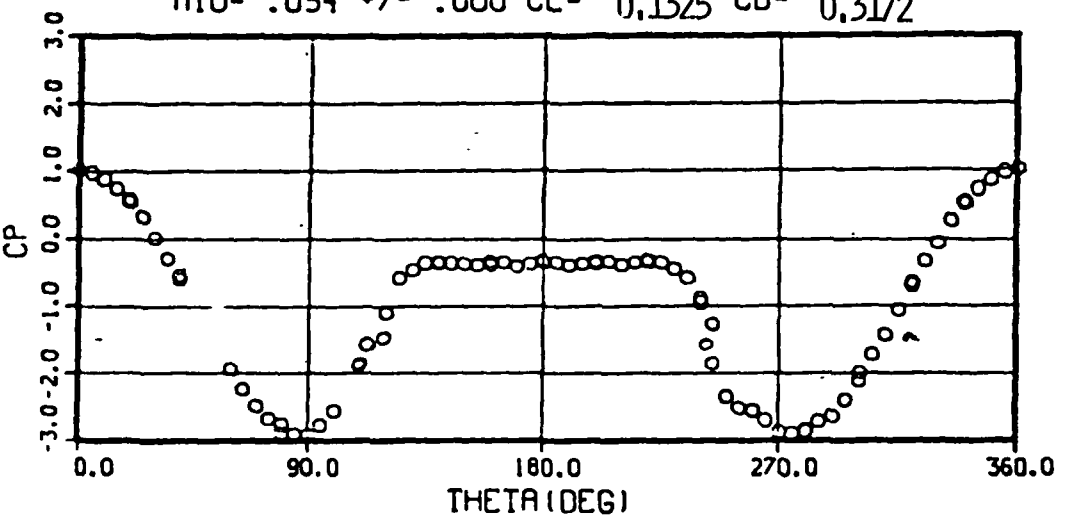


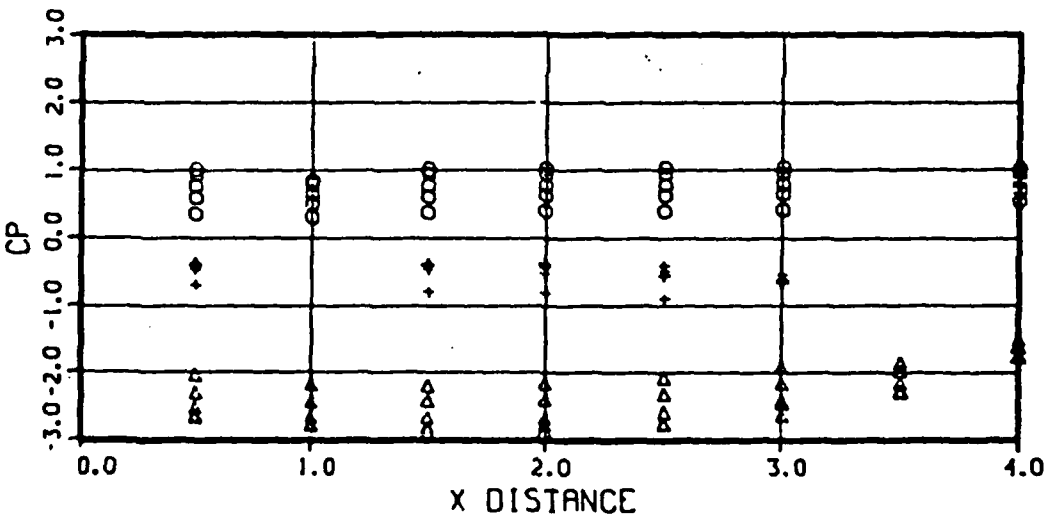


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 060 QIU- 4.3 +/- .00 RNDIU- .382 +/-.000
PIU- 2096. +/- .00 VIU- 61.04 +/- .000
MIU- .054 +/- .000 CL- 0.1325 CD- 0.3172

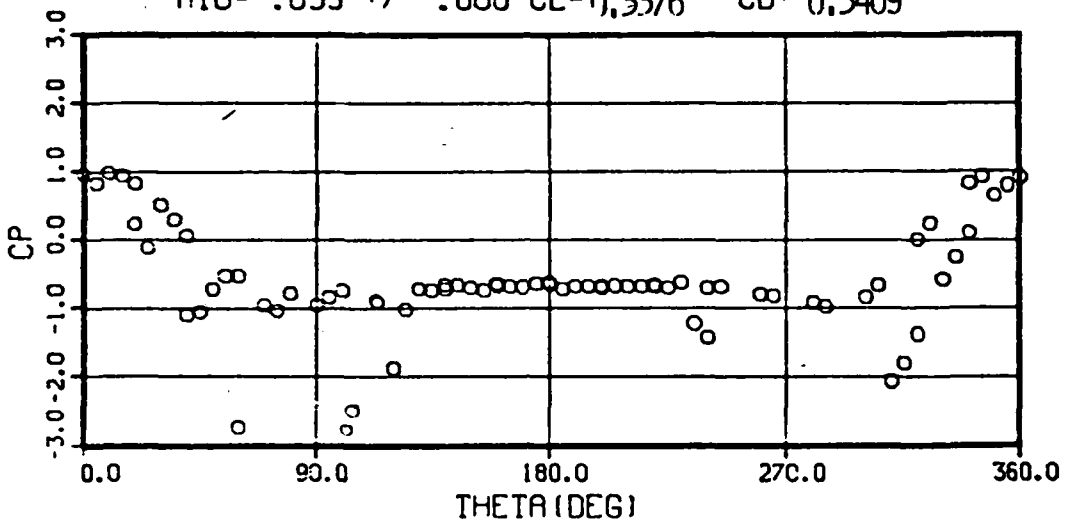


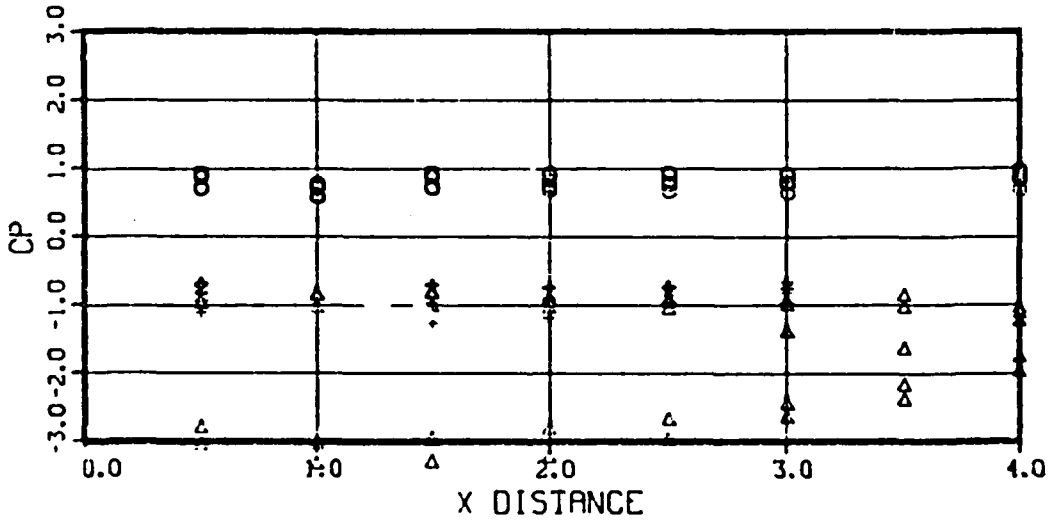


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 061 QIU- 4.1 +/- .00 RNDIU- .372 +/-.000
PIU- 2096. +/- .00 VIU- 59.38 +/- .008
MIU- .053 +/- .000 CL-0,3376 CD- 0,5409

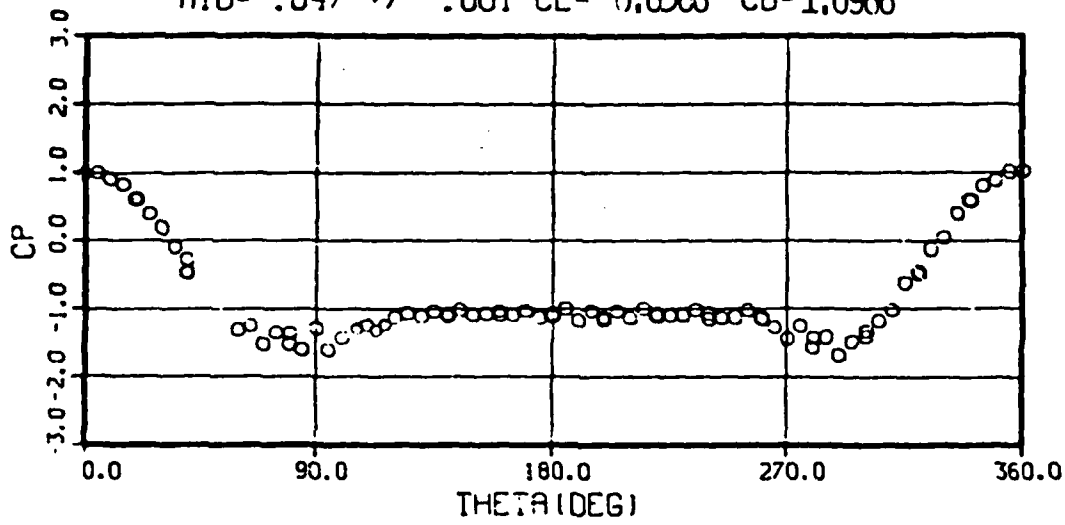


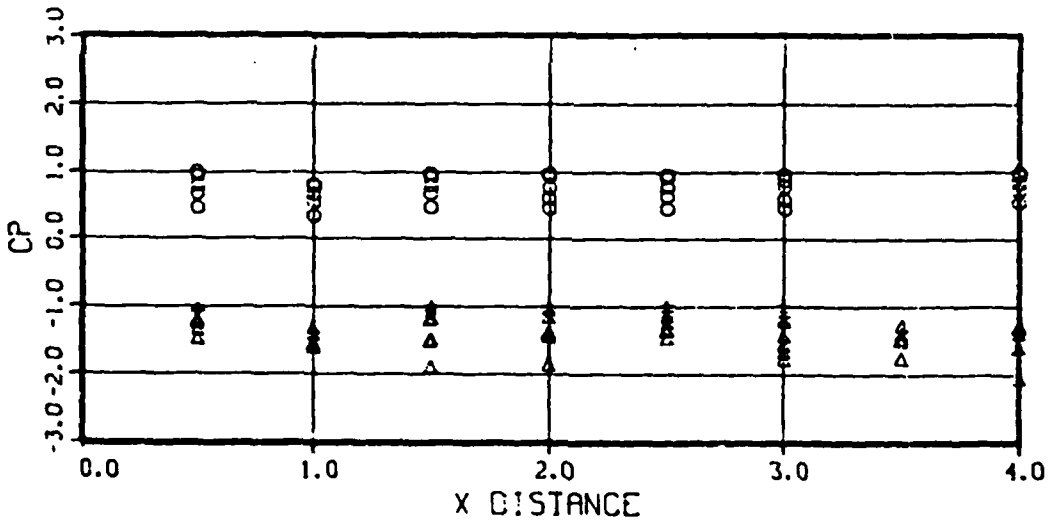


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 062 Q1U- 3.2 +/- .08 RND1U- .330 +/-.003
P1U- 2096. +/- .CO V1U- 52.73 +/- .498
M1U- .047 +/- .001 CL- 0.0366 CD-1.0966

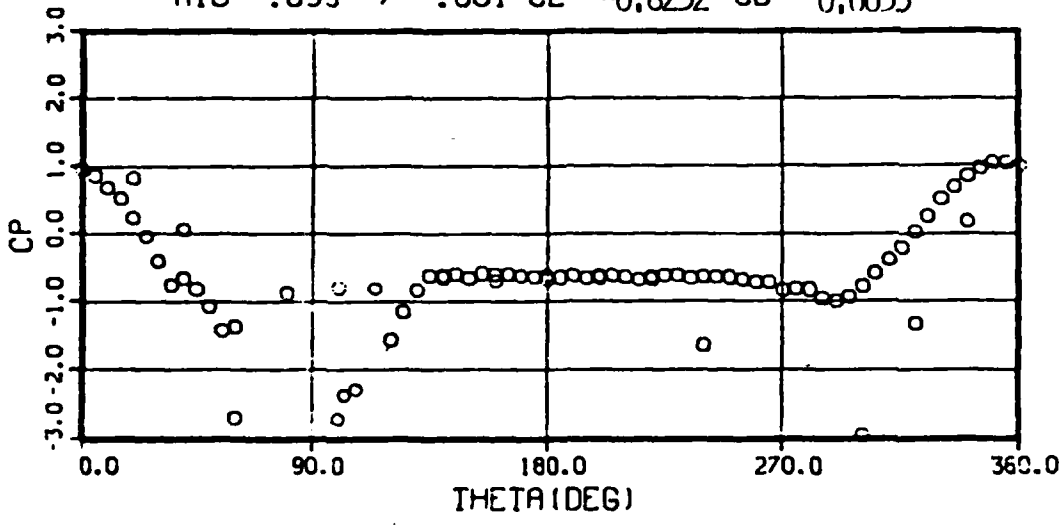


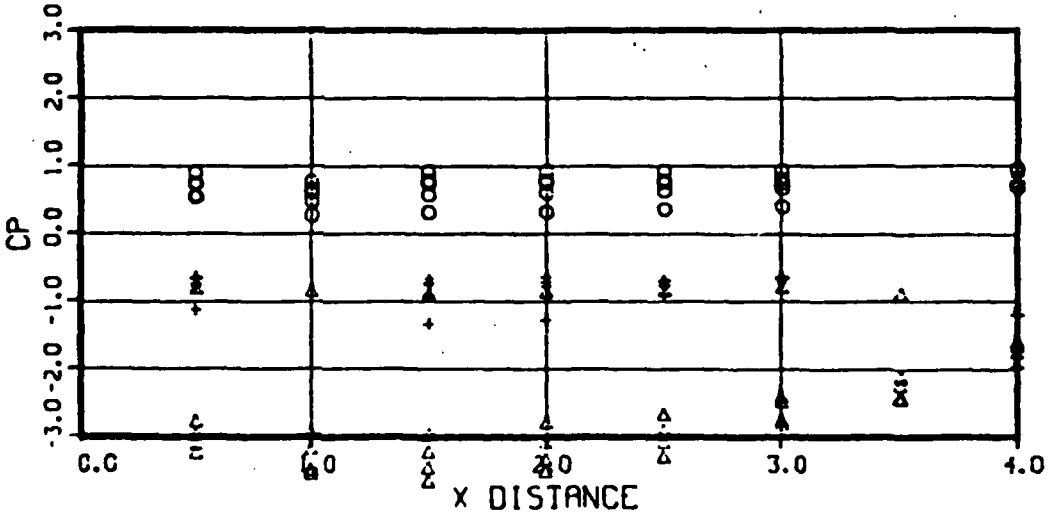


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 063 01U- 4.1 +/- .08 RND1U- .371 +/-.002
P1U- 2095. +/- .00 V1U- 59.25 +/- .450
M1U- .053 +/- .001 CL- -0.8252 CD- 0.6053

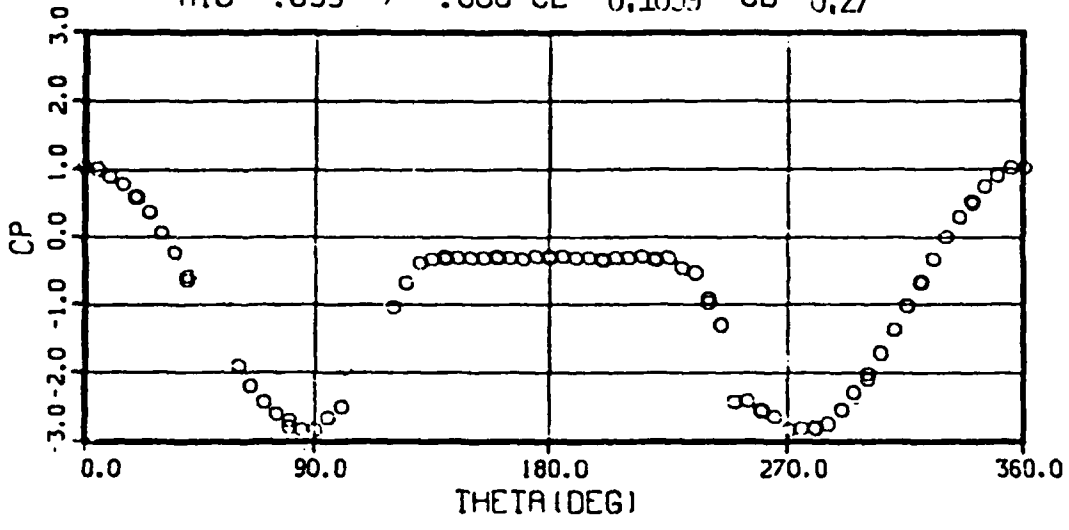


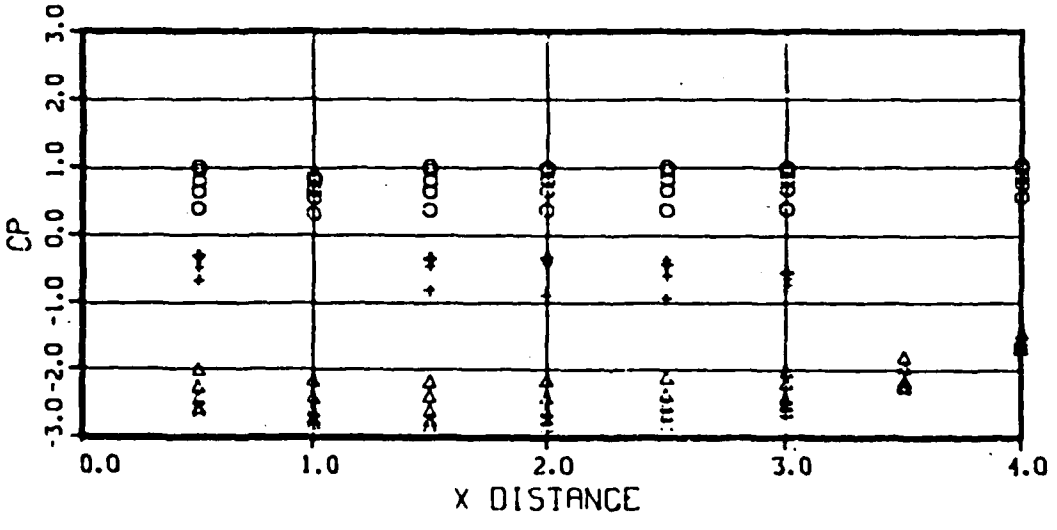


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 065 01U- 4.5 +/- .00 RND1U- .393 +/-.000
P1U- 2095. +/- .00 V1U- 62.61 +/- .008
M1U- .055 +/- .000 CL- 0.1099 CD- 0.27

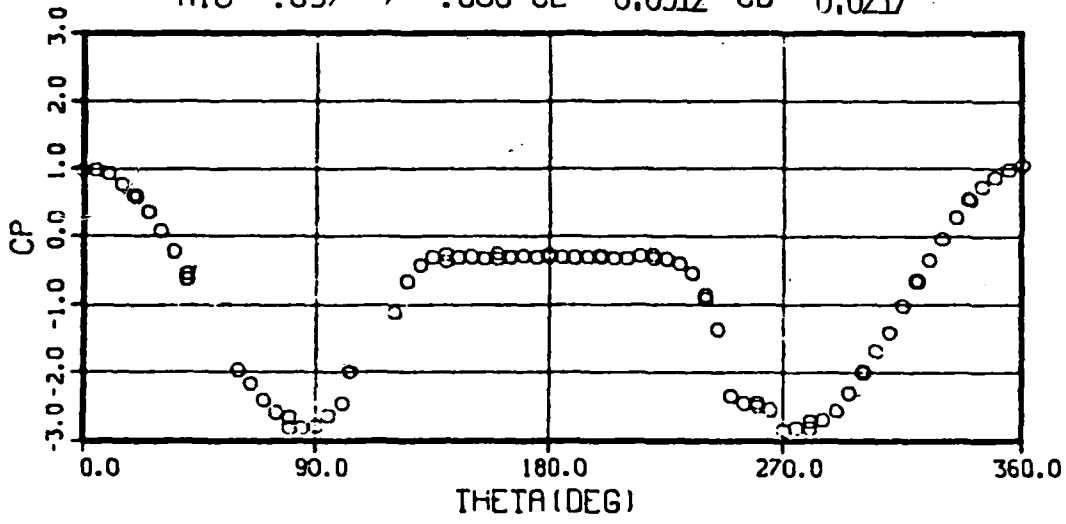


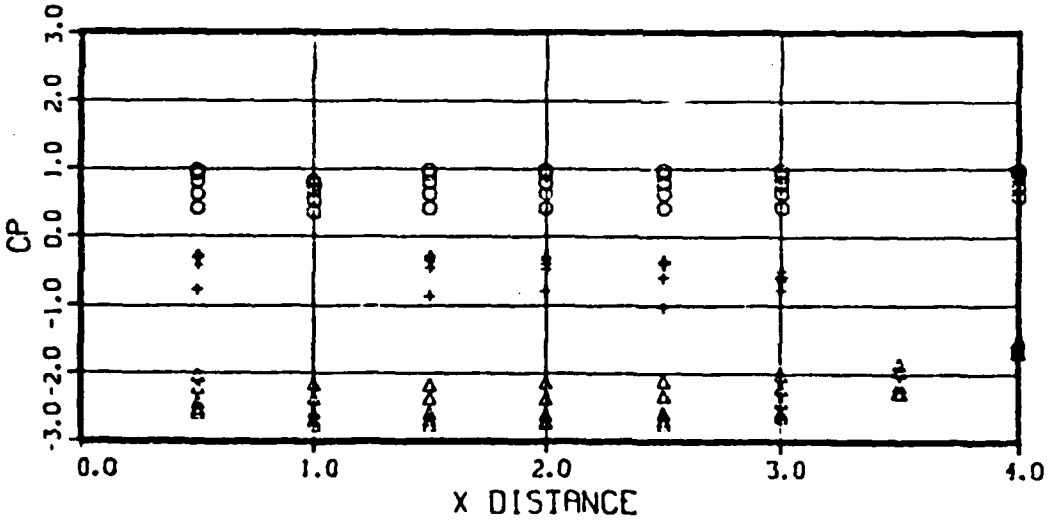


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 066 O1U- 4.7 +/- .00 RND1U- .403 +/-.000
P1U- 2095. +/- .00 V1U- 64.17 +/- .008
M1U- .057 +/- .000 CL- 0.0912 CD- 0.0217

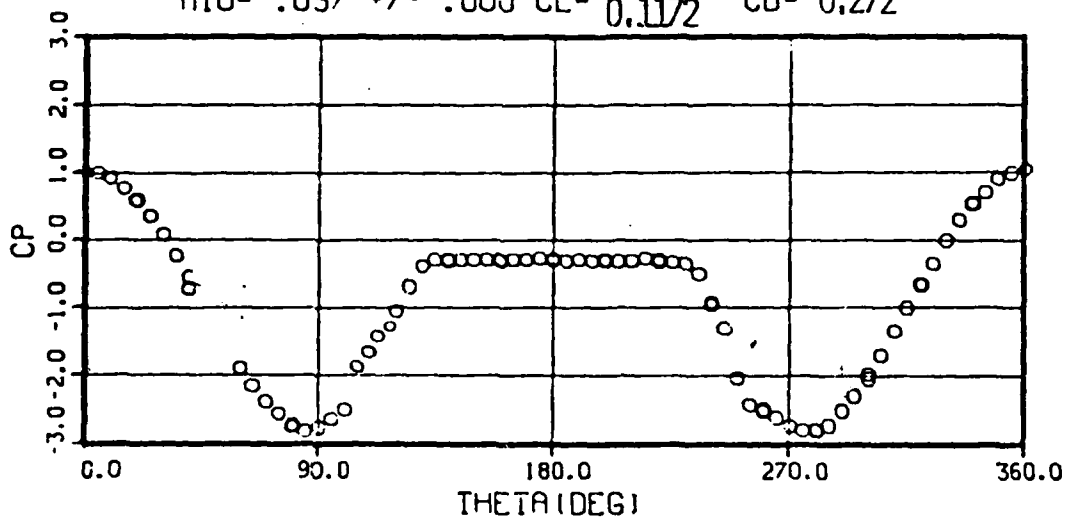


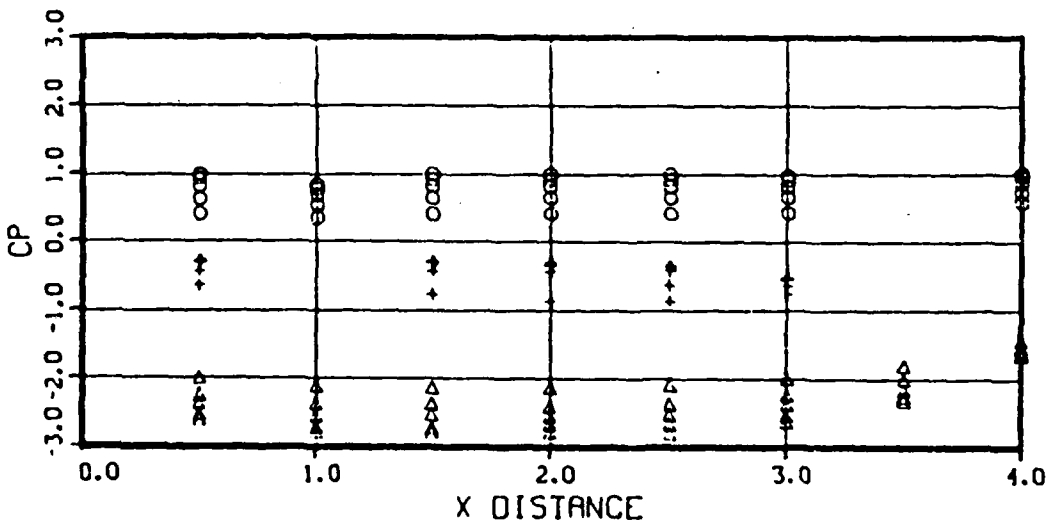


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 067 O1U- 4.8 +/- .00 RNO1U- .406 +/-.000
P1U- 2095. +/- .00 V1U- 64.68 +/- .010
M1U- .057 +/- .000 CL- 0.1172 CD- 0.272

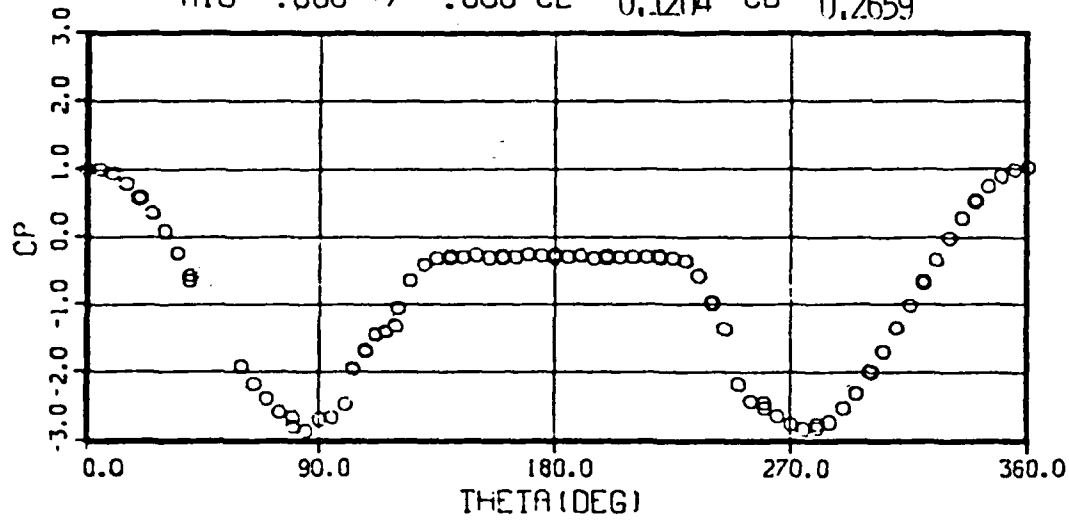


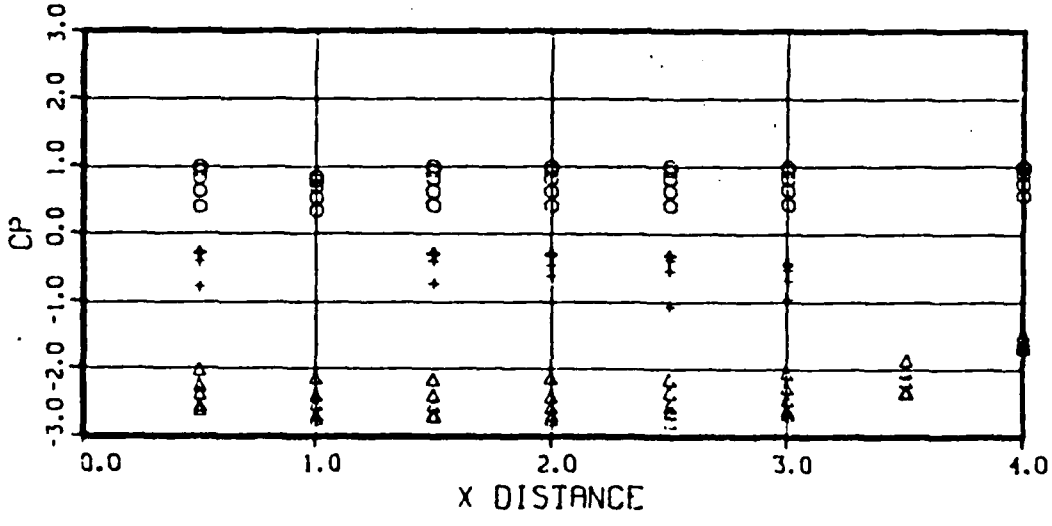


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

PUN 068 O1U- 5.3 +/- .00 RND1U- .425 +/-.000
P1U- 2094. +/- .00 V1U- 67.68 +/- .000
M1U- .060 +/- .000 CL- 0.1204 CD- 0.2659

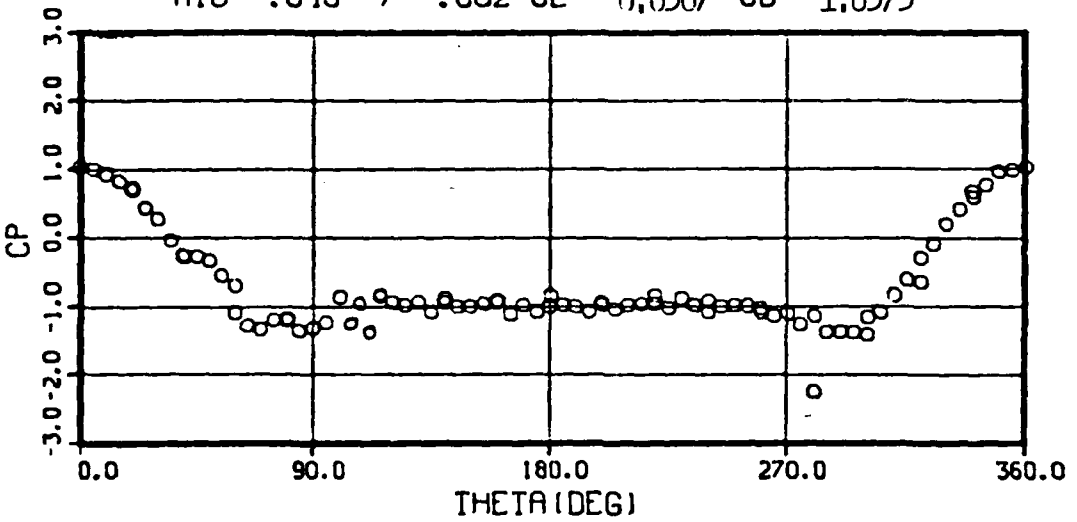


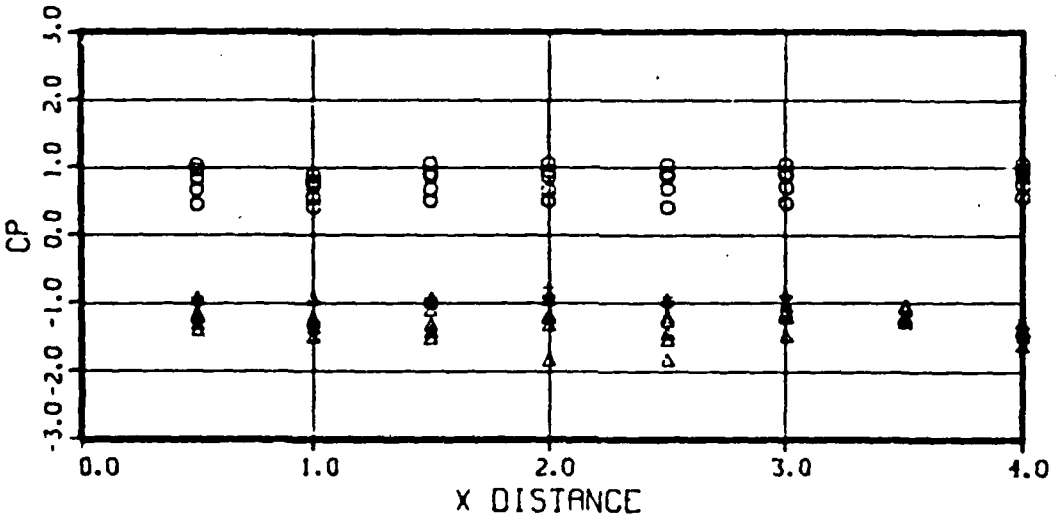


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 082 01U- 3.2 +/- .24 RND1U- .333 +/-.010
P1U- 2099. +/- .00 V1U- 52.34 +/- 1.488
M1U- .046 +/- .002 CL- 0.0367 CD- 1.0575

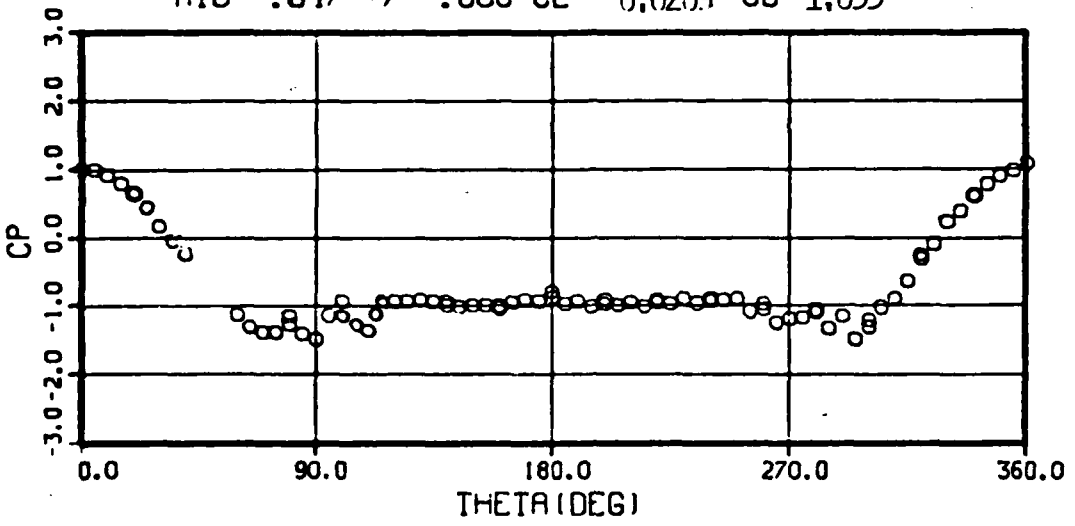


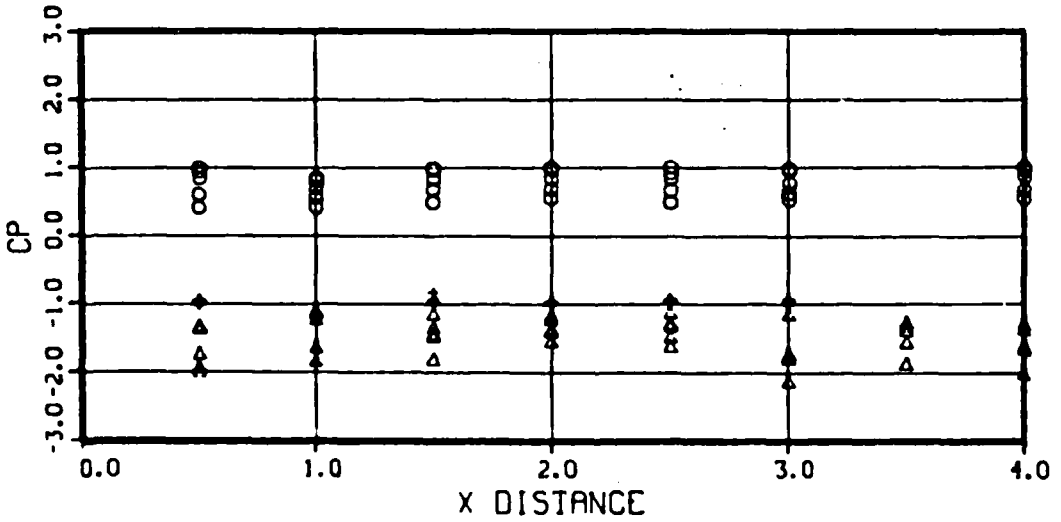


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 081 Q1U- 3.3 +/- .08 RND1U- .338 +/-.003
P1U- 2099. +/- .00 V1U- 53.11 +/- .506
M1U- .047 +/- .000 CL- 0.0209 CD- 1.033

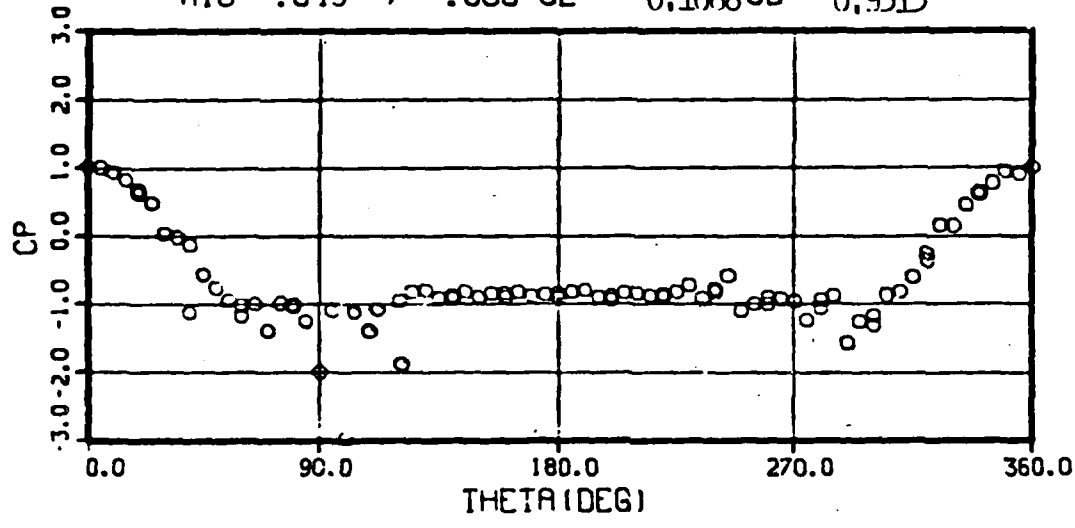


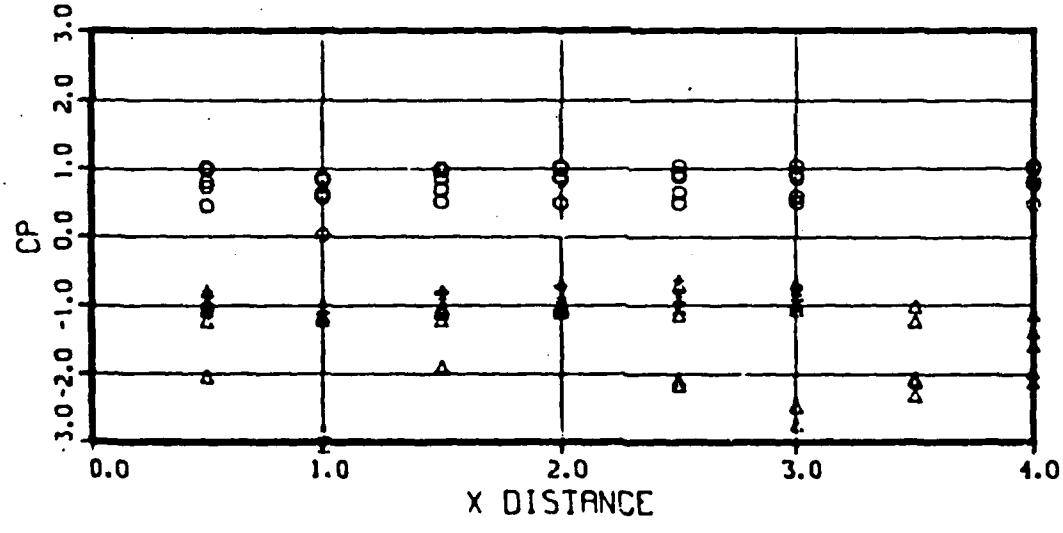


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 080 01U- 3.5 +/- .00 RND1U- .350 +/-.000
P1U- 2099. +/- .80 V1U- 55.07 +/- .016
M1U- .049 +/- .000 CL- - 0.1088CD- 0.9513

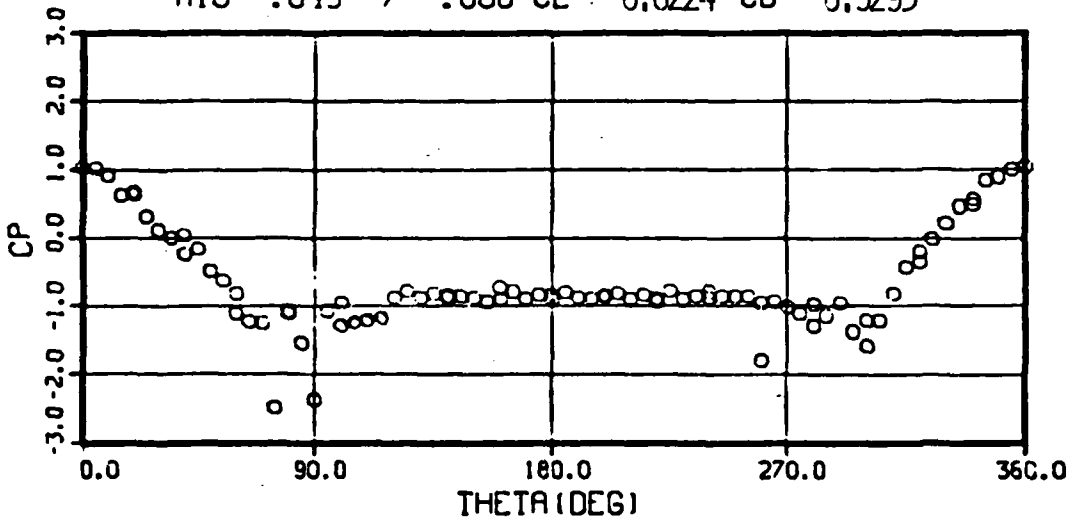


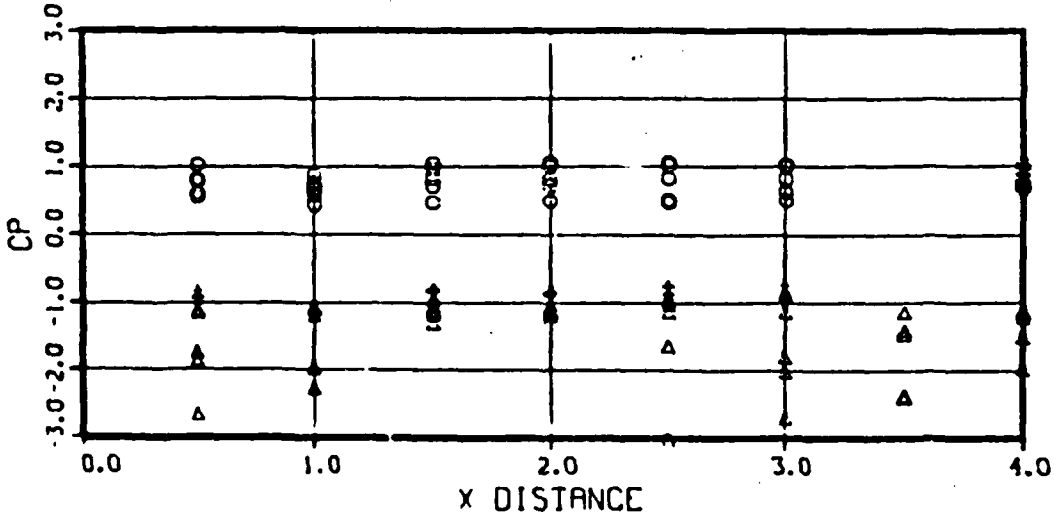


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 079 01U- 3.5 +/- .00 RND1U- .350 +/-.000
P1U- 2098. +/- .00 V1U- 55.10 +/- .006
M1U- .049 +/- .000 CL- -0.0224 CD- 0.9295

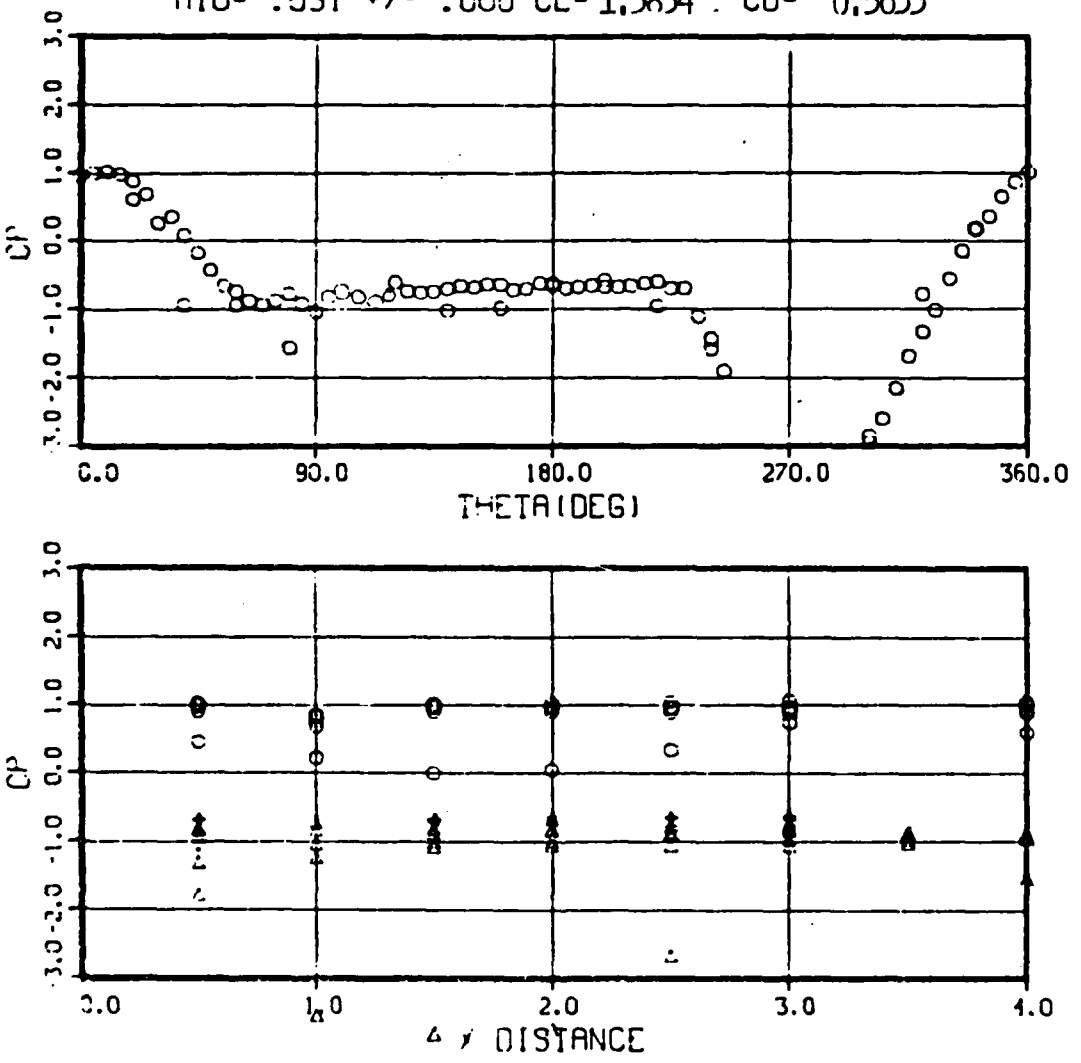




CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

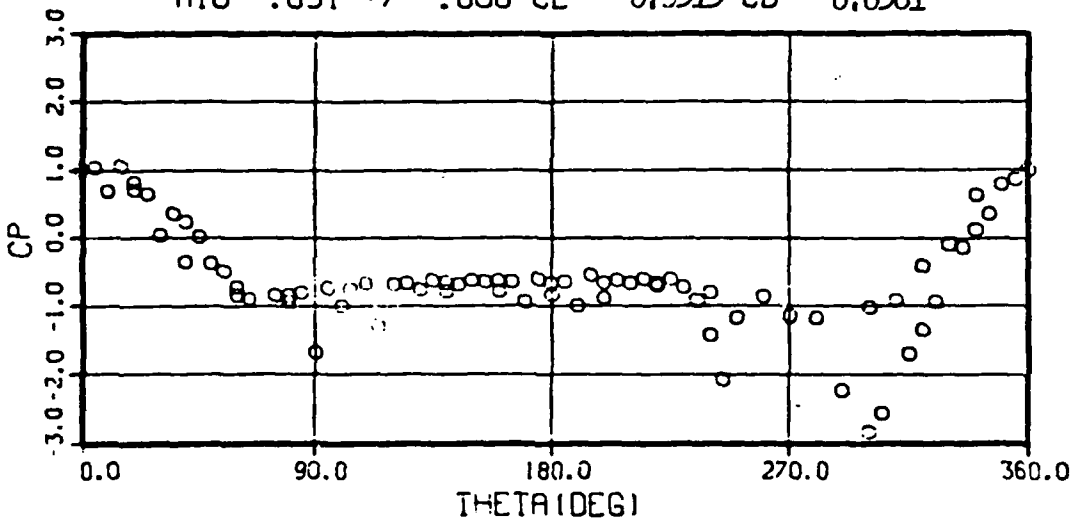
RUN 078 QIU- 3.8 +/- .08 RNDIU- .364 +/-.003
PIU- 2098. +/- .00 VIU- 57.34 +/- .458
MIU- .051 +/- .000 CL- 1.3854 CD- 0.5633

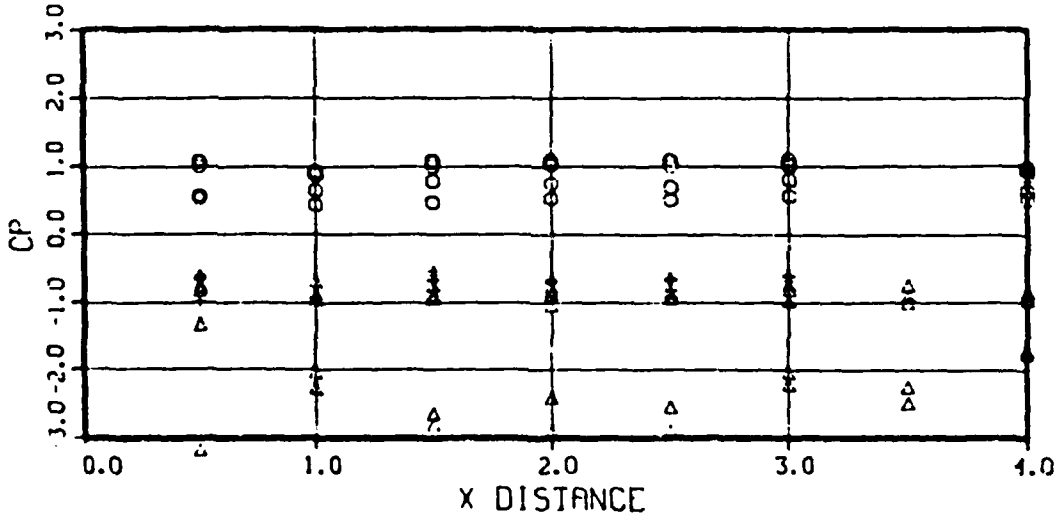


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 077 QIU- 3.8 +/- .00 RNDIU- .364 +/-.000
PIU- 2098. +/- .00 VIU- 57.46 +/- .006
MIU- .051 +/- .000 CL- 0.9313 CD- 0.6381

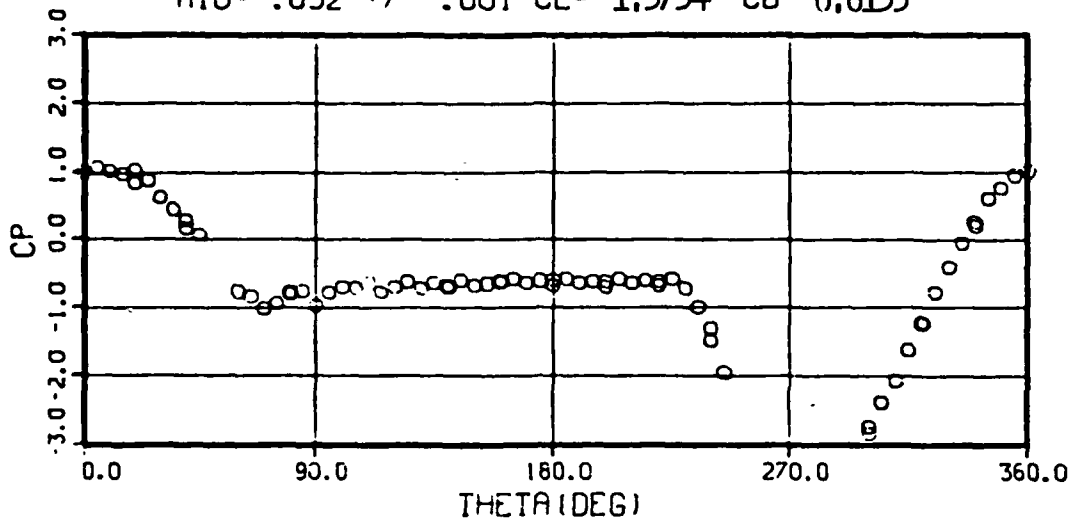


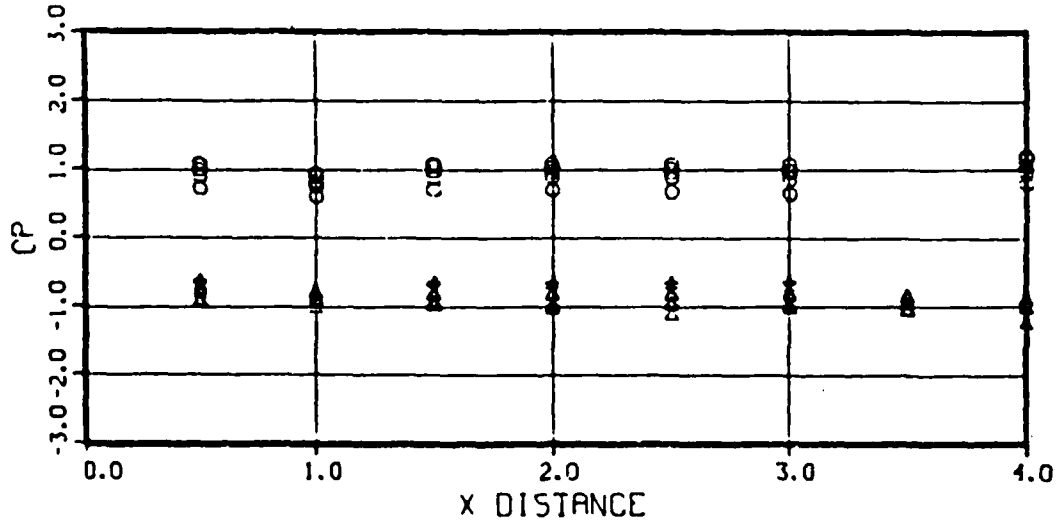


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF. 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 076 01U- 4.0 +/- .08 RND1U- .372 +/-.003
P1U- 2098. +/- .00 V1U- 58.73 +/- .450
M1U- .052 +/- .001 CL- 1.5734 CD- 0.6135

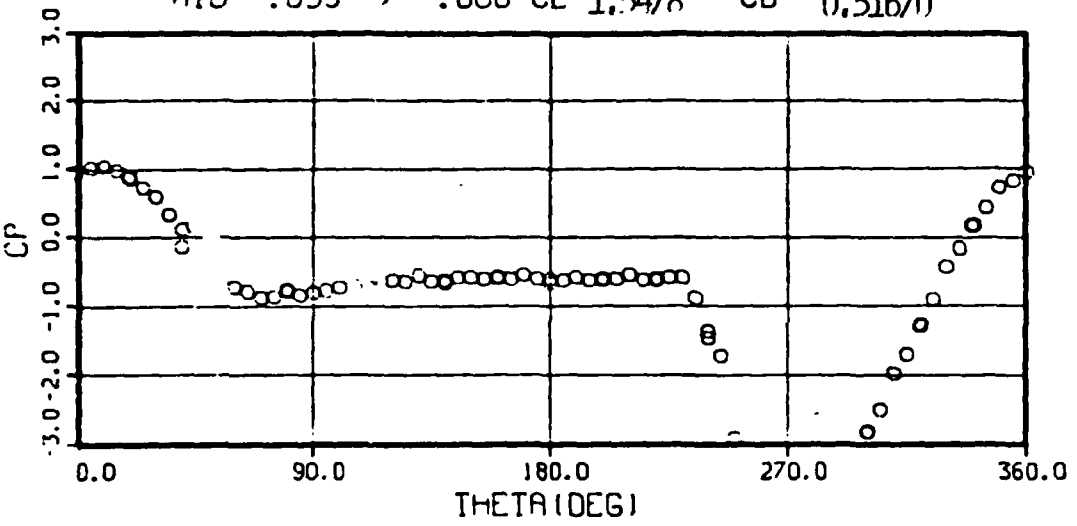


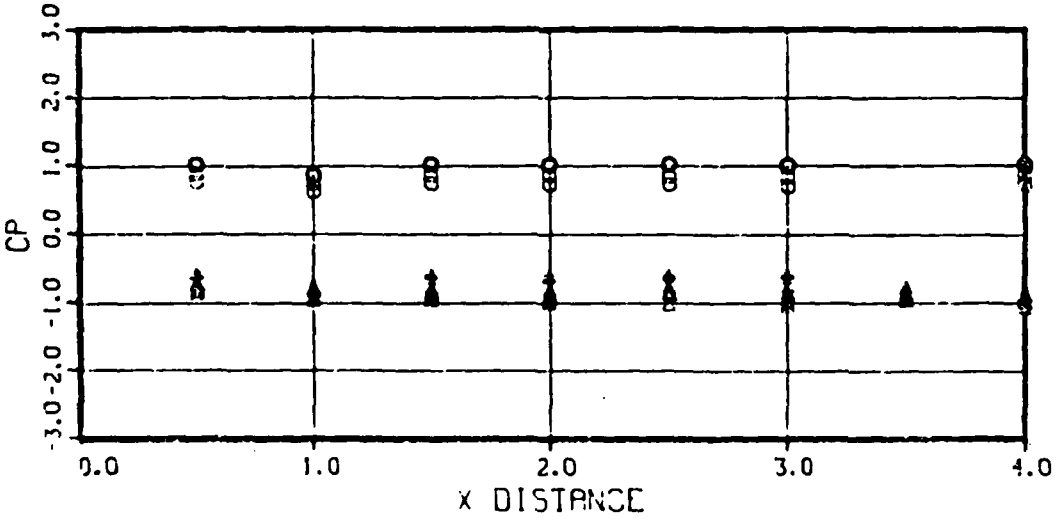


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF .4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 075 QIU- 4.1 +/- .00 RNDIU- .375 +/-.000
PIU- 2098. +/- .00 VIU- 59.19 +/- .008
MIU- .053 +/- .000 CL-1.5478 CD- 0.51670

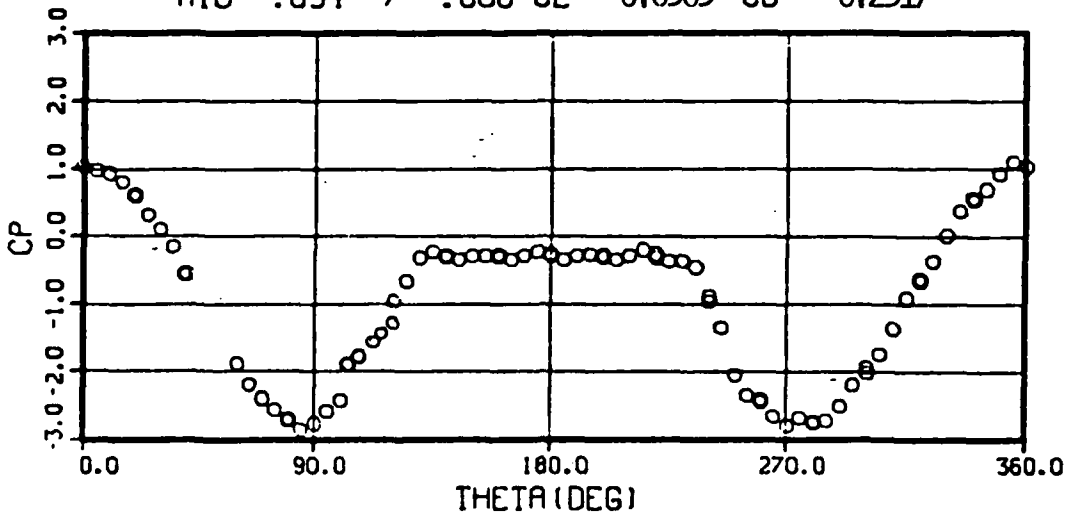


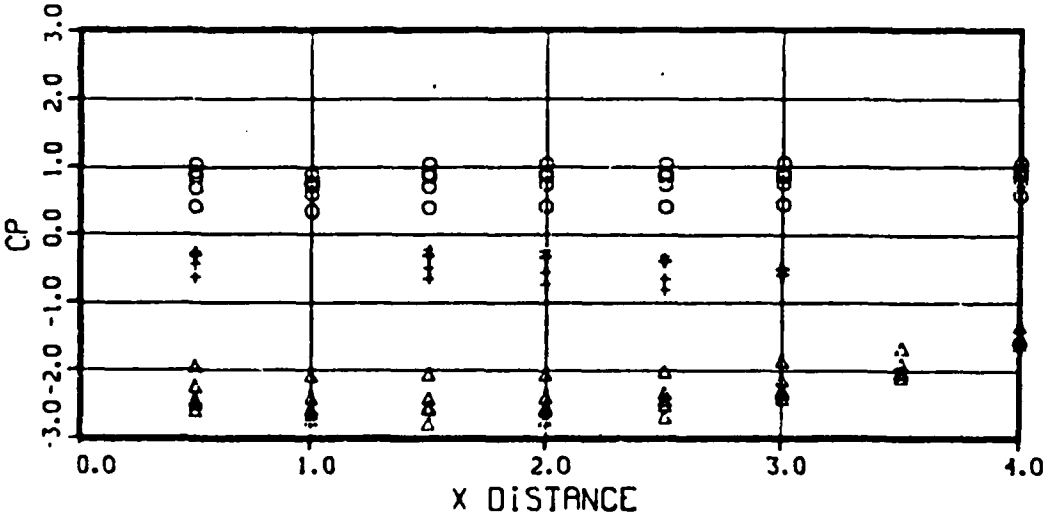


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 074 D1U- 4.3 +/- .00 RND1U- .385 +/-.000
P1U- 2097. +/- .00 V1U- 60.87 +/- .008
M1U- .054 +/- .000 CL- 0.0563 CD- 0.2517

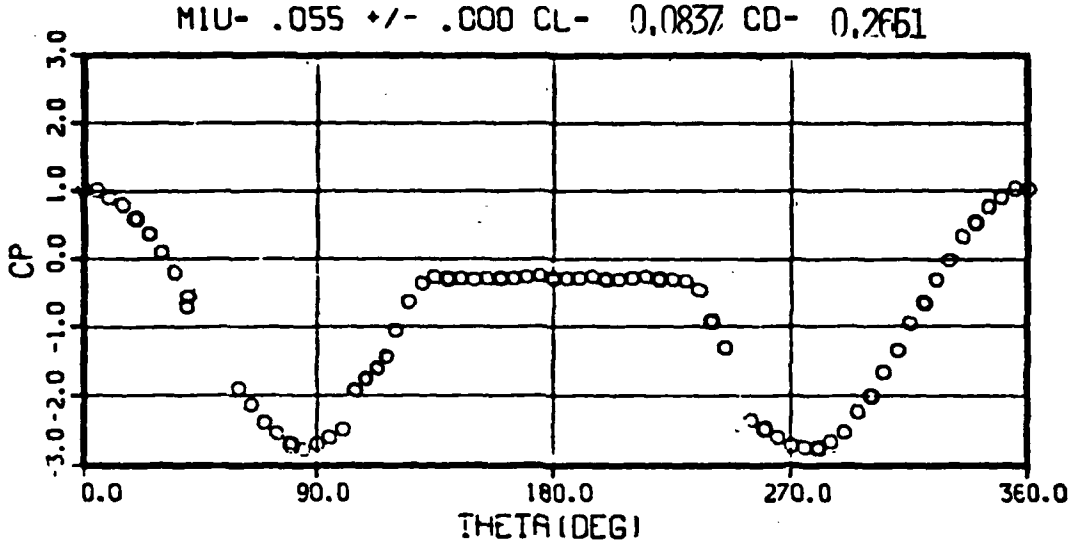


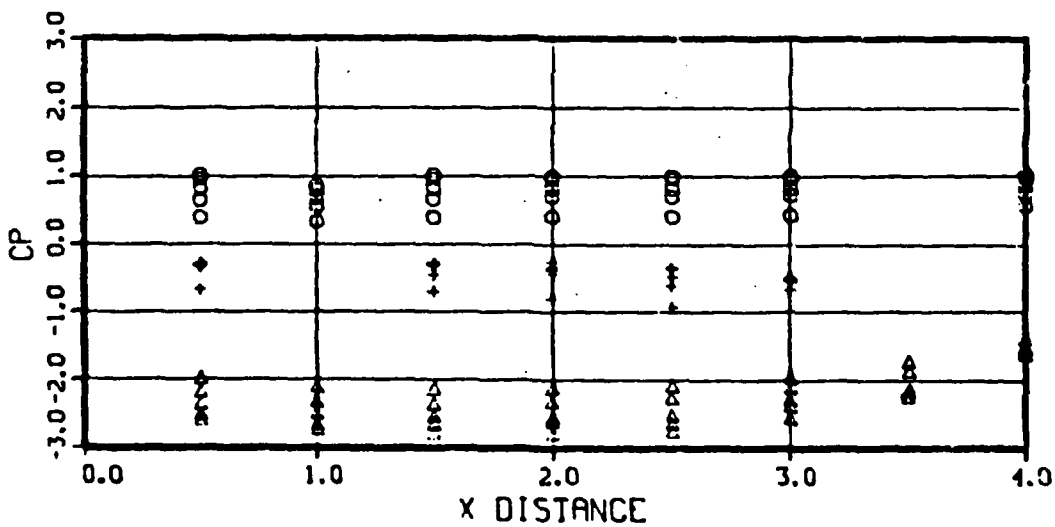


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 073 01U- 4.5 +/- .00 RND1U- .395 +/-.001
P1U- 2096. +/- .00 V1U- 62.50 +/- .010
M1U- .055 +/- .000 CL- 0.0837 CD- 0.2661

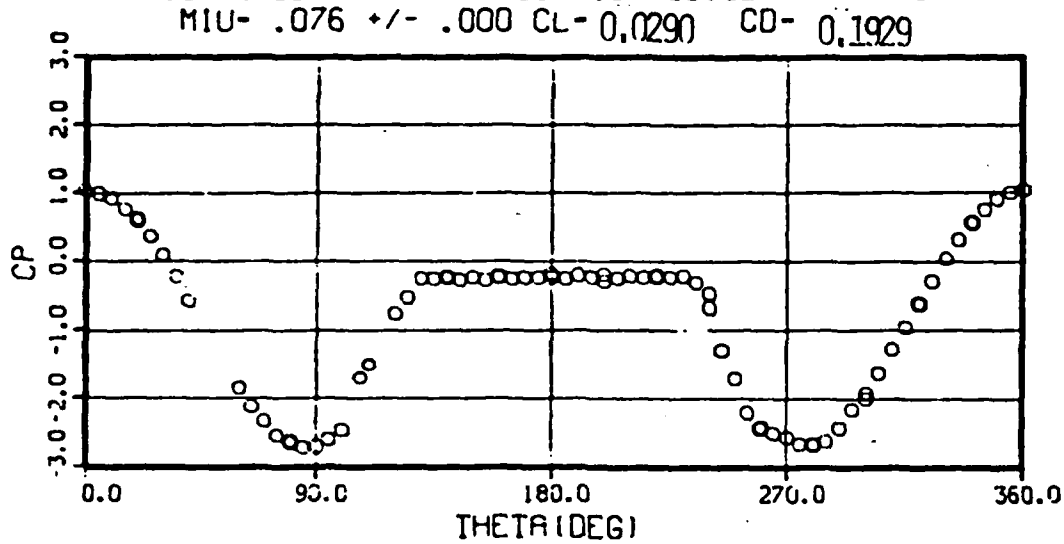


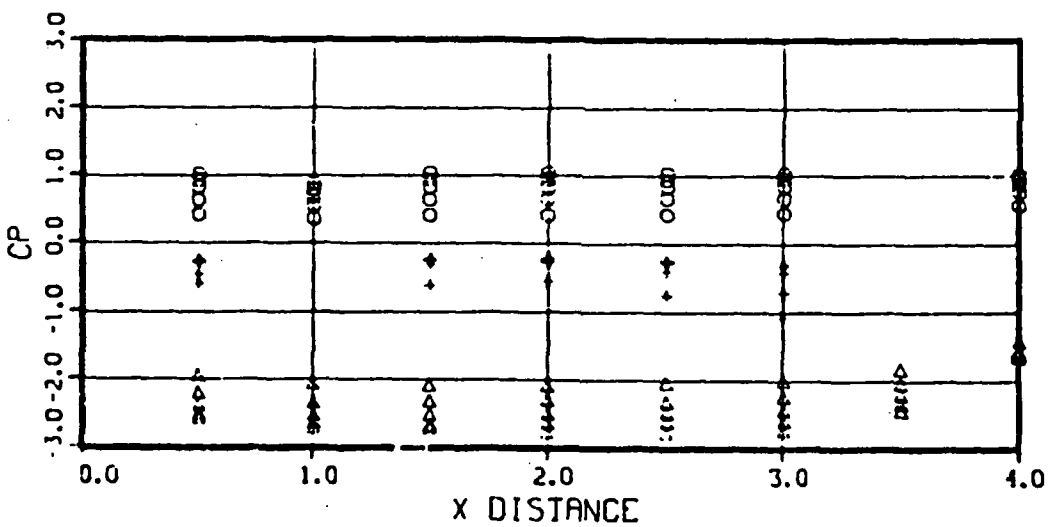


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 072 Q1U- 8.5 +/- .06 RN.D1U- .539 +/-.001
P1U- 2092. +/- .00 V1U- 85.62 +/- .248
M1U- .076 +/- .000 CL- 0.0290 CD- 0.1929

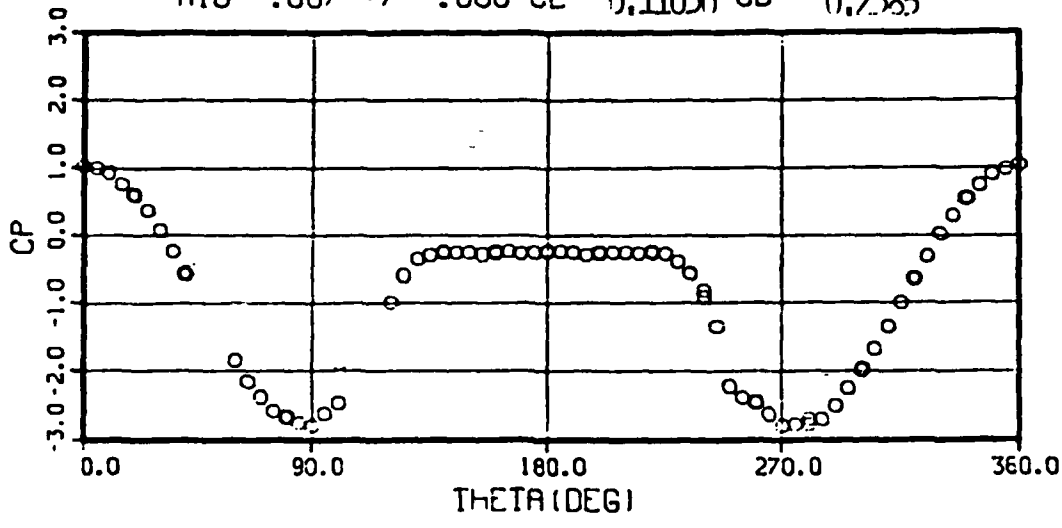


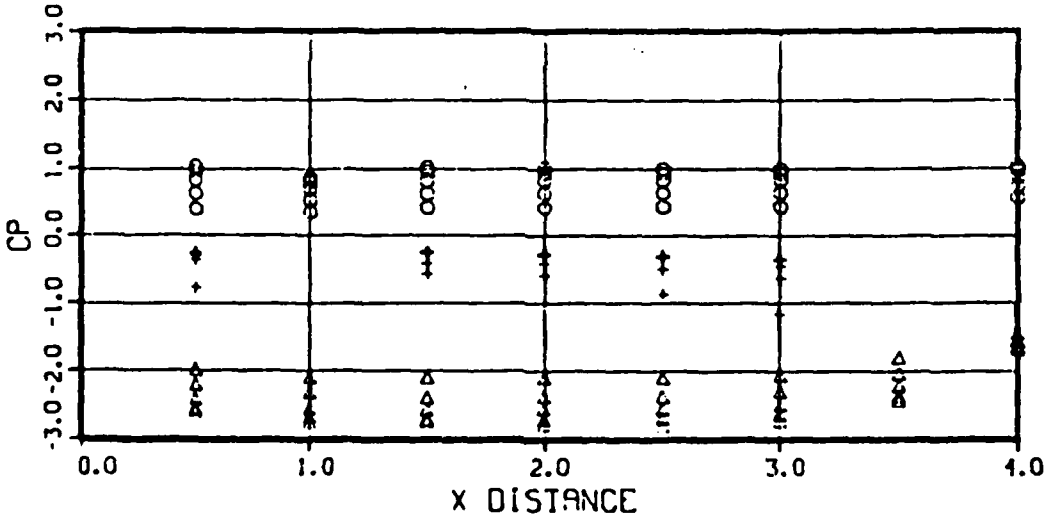


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 071 QIU- 6.6 +/- .00 RNDIU- .478 +/-.000
PIU- 2093. +/- .00 VIU- 75.94 +/- .006
MIU- .067 +/- .000 CL- 0.11030 CD- 0.2385

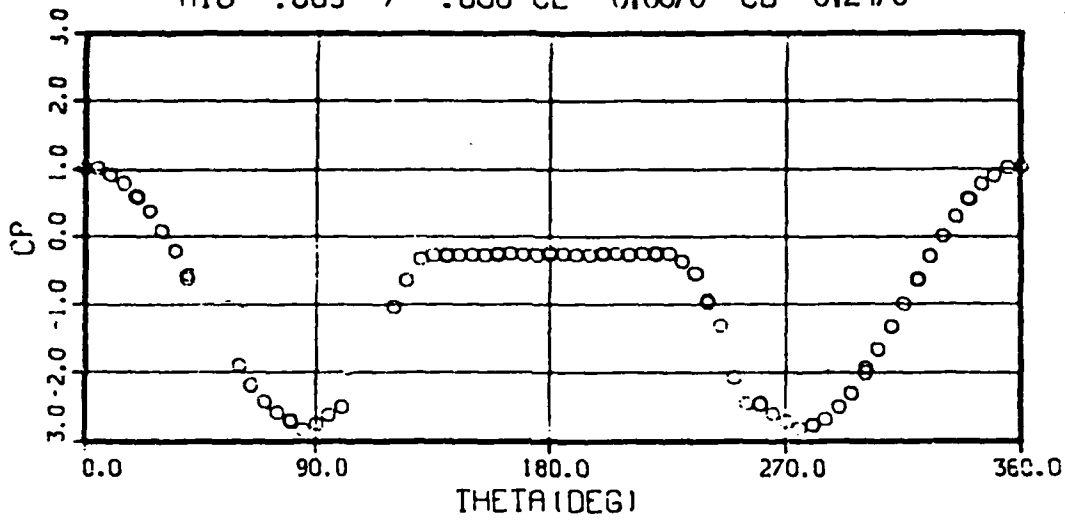


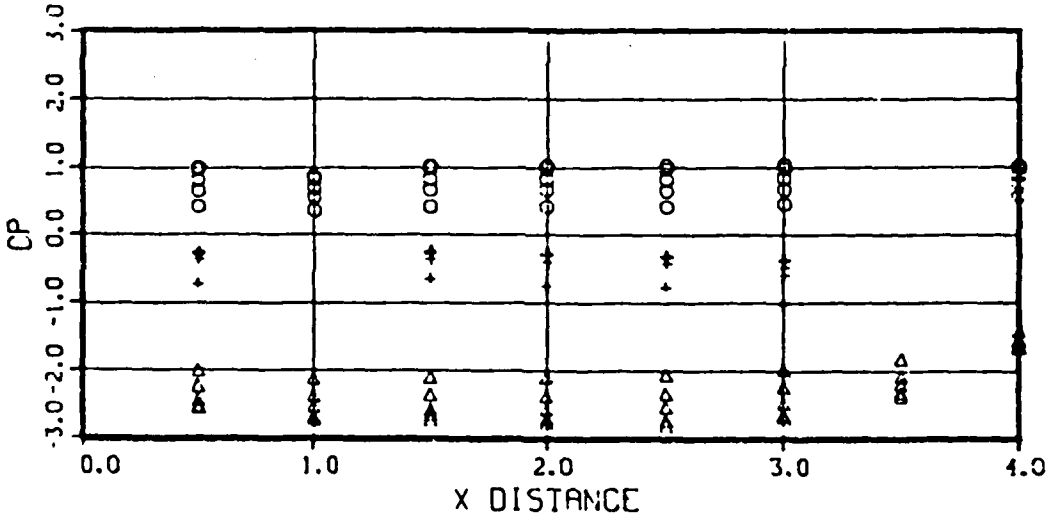


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 070 QIU- 5.8 +/- .00 RNDIU- .447 +/-.000
PIU- 2094. +/- .00 VIU- 70.99 +/- .008
MIU- .063 +/- .000 CL- 0.0876 CD- 0.2476

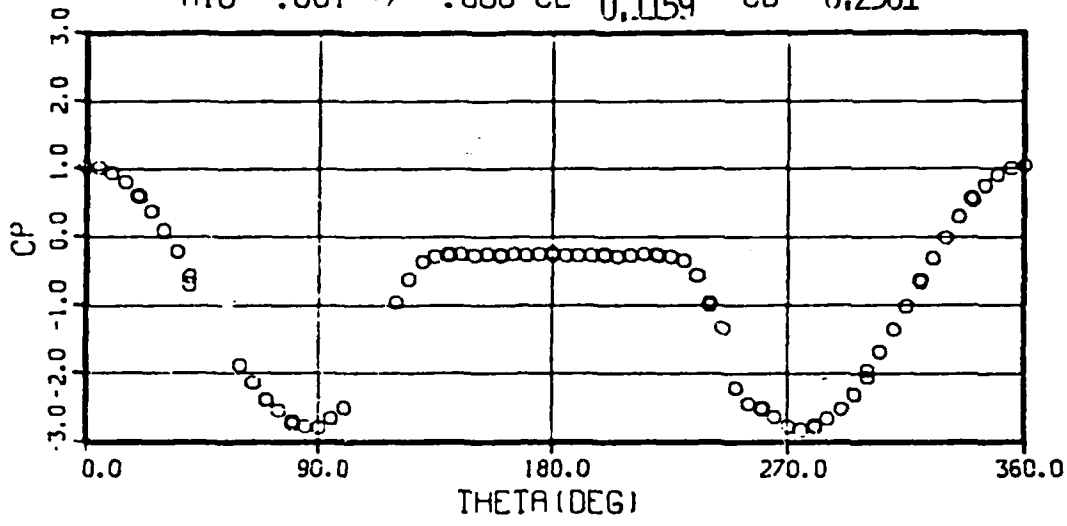


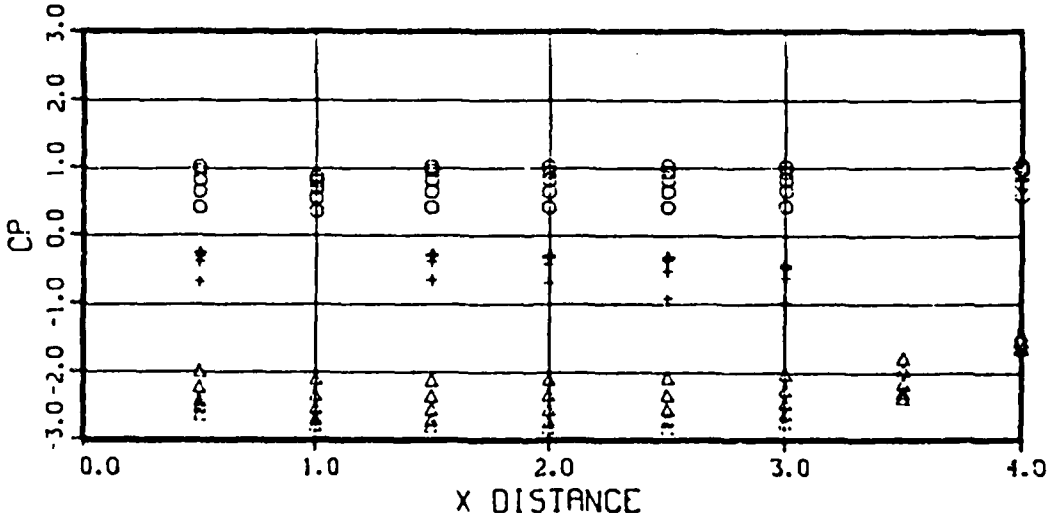


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 069 QIU- 5.4 +/- .00 RNDIU- .432 +/-.000
PIU- 2094. +/- .80 VIU- 68.64 +/- .016
MIU- .061 +/- .000 CL- 0.1159 CD- 0.2501

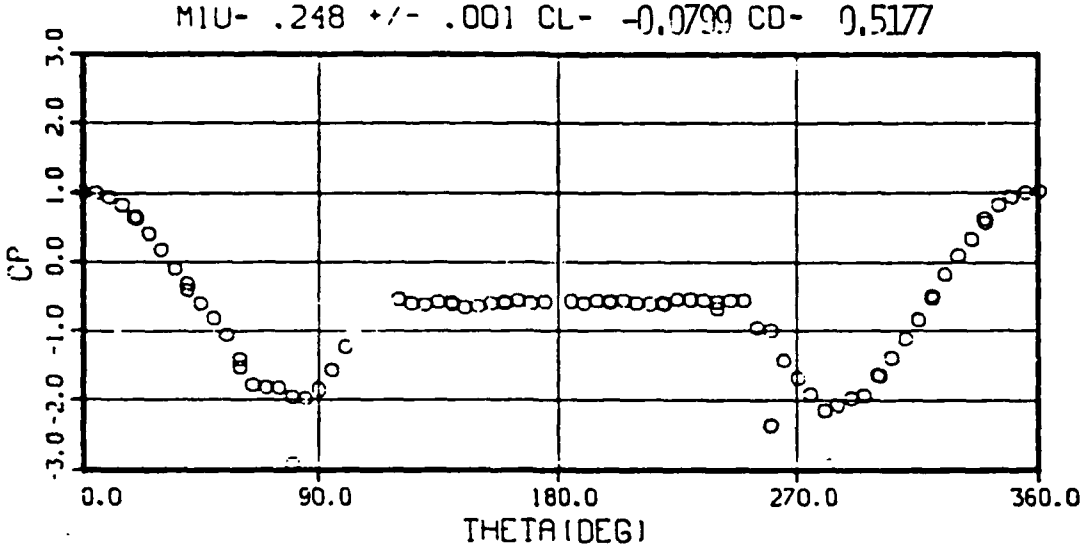


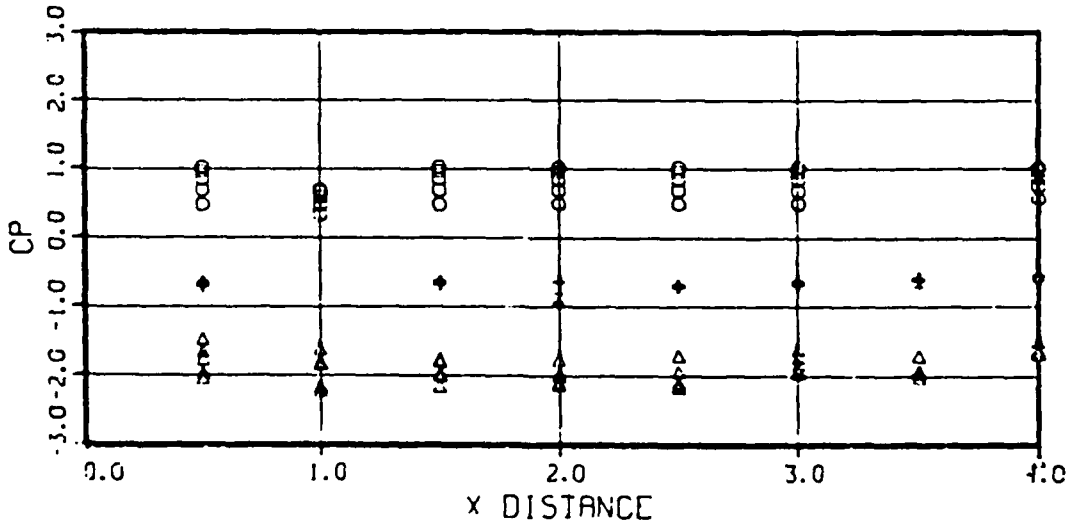


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 091 Q1U-431.4 +/- 2.10 RND1U-8.063 +/-.005
P1U-10030. +/- 3.20 V1U-284.56 +/- .936
M1U- .248 +/- .001 CL- -0.0799 CD- 0.5177

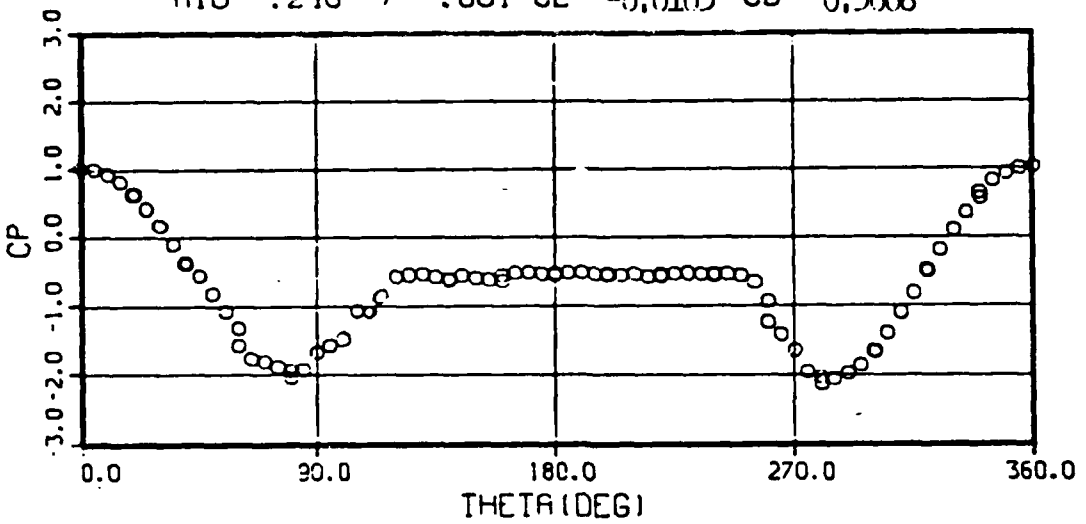


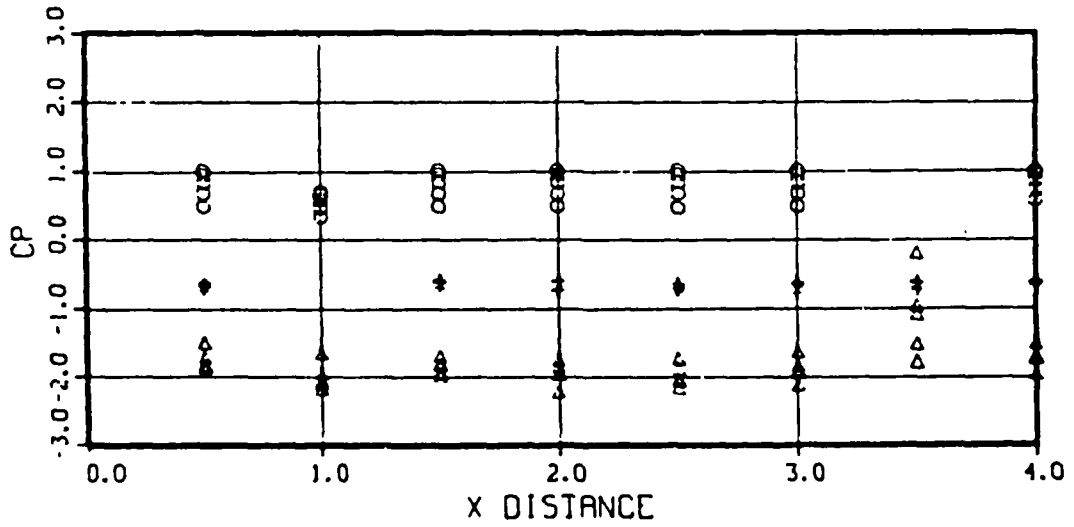


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 092 01U-382.5 +/- 2.48 RND1U-7.146 +/-.019
P1U- 8899. +/- 8.00 V1U-284.55 +/- 1.066
M1U- .248 +/- .001 CL- -0.0105 CD- 0.5068

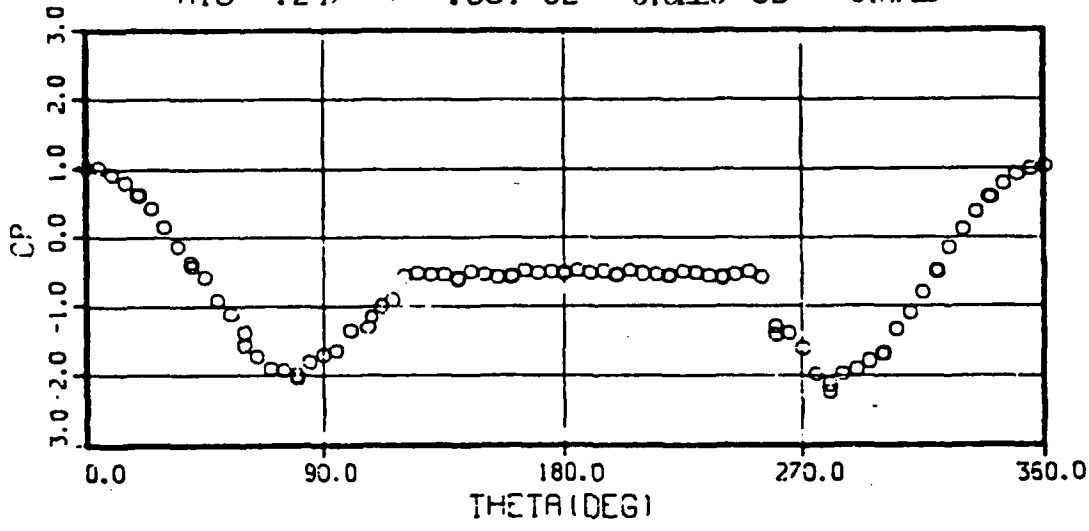


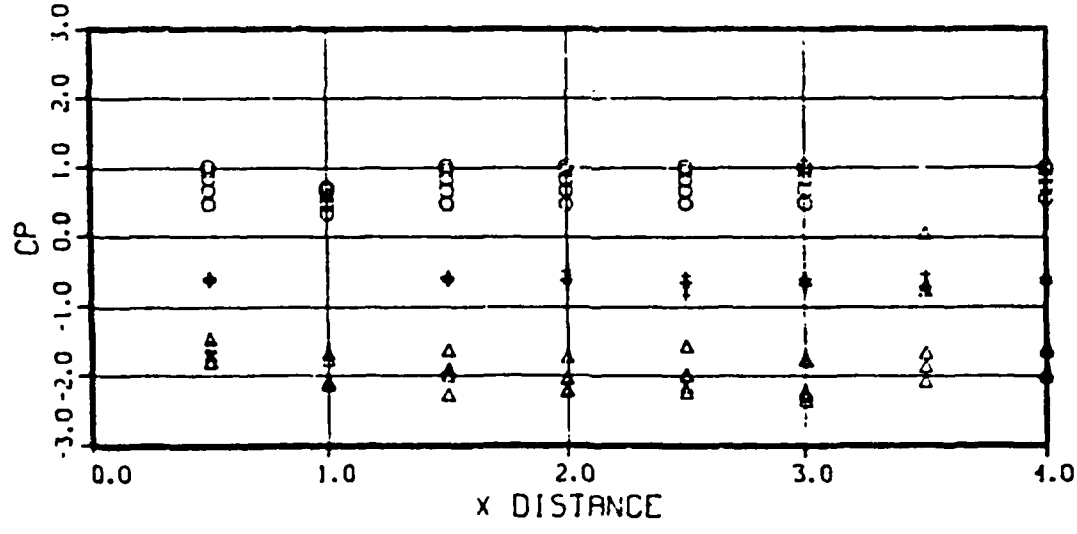


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF. 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 093 01U-329.2 +/- 1.68 RND1U-6.128 +/-.018
P1U- 7684. +/- 2.00 V1U-284.67 +/- .800
M1U- .247 +/- .001 CL- -0.0220 CD- 0.4715

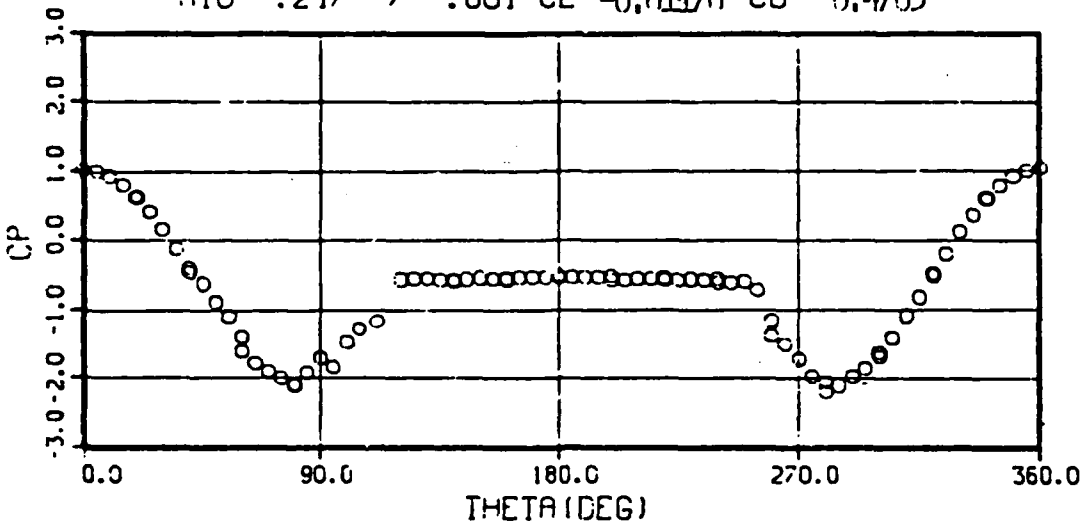


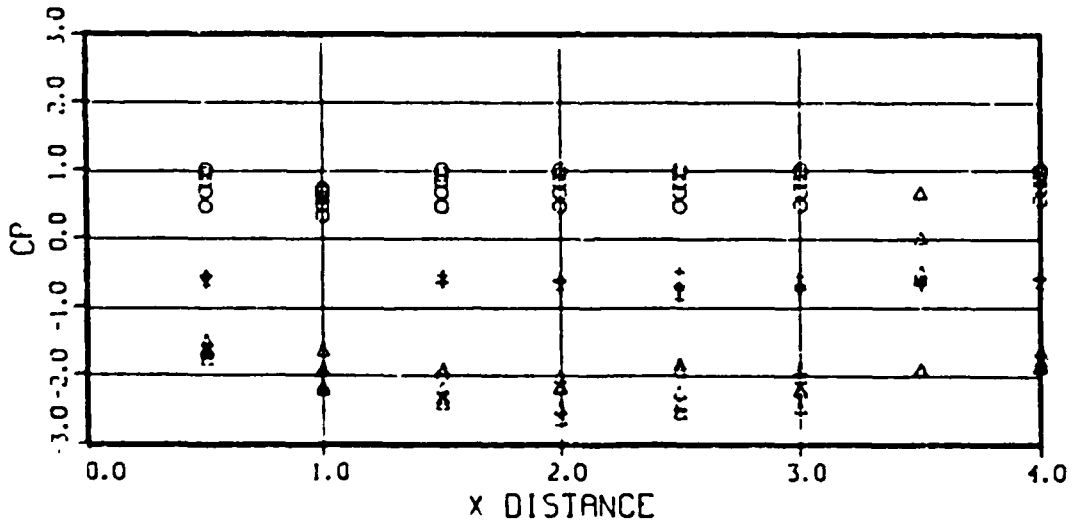


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 094 U1U-272.1 +/- 1.58 RNU1U-5.098 +/-.021
P1U- 6364. +/- 6.60 V1U-283.79 +/- .728
M1U- .247 +/- .001 CL--0.01170 CD- 0.4705

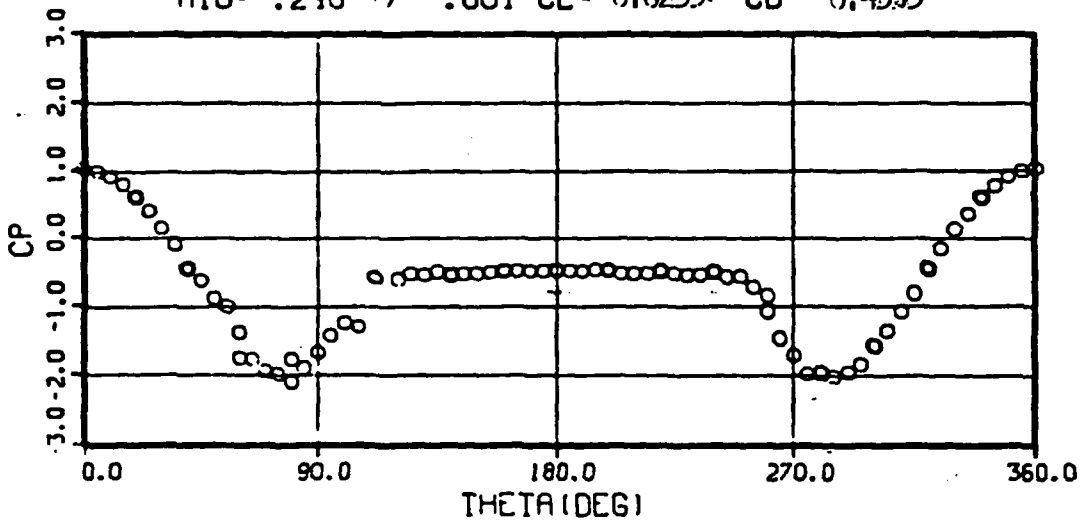


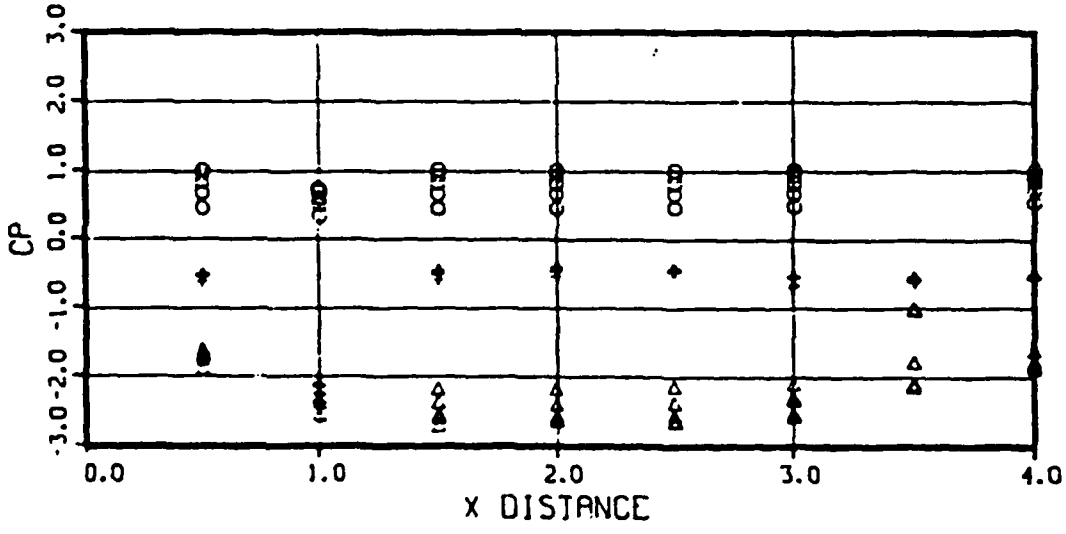


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 095 Q1U-219.0 +/- 1.32 RND1U-4.129 +/-.007
P1U- 5104. +/- 10.00 V1U-283.40 +/- 1.014
M1U- .248 +/- .001 CL- 0.0253 CD- 0.4553

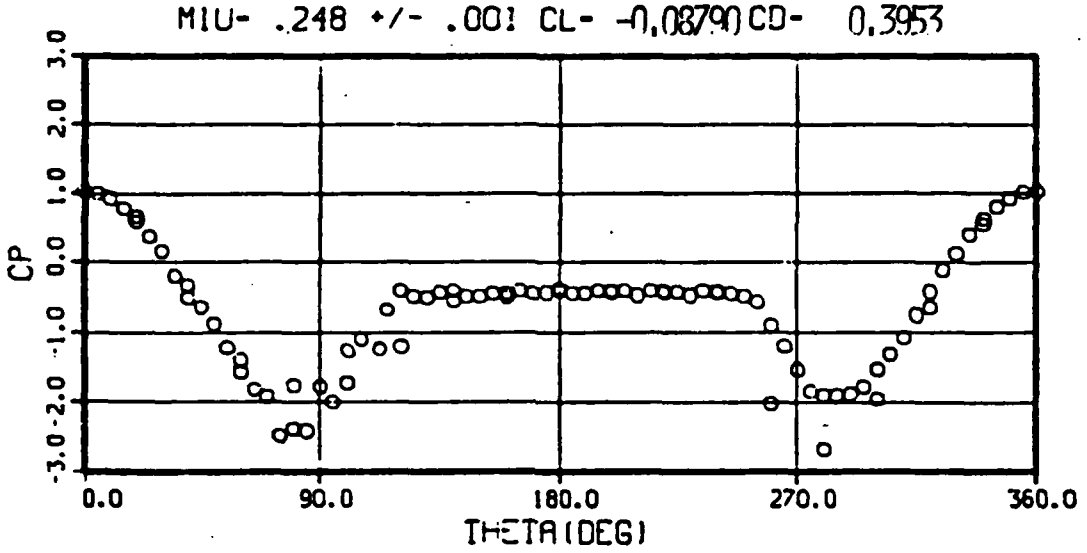


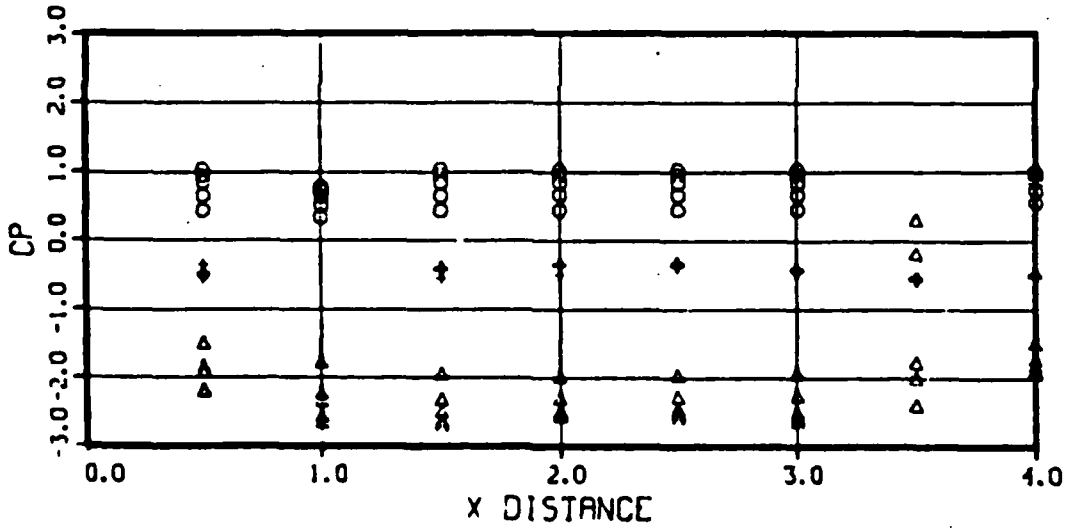


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 096 QIU-16[illegible].3 +/- .42 RNDIU-3.066 +/-.010
PIU- 3756. +/- 8.40 VIU-282.52 +/- .564
MIU- .248 +/- .001 CL- -0.0879 CD- 0.3953

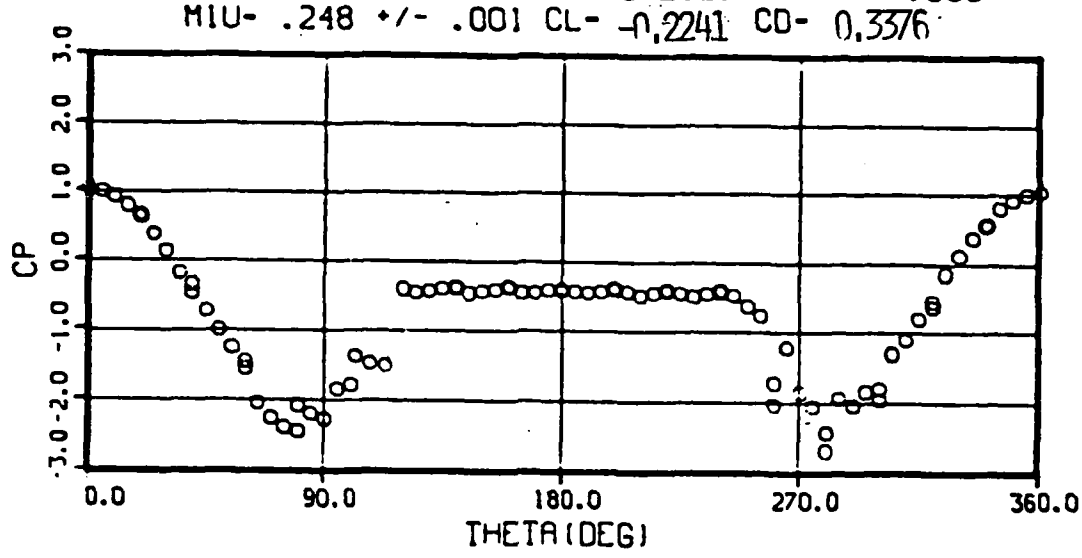


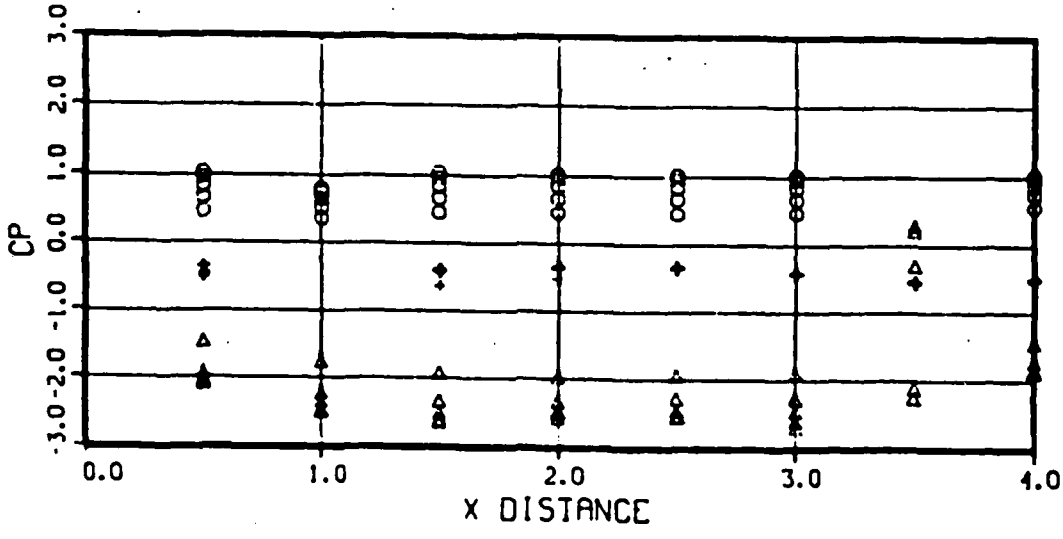


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 097 QIU-135.2 +/- .80 RNDIU-2.569 +/-.013
PIU- 3141. +/- 5.20 VIU-282.77 +/- .868
MIU- .248 +/- .001 CL- -0.2241 CD- 0.3376

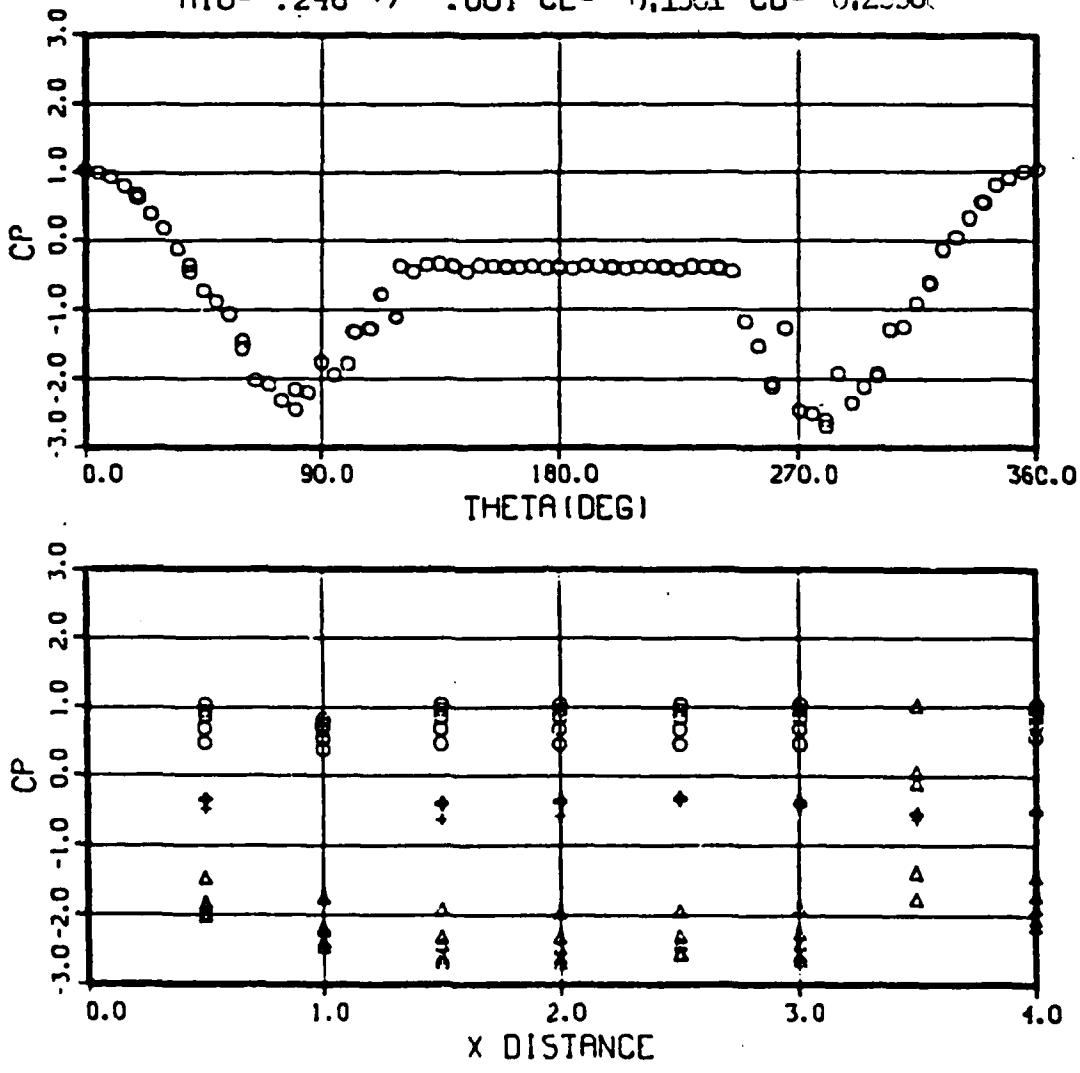




CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

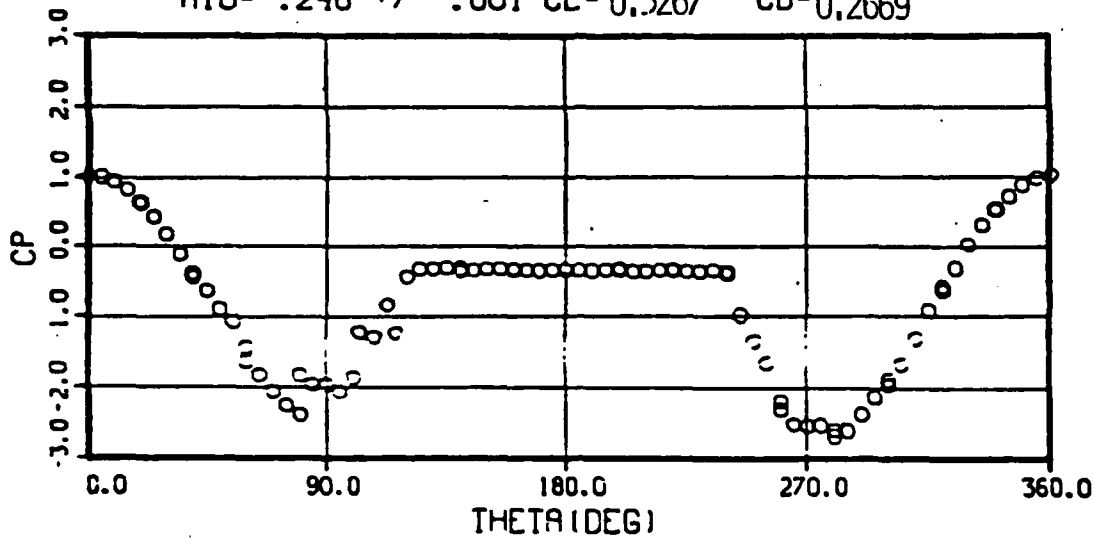
RUN 098 O1U-107.4 +/- 1.20 RND1U-2.050 +/-.012
P1U- 2497. +/- 5.40 V1U-282.21 +/- 1.694
M1U- .248 +/- .001 CL- 0.1961 CD- 0.2998

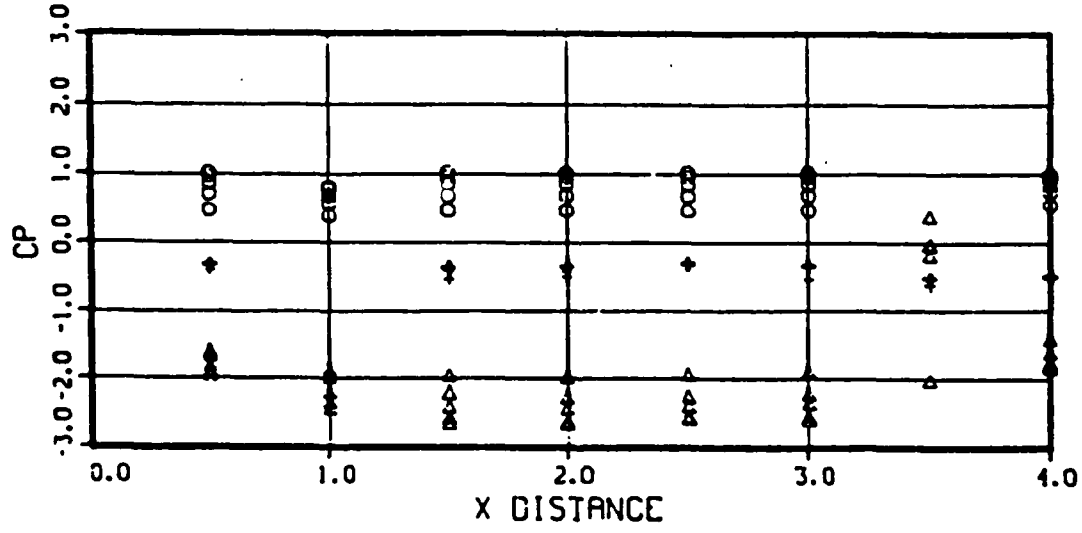


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 099 QIU- 80.3 +/- .20 RNDIU-1.535 +/-.002
PIU- 1856. +/- 4.40 VIU-282.51 +/- .326
MIU- .248 +/- .001 CL- 0.3267 CD-0.2669

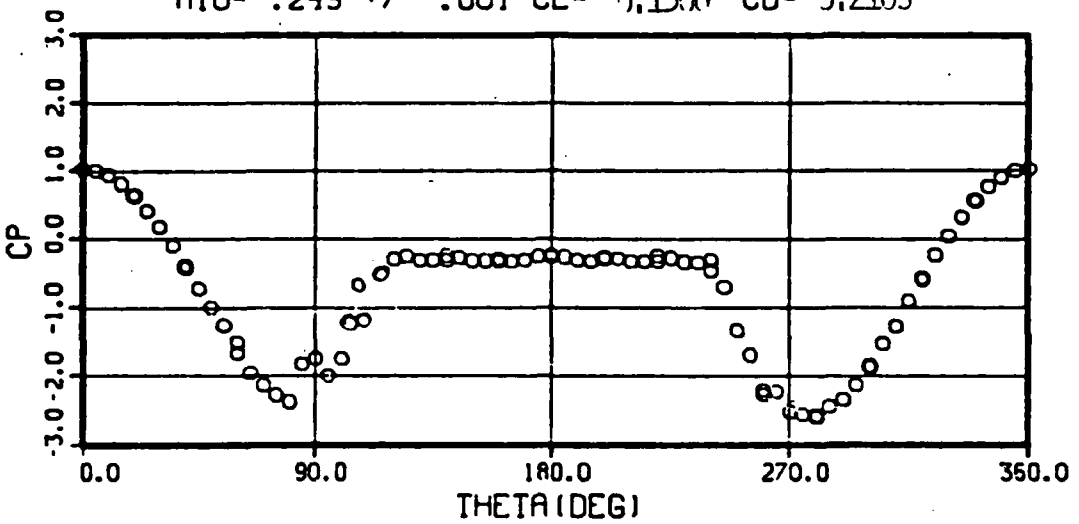


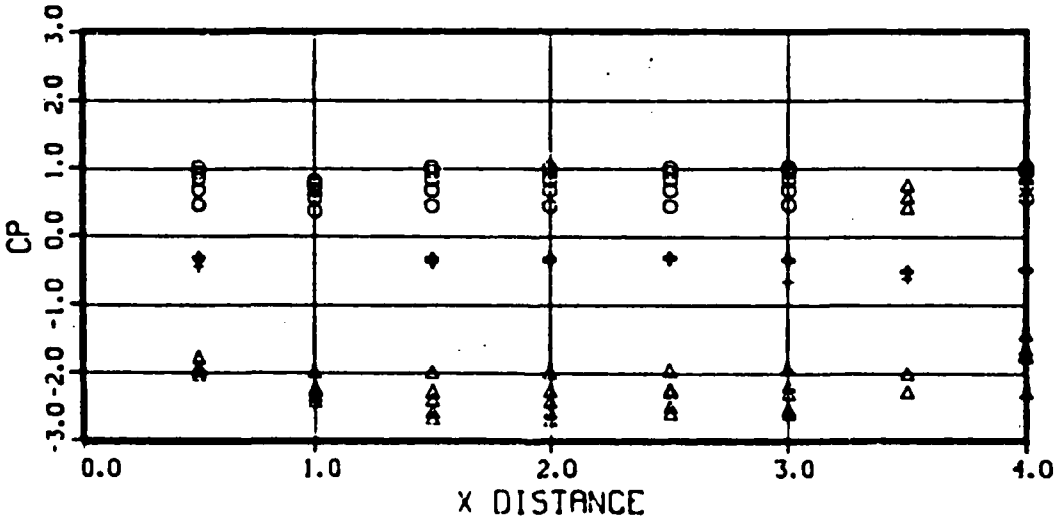


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 100 Q1U- 67.1 +/- .16 RND1U-1.280 +/-.003
P1U- 1540. +/- 2.20 V1U-283.25 +/- .238
M1U- .249 +/- .001 CL- 0.1506 CD- 0.2109

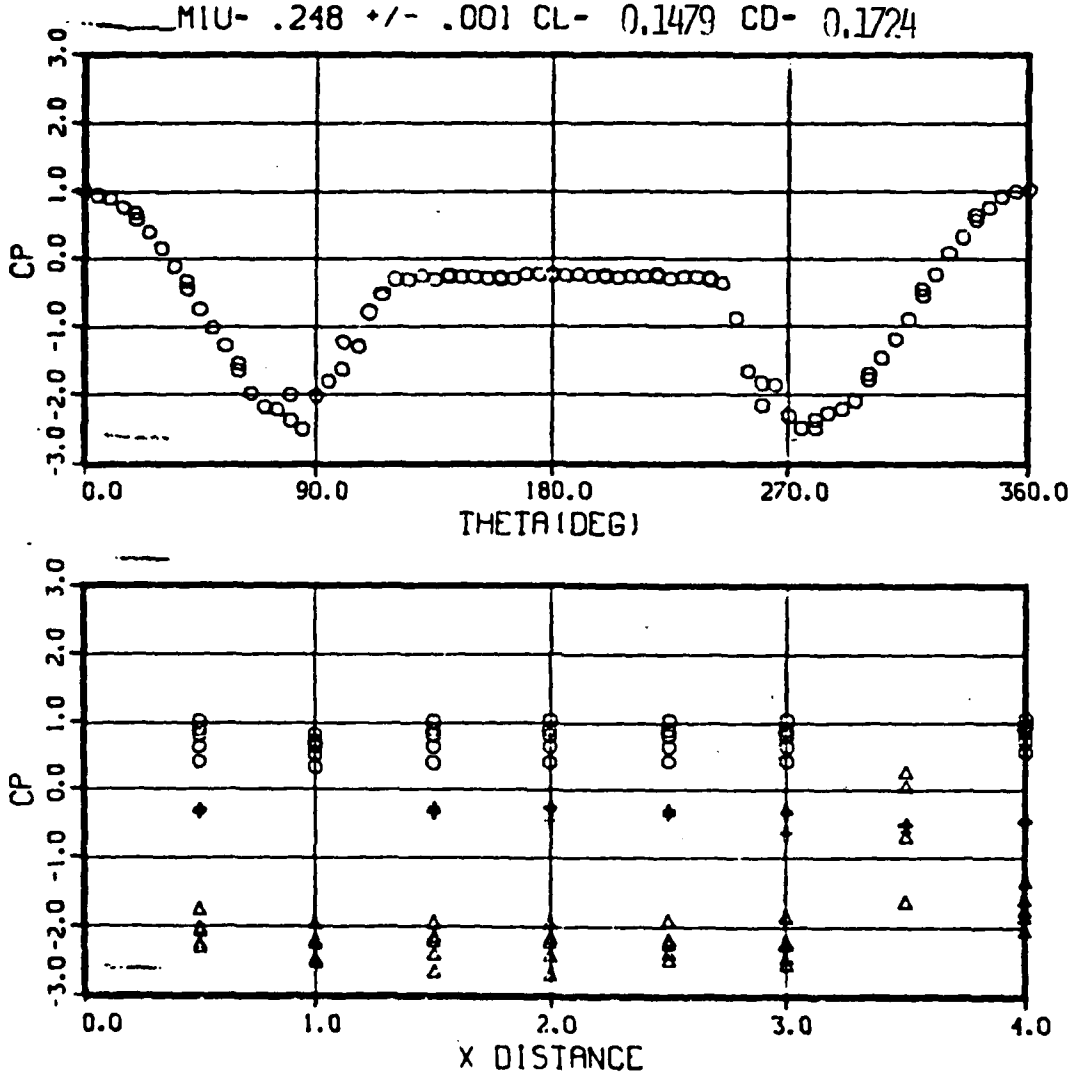




CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF. 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

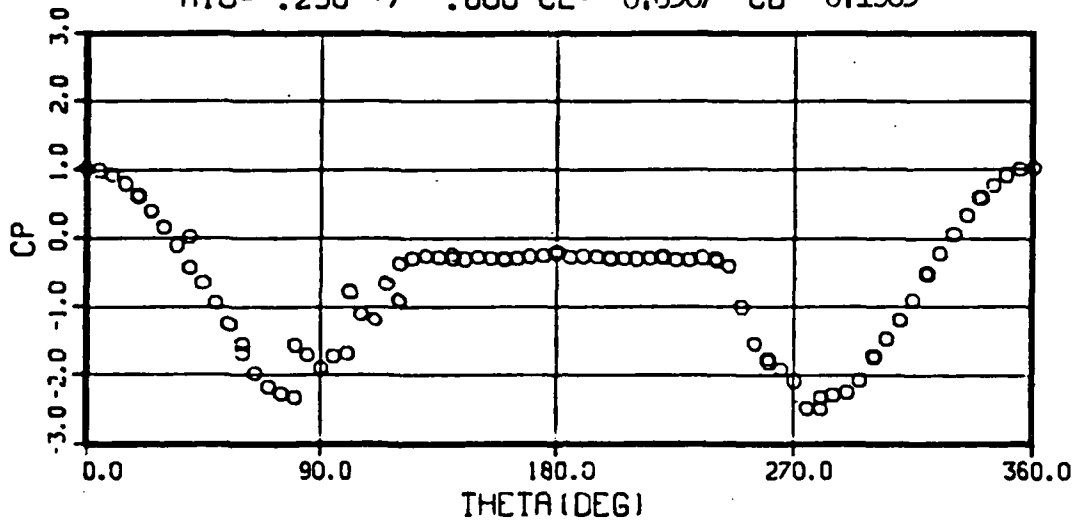
RUN 101 Q1U- 54.0 +/- .32 RND1U-1.040 +/- .004
P1U- 1252. +/- 4.00 V1U-281.49 +/- 1.010
M1U- .248 +/- .001 CL- 0.1479 CD- 0.1724

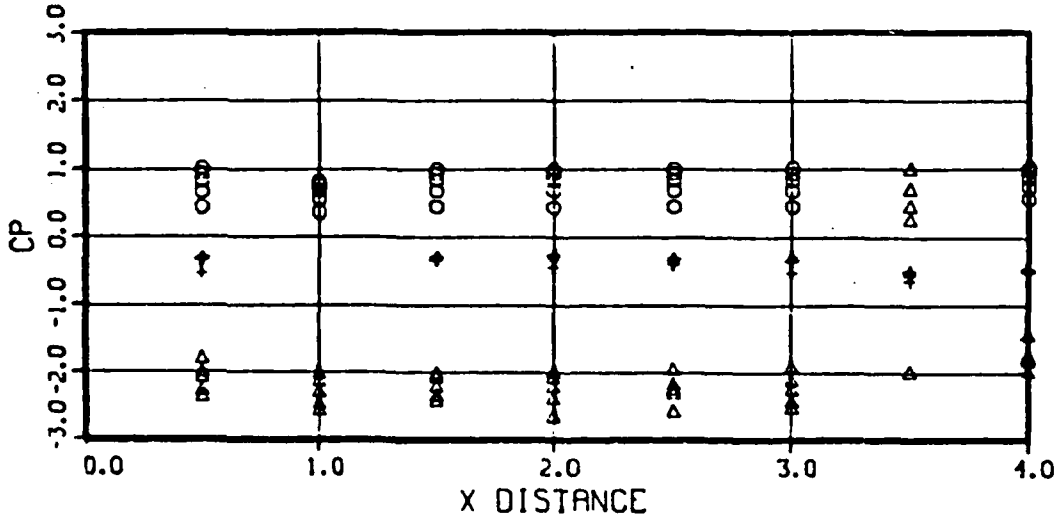


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 102 Q1U- 48.5 +/- .10 RND1U- .929 +/- .002
P1U- 1110. +/- 2.80 V1U-283.15 +/- .506
M1U- .250 +/- .000 CL- 0.0387 CD- 0.1983

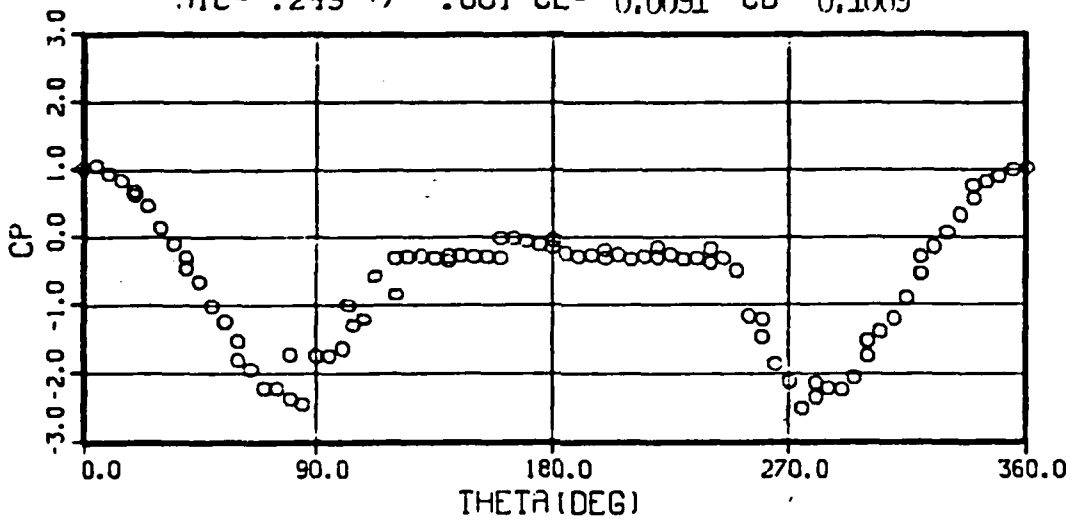


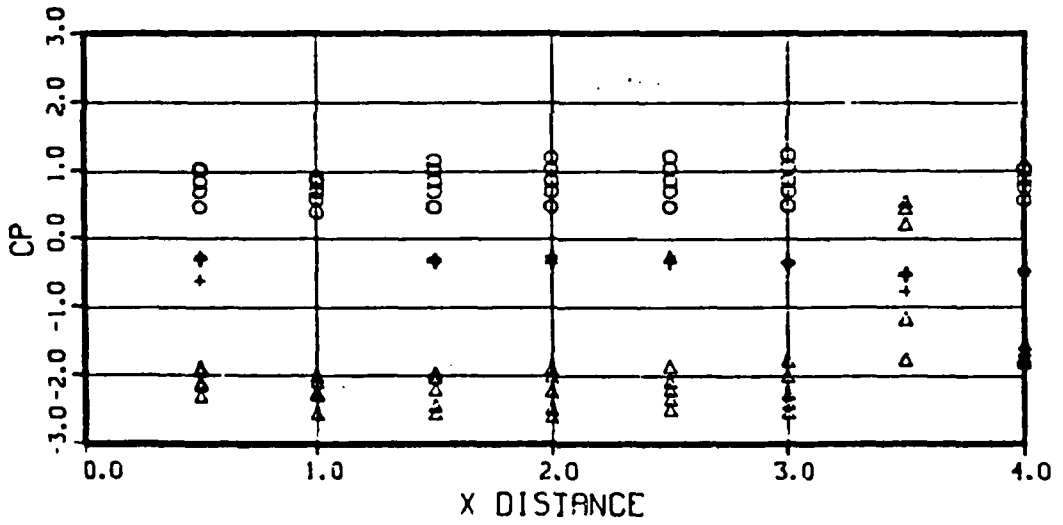


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF .4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 103 QIU- 42.5 +/- .14 RNDIU- .819 +/-.002
PIU- 979. +/- 3.20 VIU-282.09 +/- .588
MIU- .249 +/- .001 CL- 0.0091 CD- 0.1669

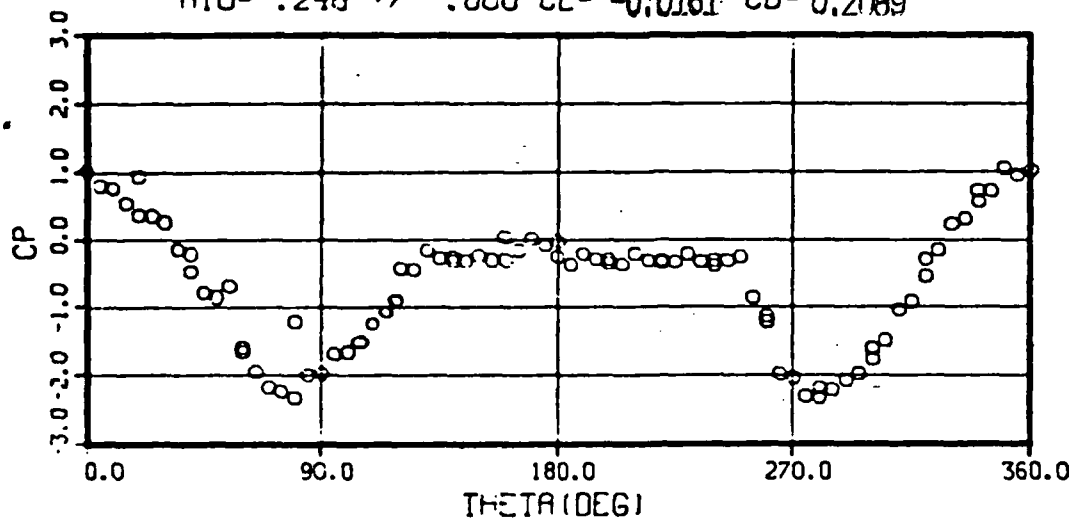


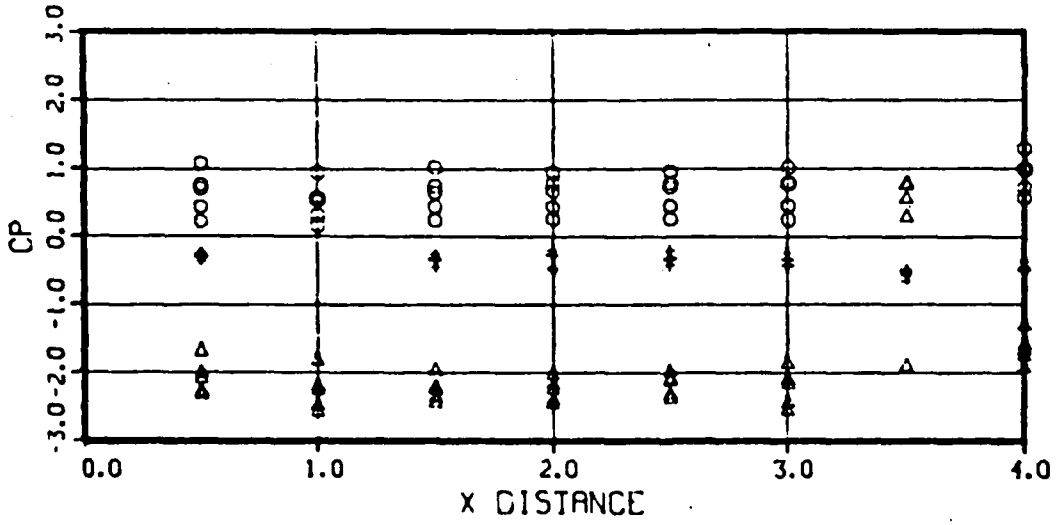


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 104 Q1U- 37.0 +/- .00 RND1U- .715 +/-.001
P1U- 858. +/- 2.60 V1U-280.91 +/- .170
M1U- .248 +/- .000 CL- -0.0161 CD- 0.2089

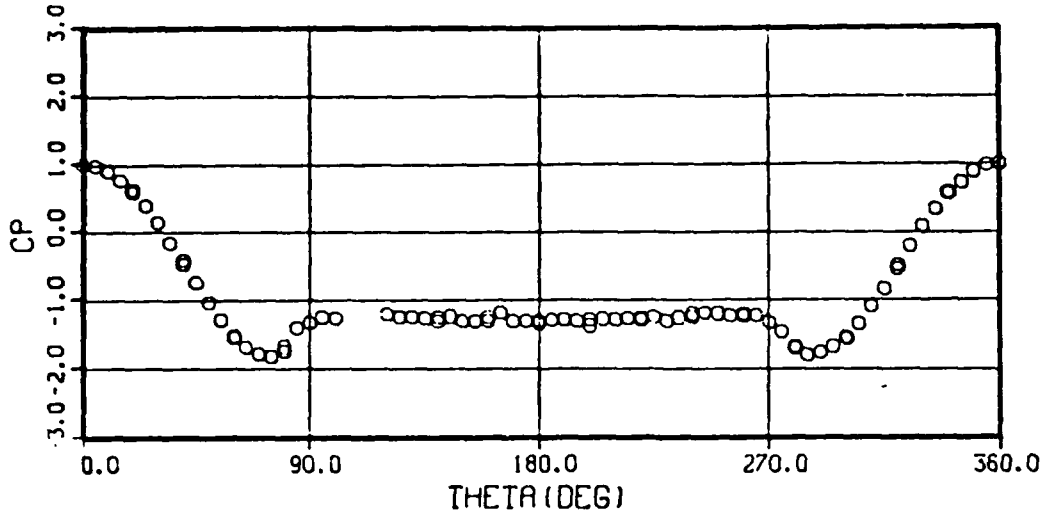


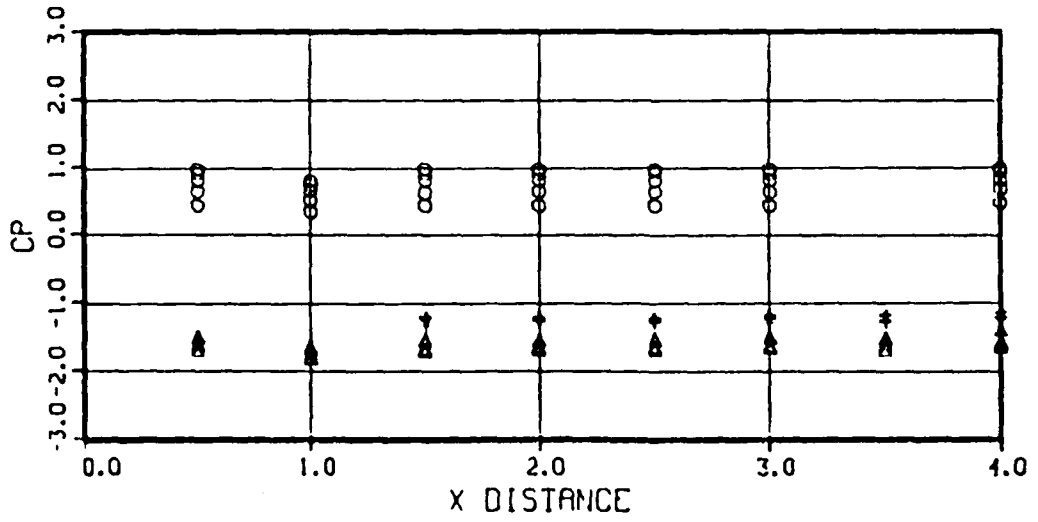


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 144 O1U- 25.2 +/- .00 RND1U- .619 +/-.001
P1U- 917. +/- 3.20 V1U-223.31 +/- .438
M1U- .198 +/- .001 CL--0.00078 CD- 1.1541

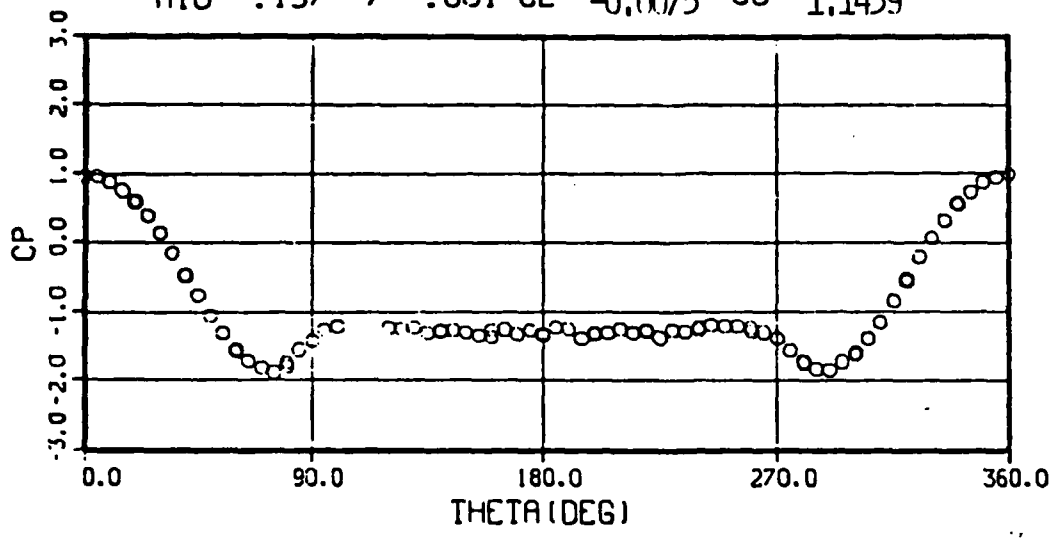


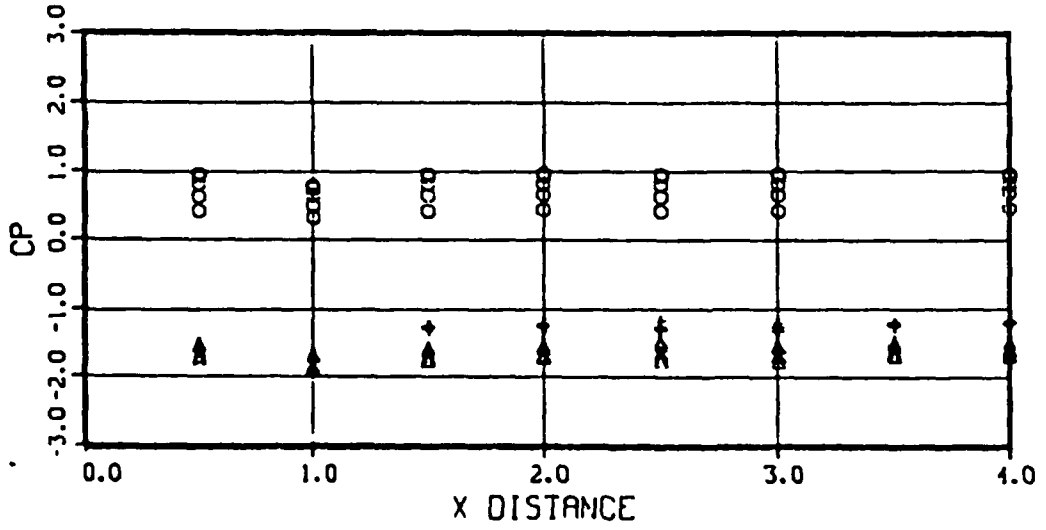


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 143 QIU- 20.8 +/- .00 RNDIU- .514 +/-.002
PIU- 762. +/- 4.60 VIU-221.96 +/- .648
MIU- .197 +/- .001 CL- -0.0075 CD- 1.1439

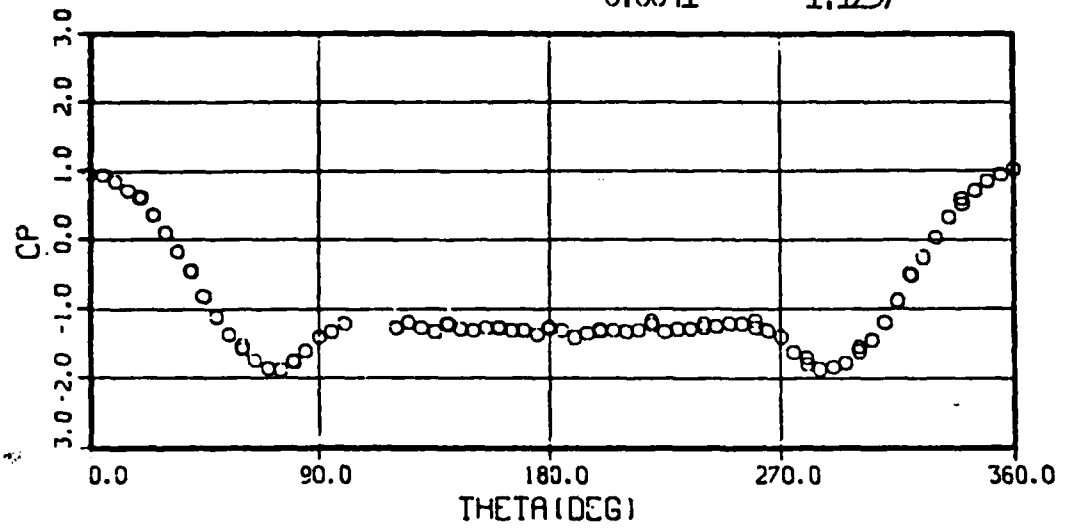


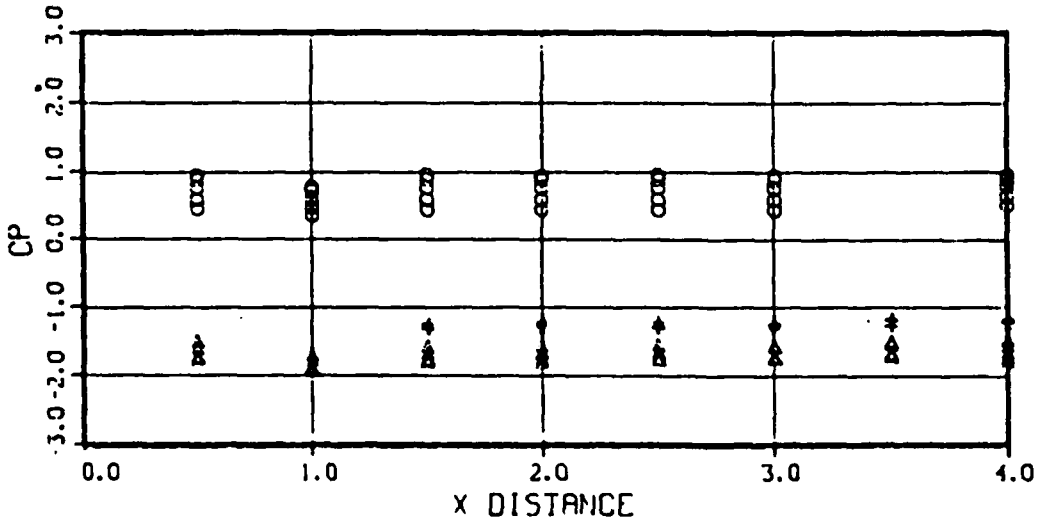


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 142 Q1U- 16.5 +/- .40 RND1U- .415 +/-.006
P1U- 612. +/- 15.60 V1U-219.46 +/- .600
M1U- .196 +/- .001 CL- -0.0041 CD- 1.1237

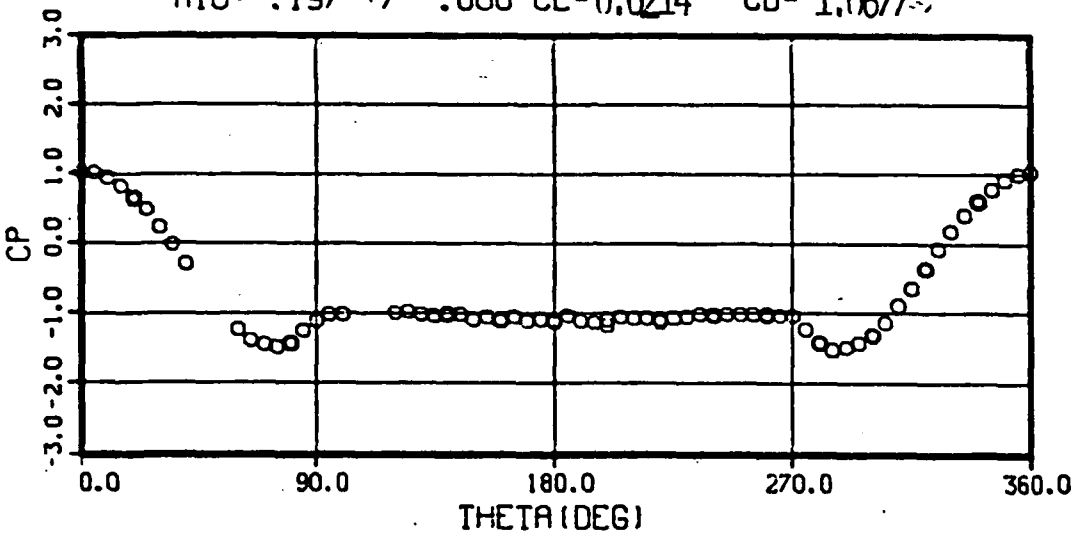


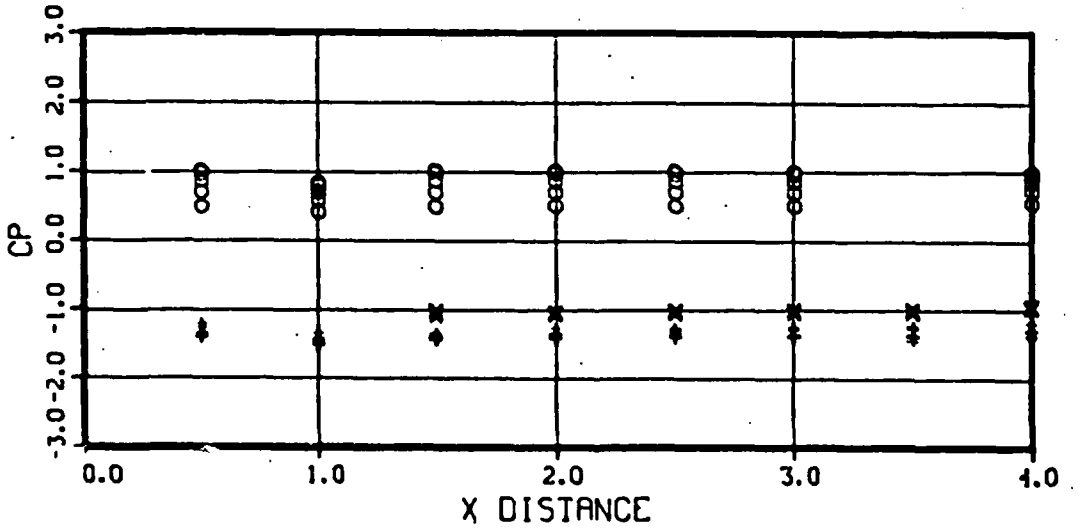


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 140 Q1U- 51.8 +/- .00 RND1U-1.287 +/-.001
P1U- 1904. +/- 5.20 V1U-221.34 +/- .222
M1U- .197 +/- .000 CL-0.0214 CD- 1.0677

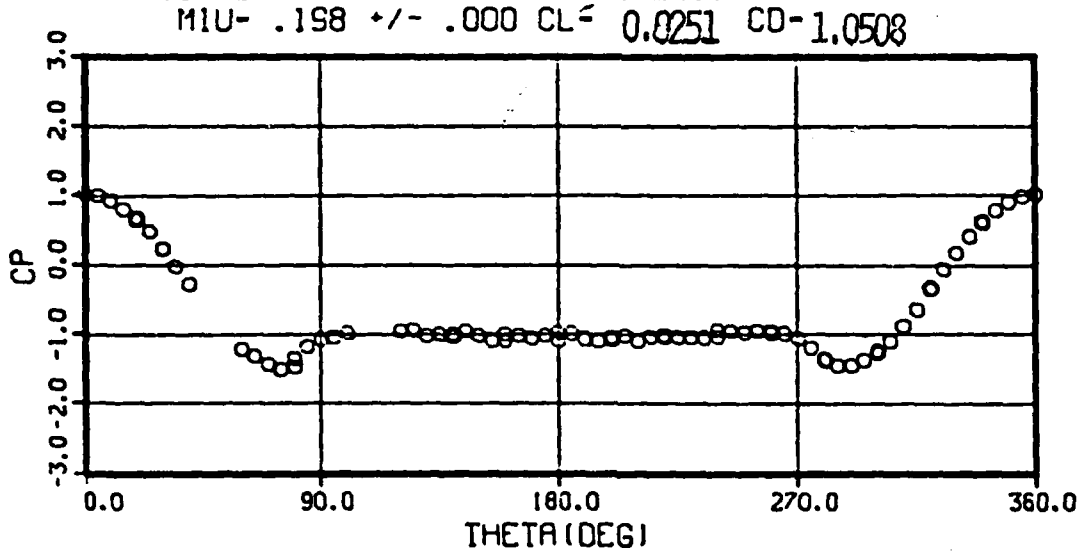


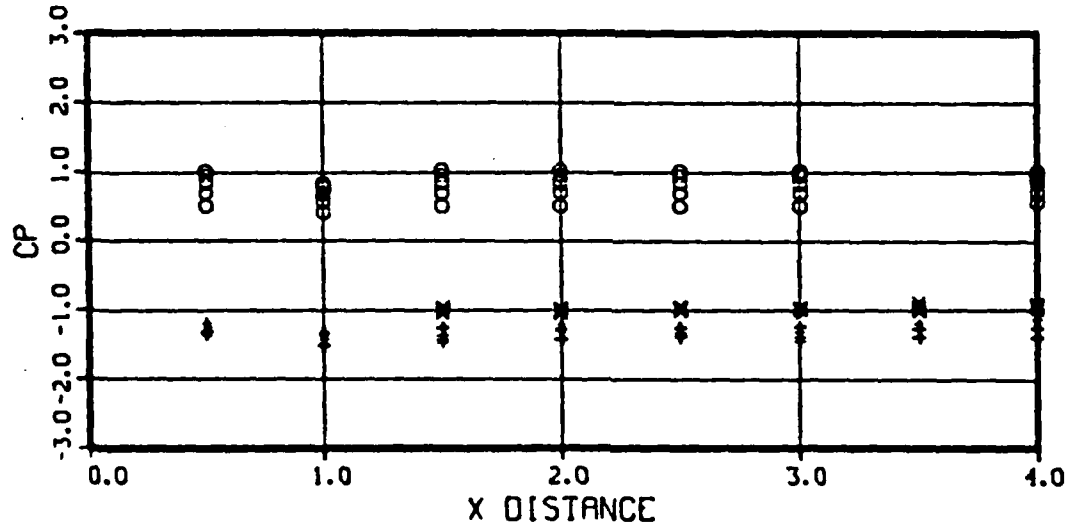


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 139 QIU- 61.3 +/- .18 RNDIU-1.537 +/-.004
PIU- 2231. +/- .60 VIU-221.38 +/- .688
MIU- .198 +/- .000 CL= 0.0251 CD-1.0508

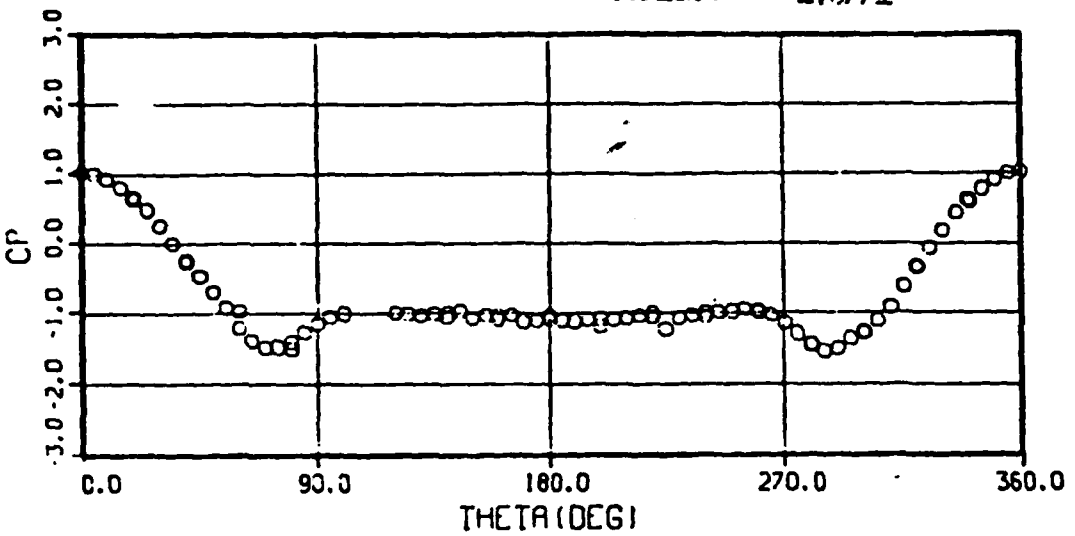


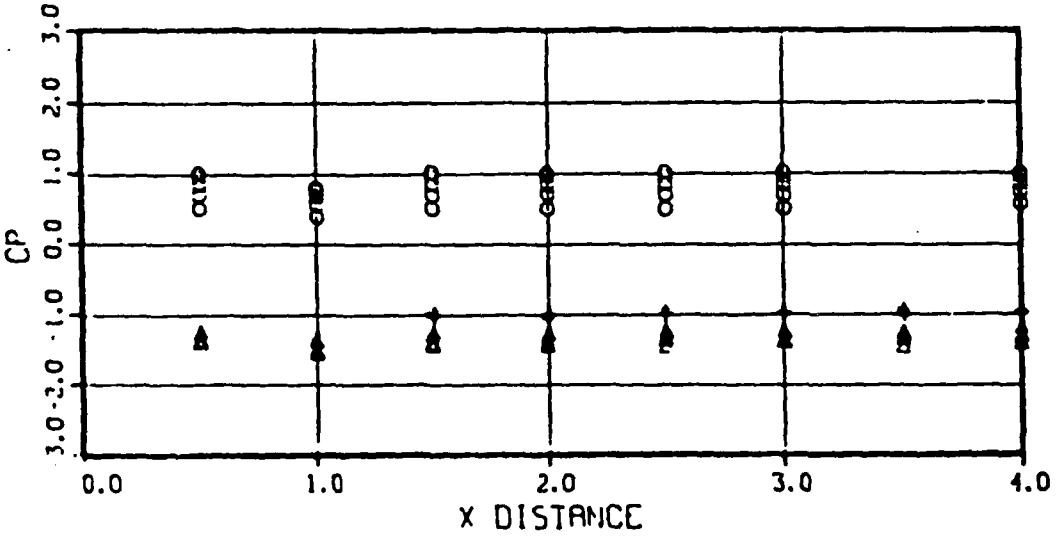


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

RUN 137 QIU- 86.4 +/- .30 RNDIU-2.064 +/-.004
PIU- 3000. +/- 1.60 VIU-228.72 +/- .422
MIU- .203 +/- .001 CL- 0.03186 CD- 1.0771

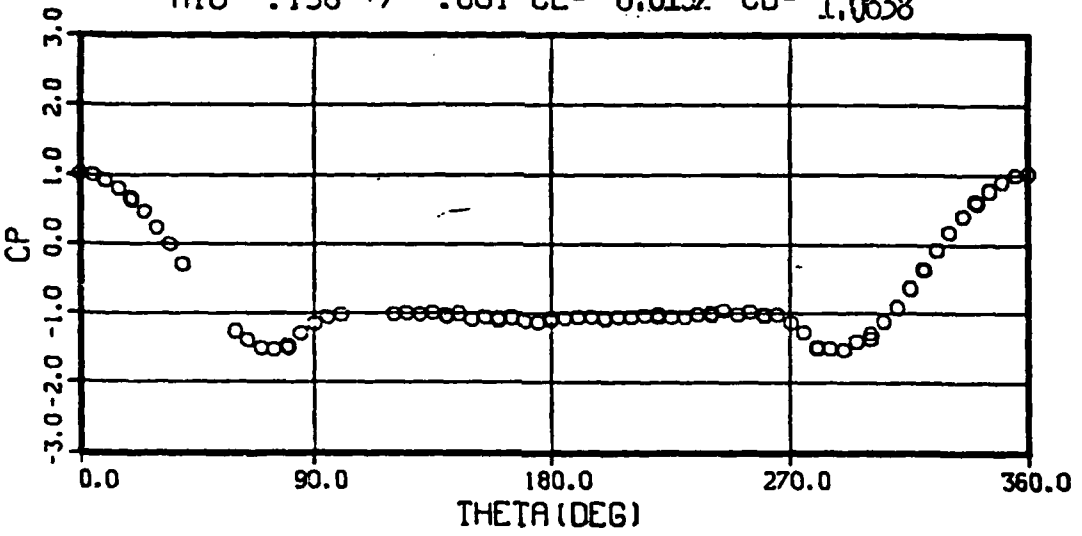


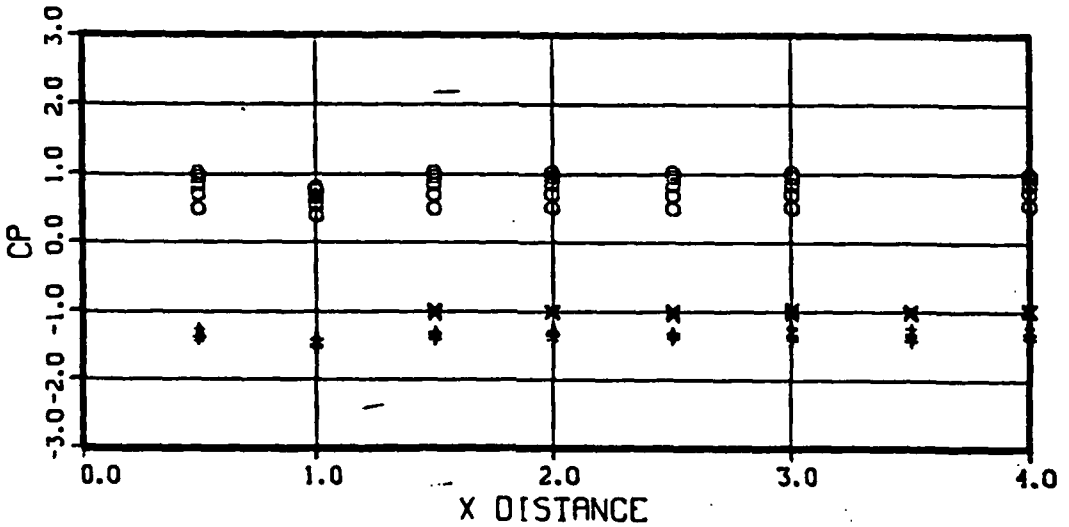


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-• 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 136 01U-103.2 +/- .94 RND1U-2.537 +/-.013
P1U- 3816. +/- 2.20 V1U-221.87 +/- .970
M1U- .196 +/- .001 CL- 0.0192 CD- 1.0638

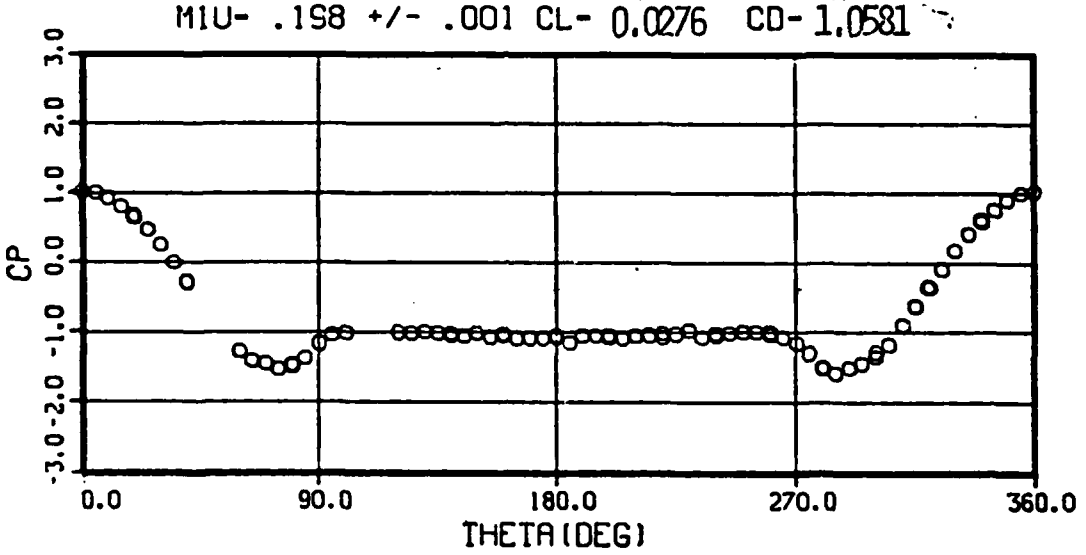


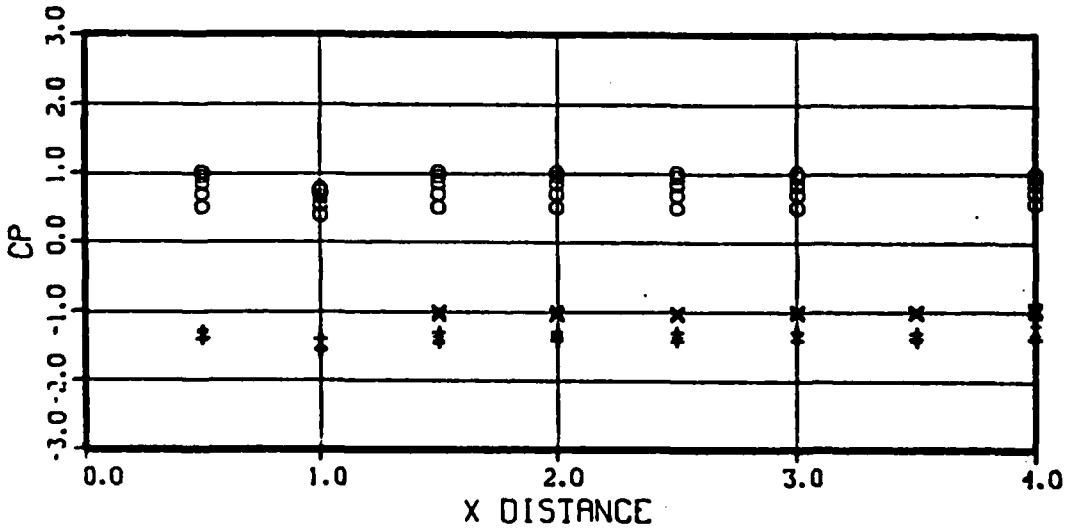


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 135 01U-125.1 +/- 1.44 RND1U-3.049 +/-.014
P1U- 4573. +/- 2.00 V1U-223.44 +/- 1.374
M1U- .198 +/- .001 CL- 0.0276 CD- 1.0581

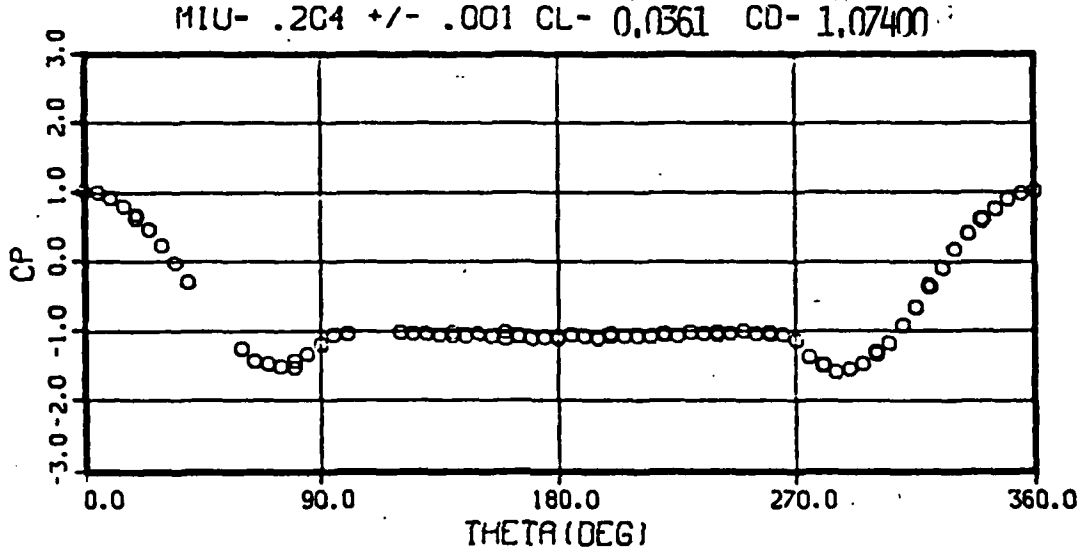


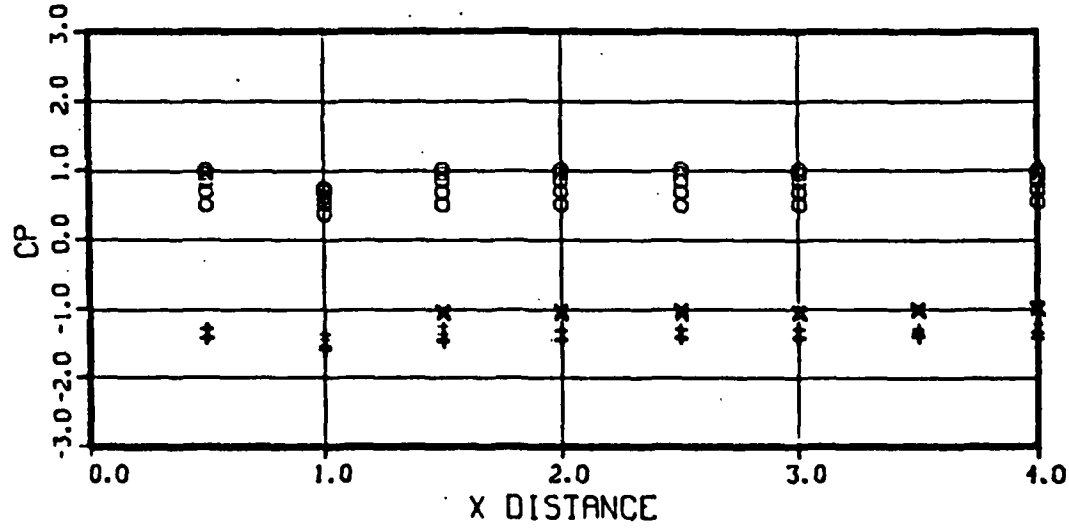


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 134 QIU-178.0 +/- 1.18 RNDIU-4.185 +/-.011
PIU- 6139. +/- 5.60 VIU-230.68 +/- .830
MIU- .204 +/- .001 CL- 0.0361 CD- 1.07400

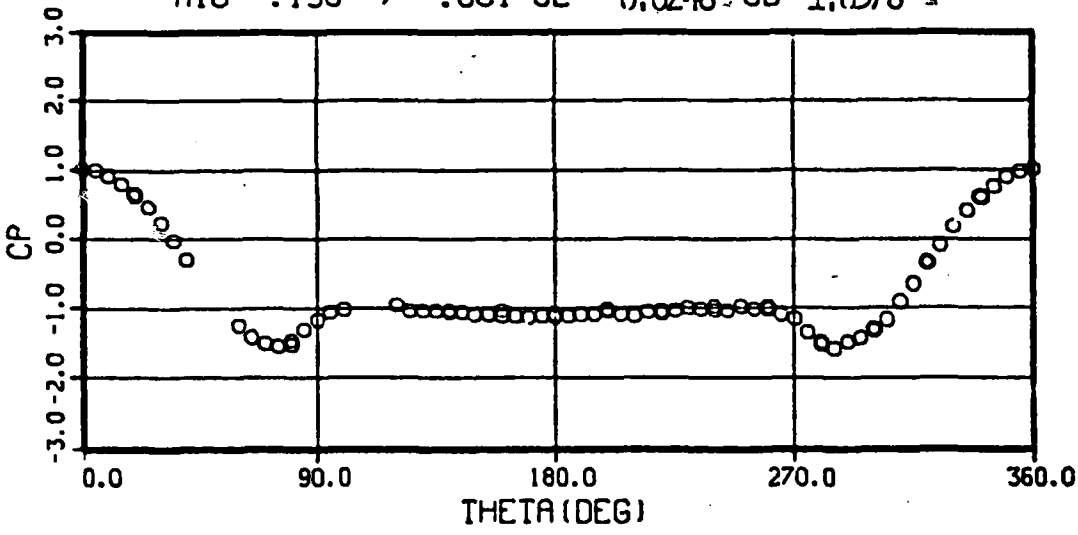


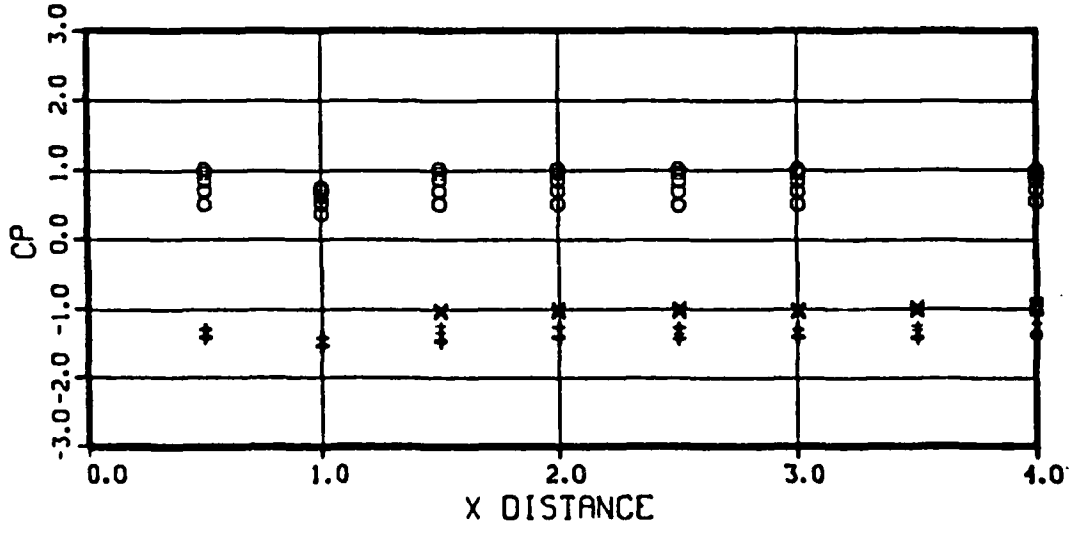


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 133 Q1U-212.6 +/- 1.74 RND1U-5.105 +/-.024
P1U- 7751. +/- 3.60 V1U-224.99 +/- .898
M1U- .198 +/- .001 CL- 0.0248 CD- 1.0378

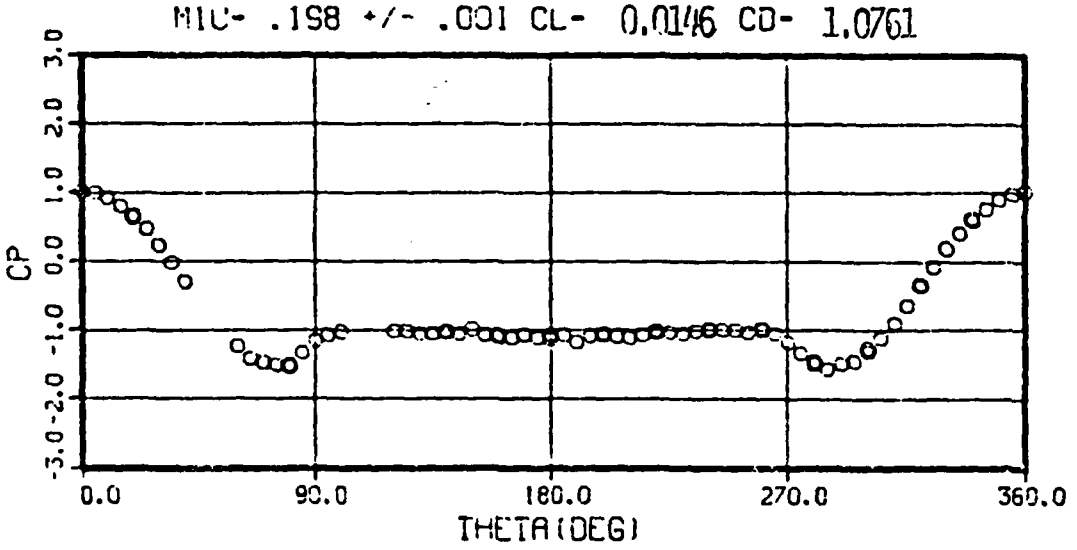


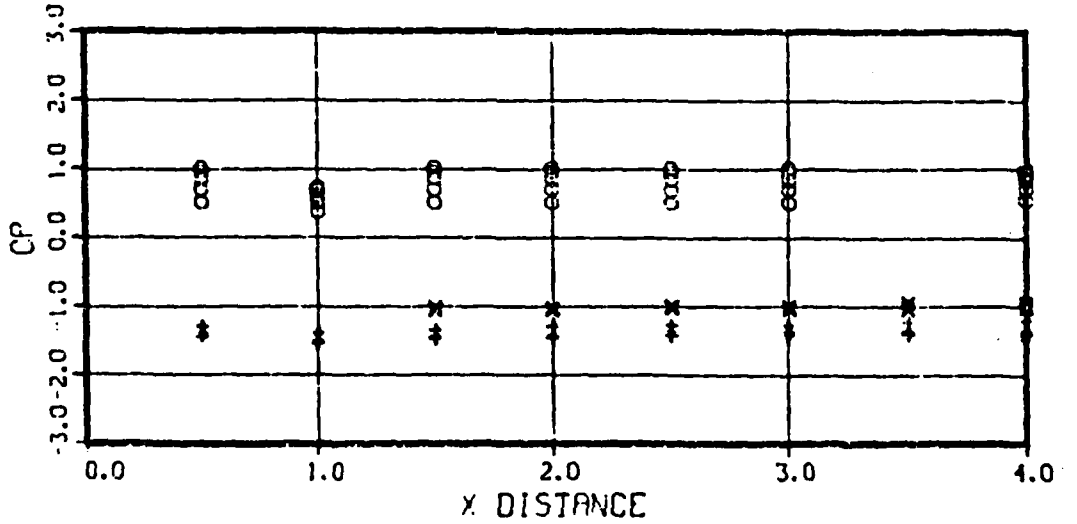


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 132 01U-276.9 +/- 1.46 RND1U-6.590 +/-.023
P1U-10068. +/- 2.00 V1U-225.97 +/- .532
M1U- .198 +/- .001 CL- 0.0146 CD- 1.0761

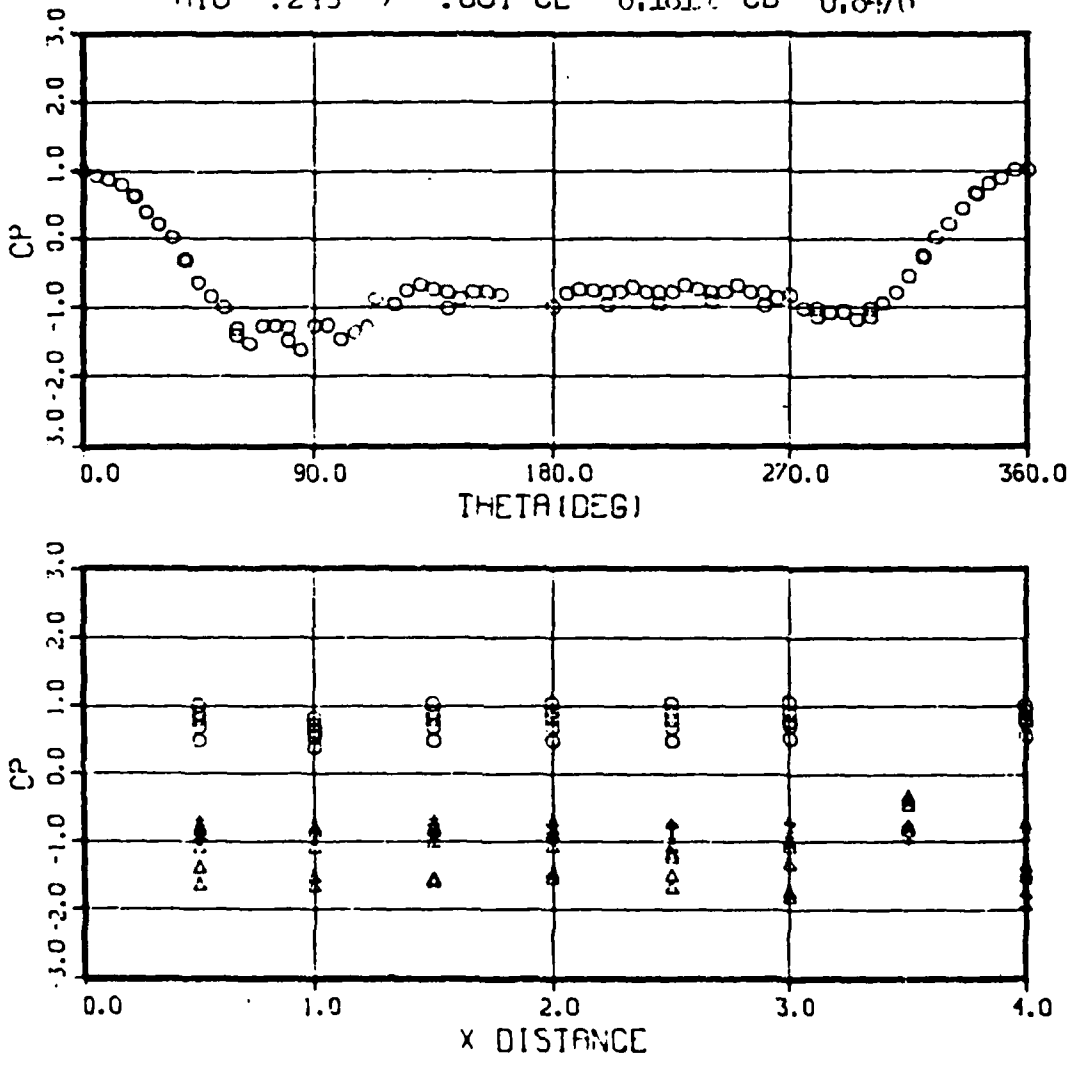




CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

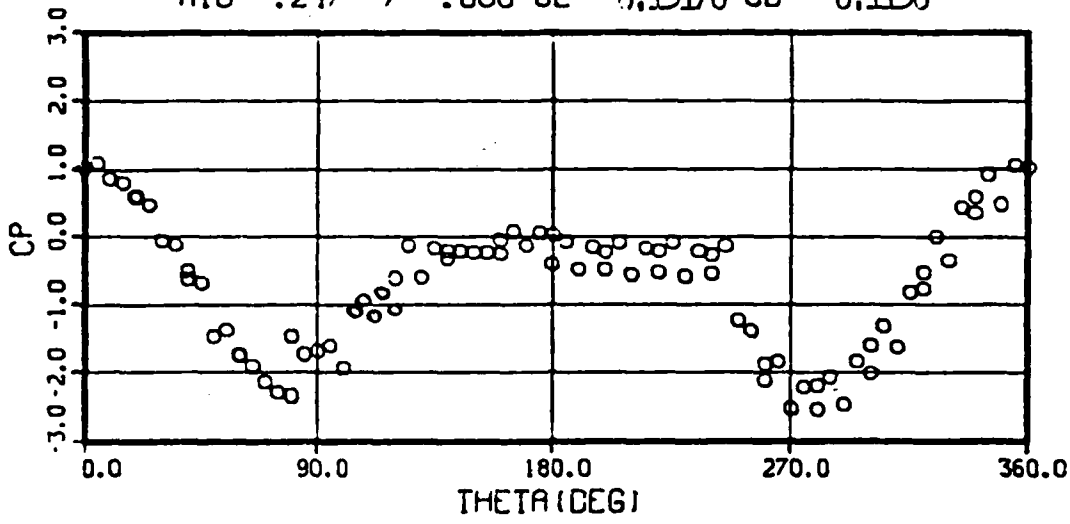
RUN 108 01U- 21.2 +/- .16 RND1U- .412 +/-.003
P1U- 490. +/- 4.60 V1U-281.14 +/- .620
M1U- .249 +/- .001 CL- -0.1819 CD- 0.8476

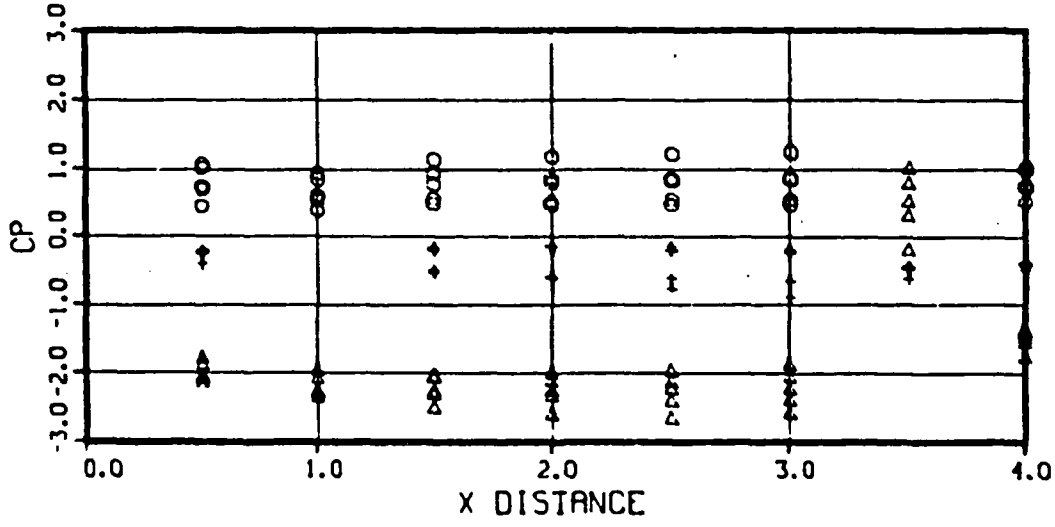


CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 106 Q1U- 26.4 +/- .12 RND1U- .515 +/-.001
P1U- 617. +/- 1.20 V1U-279.41 +/- .608
M1U- .247 +/- .000 CL- 0.13170 CD- 0.1130

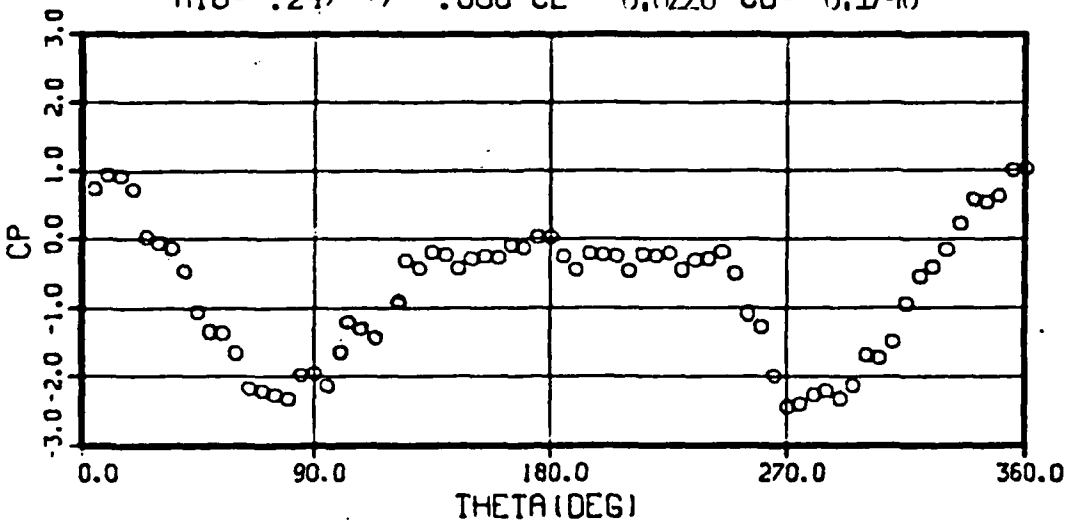


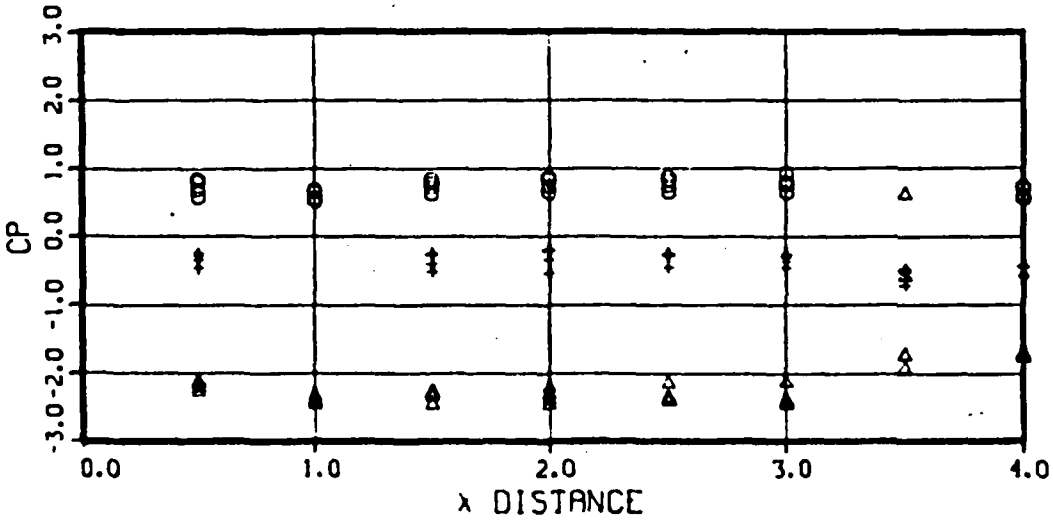


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF·4DEG-O 64DEG-• 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 105 Q1U- 31.7 +/- .08 RND1U- .617 +/-.001
P1U- 741. +/- 1.00 V1U-279.62 +/- .233
M1U- .247 +/- .000 CL- -0.0226 CD- 0.1740

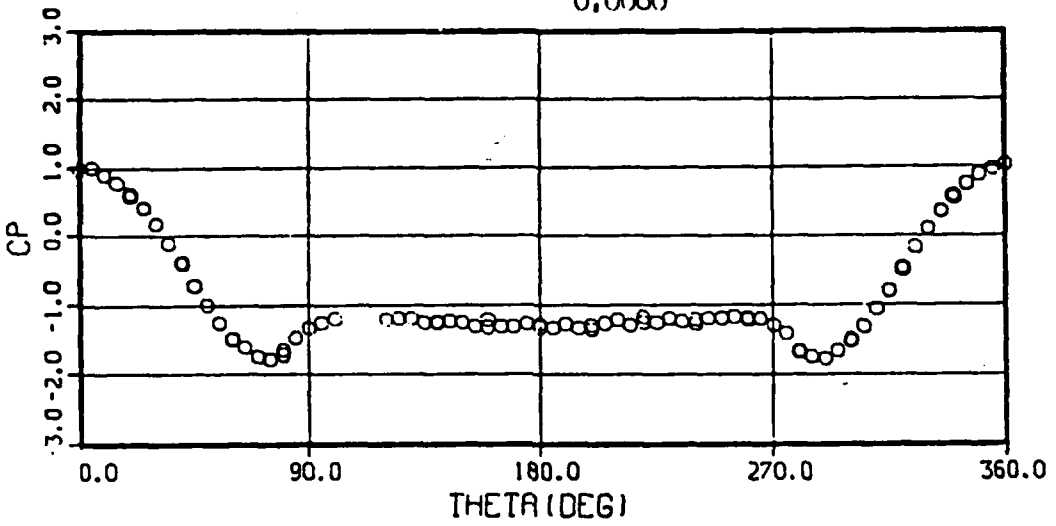


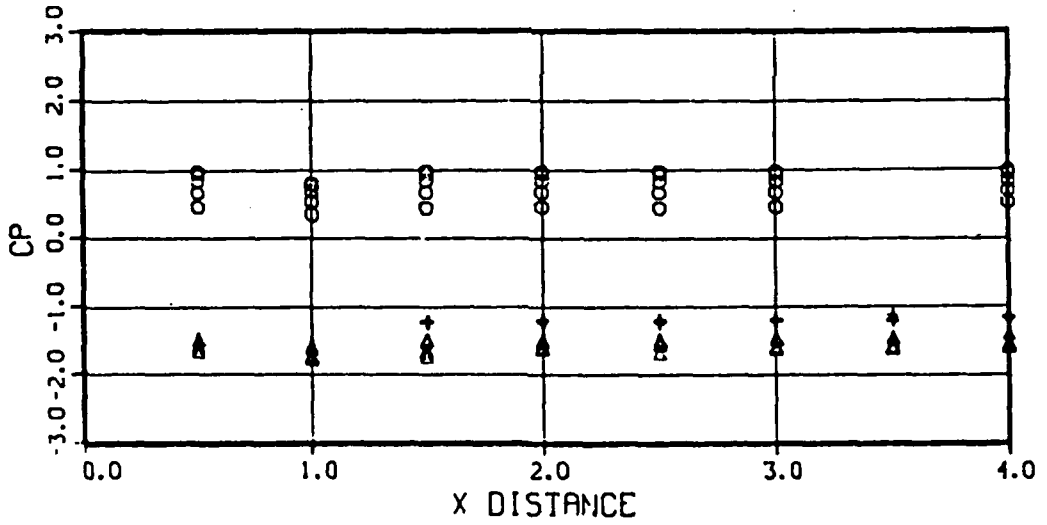


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 145 O1U- 29.9 +/- .00 RND1U- .727 +/-.002.
P1U- 1081. +/- 4.00 V1U-224.11 +/- .404
M1U- .199 +/- .001 CL- -0.0080 CD- 1.1541

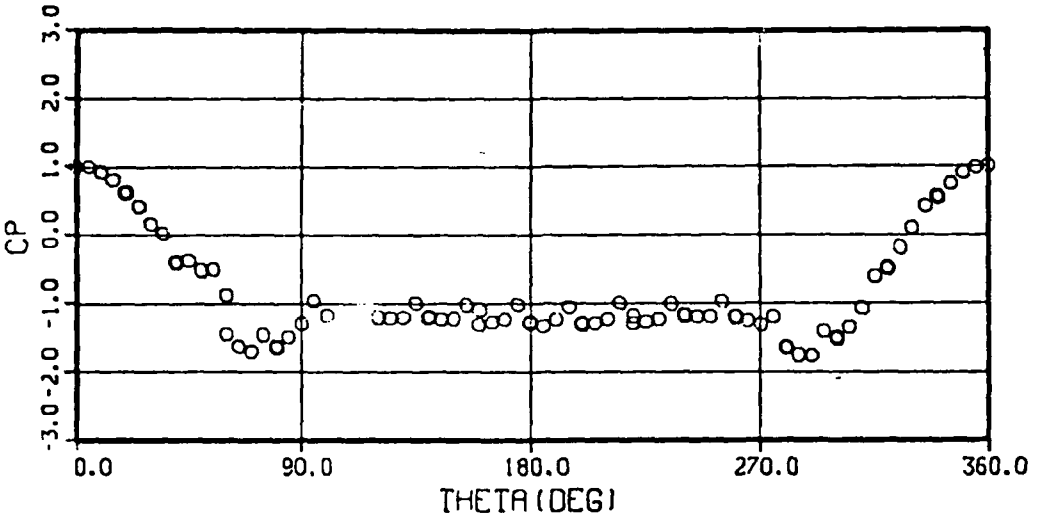


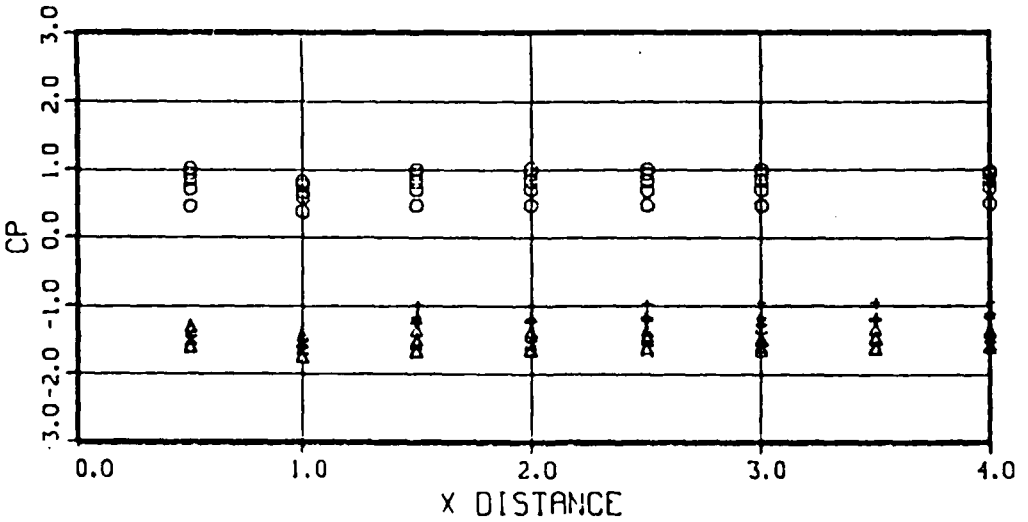


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 146 QIU- 34.4 +/- 3.16 RNOIU- .831 +/-.038
PIU- 1232. +/- 4.40 VIU-225.82 +/- 10.158
MIU- .200 +/- .009 CL- 0.067 CD- 1.15330

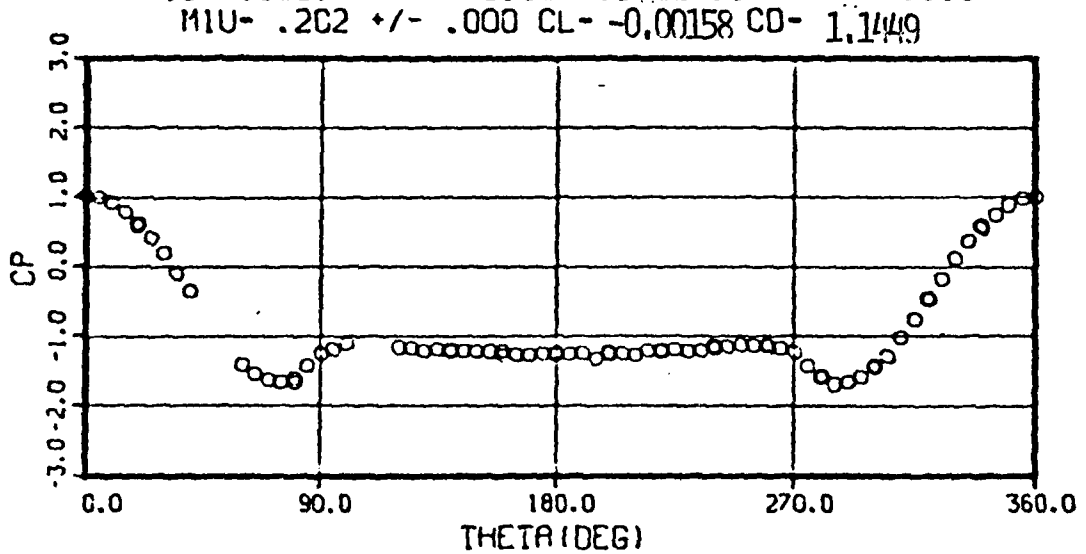


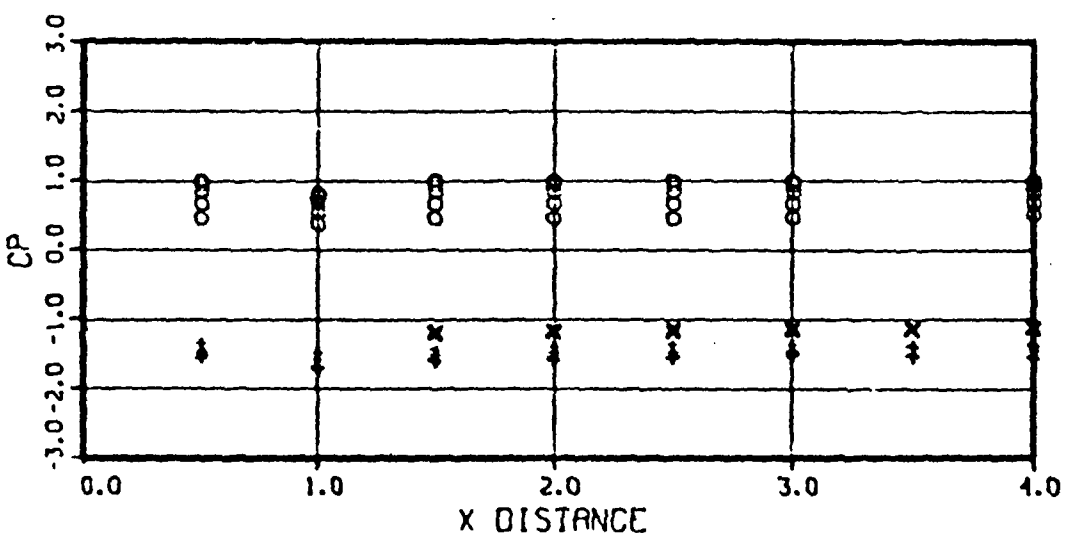


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 147 O1U- 39.8 +/- .10 RND1U- .947 +/-.003
P1U- 1393. +/- 3.60 V1U-228.57 +/- .116
M1U- .202 +/- .000 CL- -0.00158 CD- 1.1449

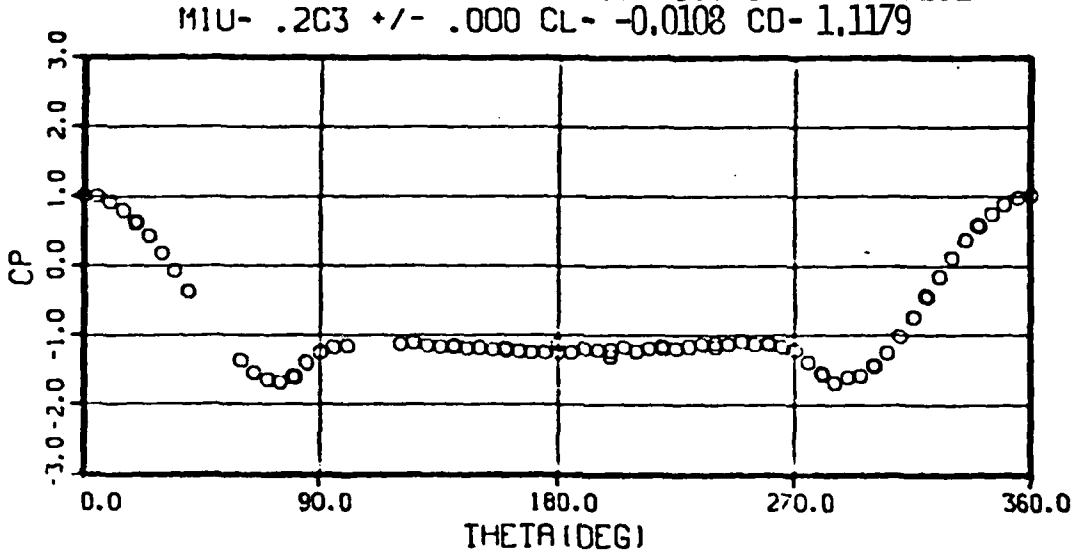


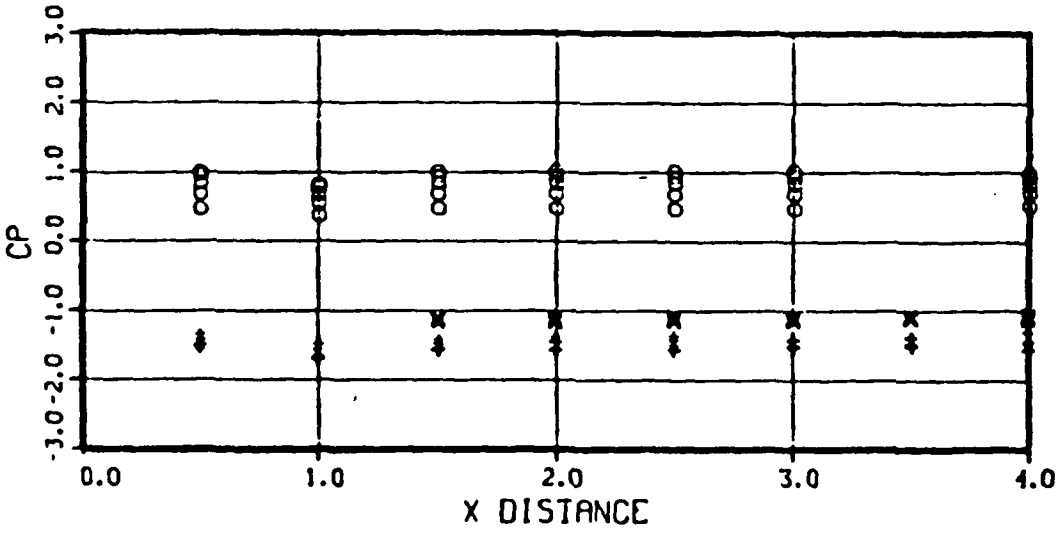


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 148 Q1U- 44.8 +/- .00 RND1U-1.057 +/-.001
P1U- 1553. +/- 3.40 V1U-230.02 +/- .252
M1U- .203 +/- .000 CL- -0.0108 CD- 1.1179

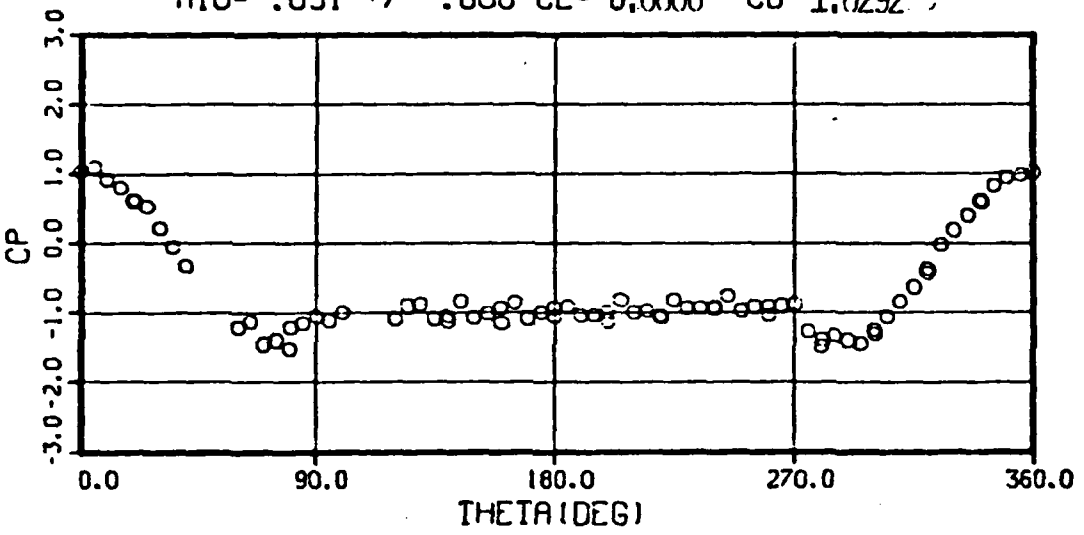


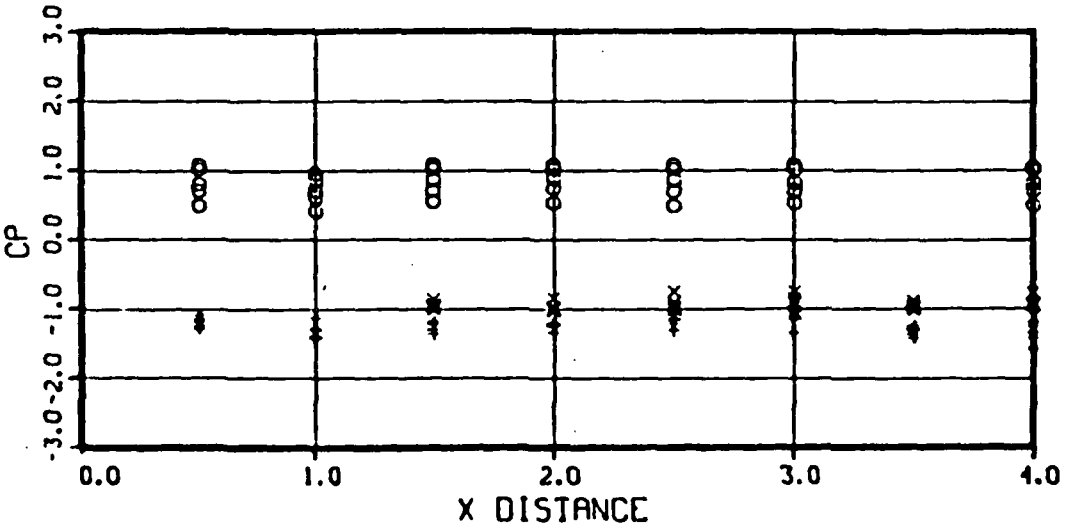


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 150 O1U- 7.0 +/- .00 RND1U-1.092 +/-.002
P1U-10321. +/- 1.40 V1U- 34.94 +/- .018
M1U- .031 +/- .000 CL- 0.0006 CD-1.0292

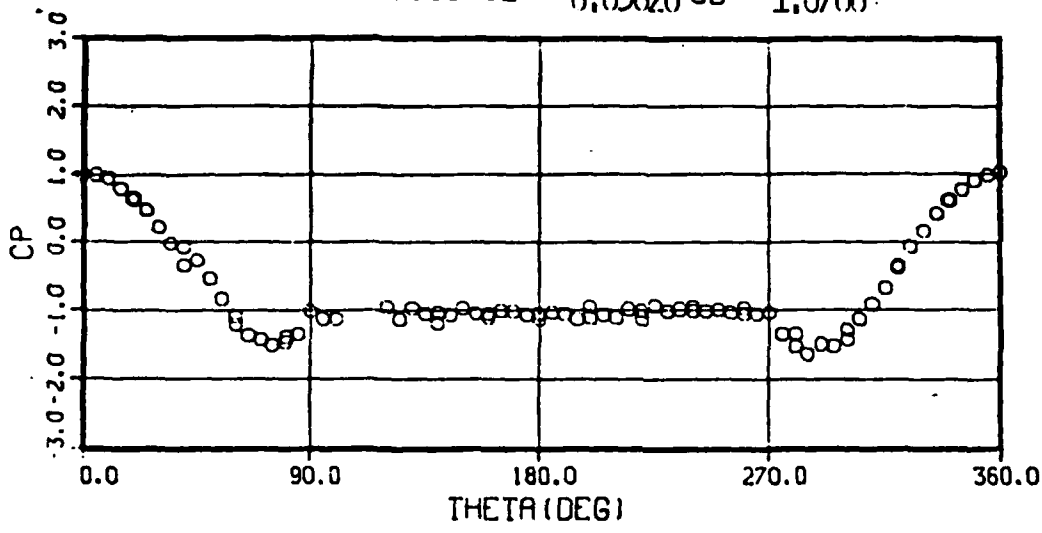


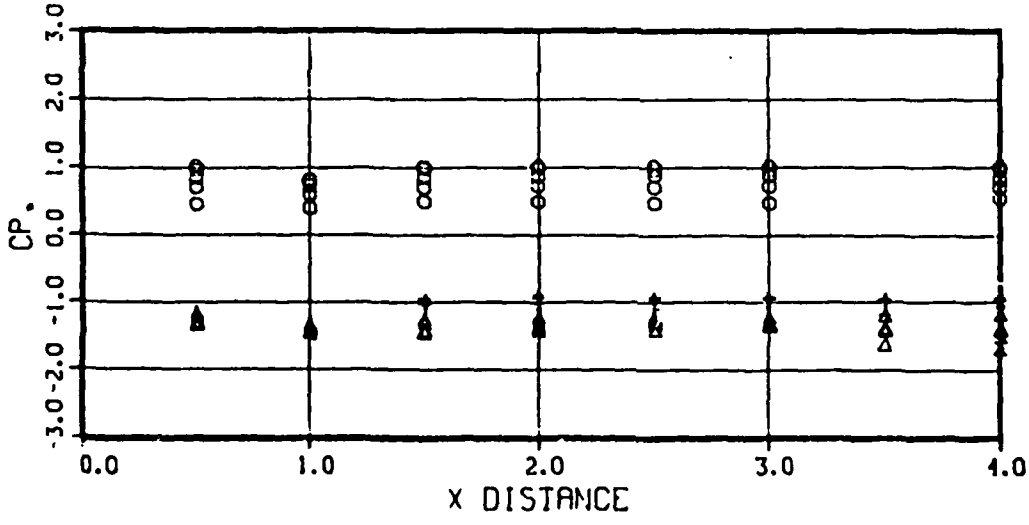


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 151 01U- 11.7 +/- .00 RND1U-1.421 +/-.001
P1U-10316. +/- .00 V1U- 45.24 +/- .016
M1U- .040 +/- .000 CL- 0.03620 CD- 1.0700

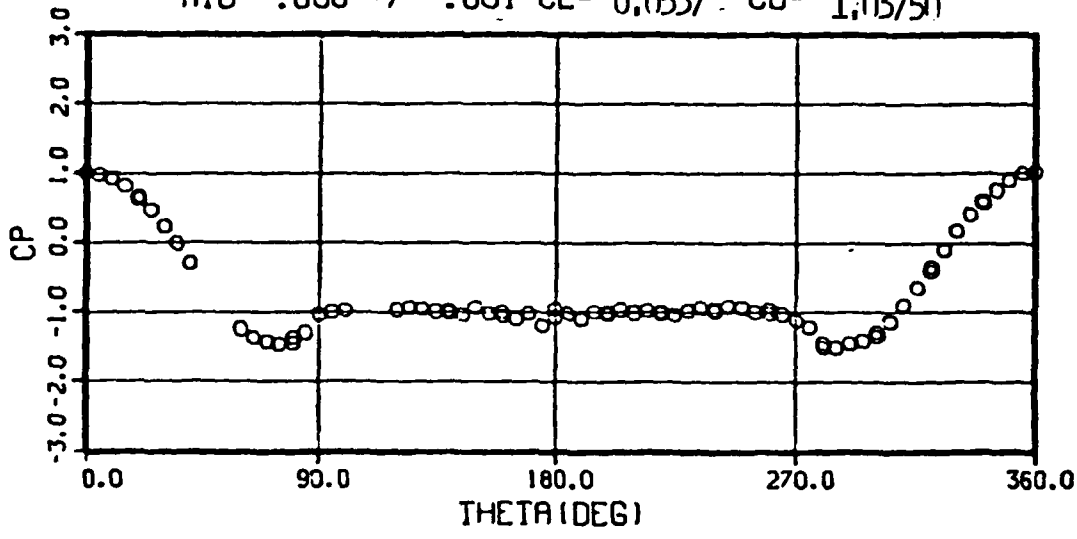


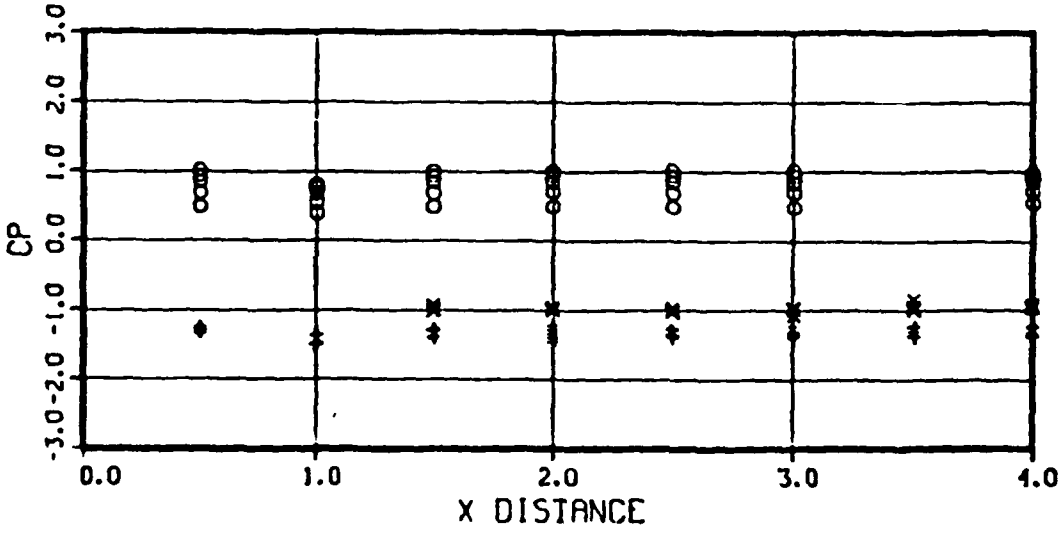


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 152 Q1U- 26.1 +/- .28 RND1U-2.127 +/-.013
P1U-10300. +/- 1.00 V1U- 67.56 +/- .434
M1U- .060 +/- .001 CL- 0.0537 CD- 1.03750

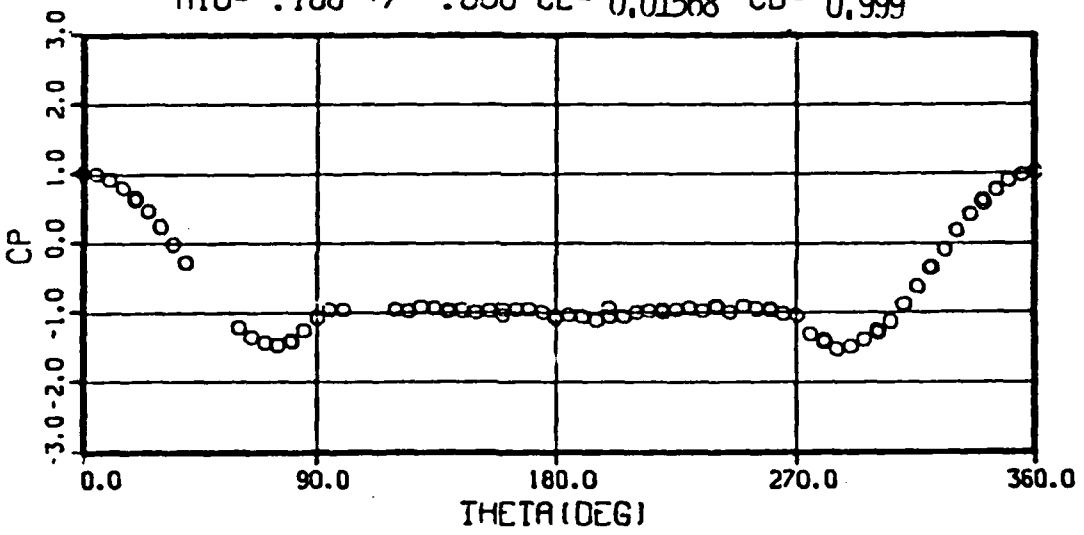


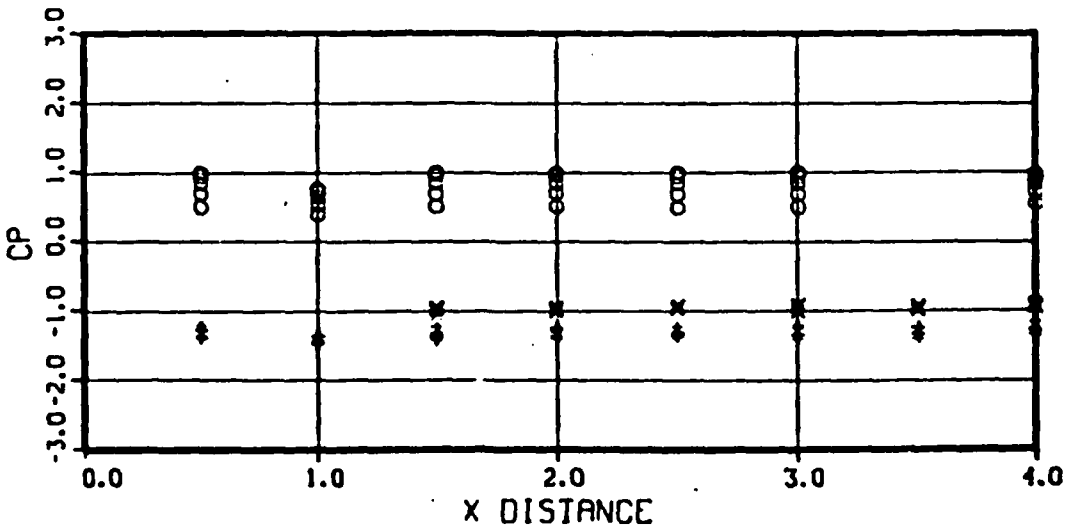


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 153 01U- 71.5 +/- .22 RND1U-3.515 +/-.007
P1U-10254. +/- 2.00 V1U-112.01 +/- .186
M1U- .100 +/- .000 CL- 0.01568 CD- 0.999

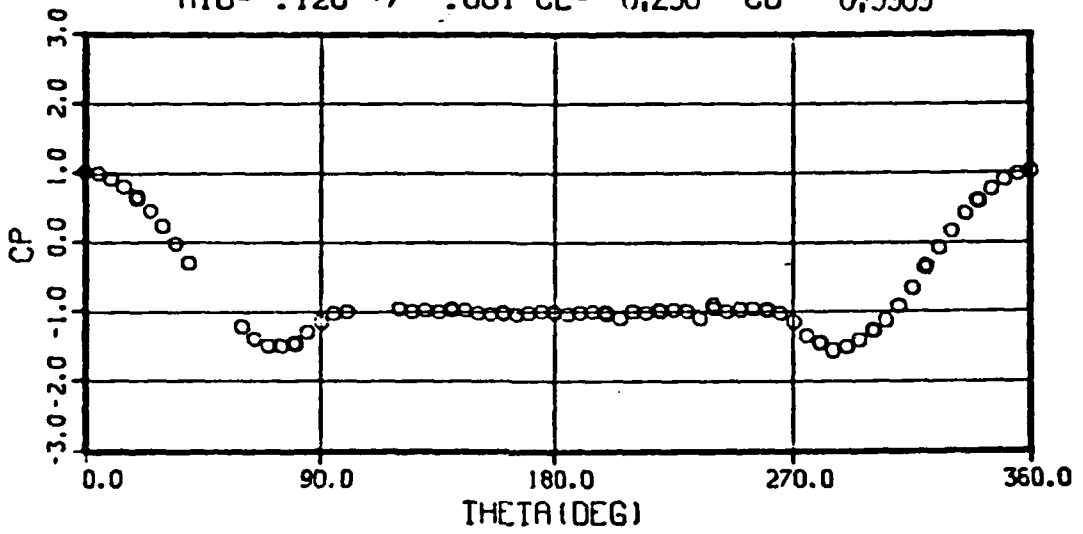


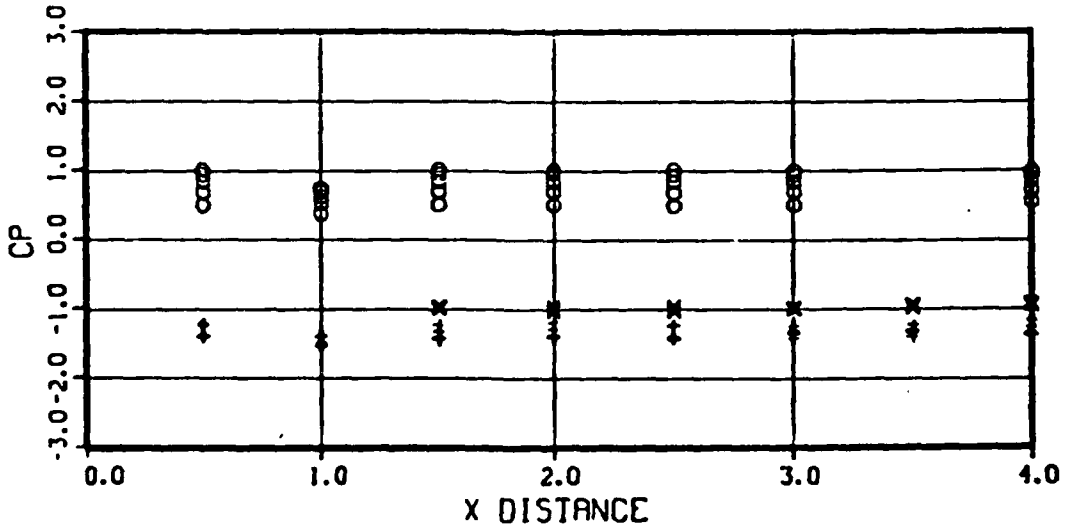


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 154 Q1U-103.1 +/- .90 RND1U-4.209 +/-.021
P1U-10226. +/- 2.20 V1U-134.77 +/- .566
M1U- .120 +/- .001 CL- -0.296 CD- 0.9909

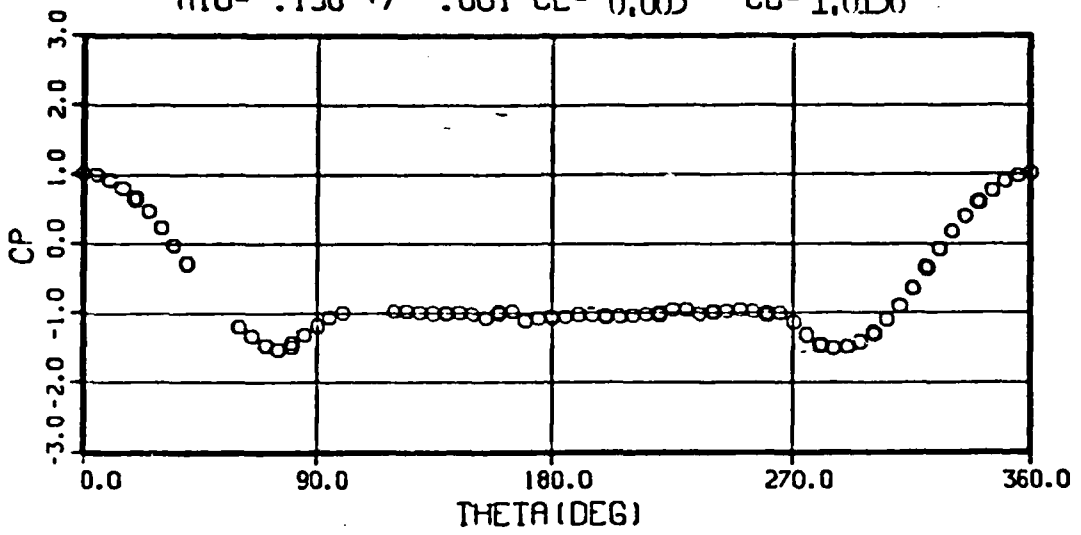


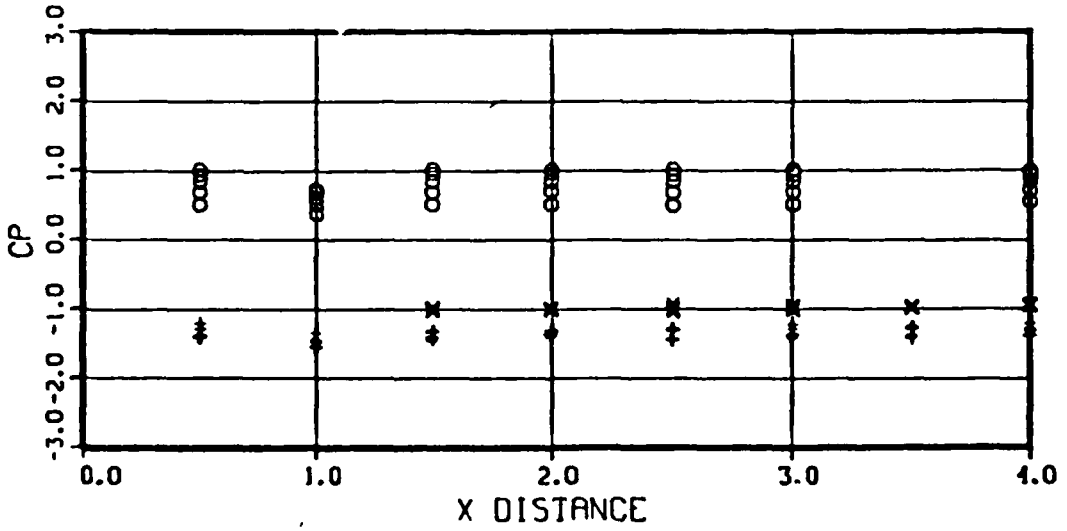


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 155 O1U-160.7 +/- .86 RND1U-5.218 +/-.017
P1U-10164. +/- 1.60 V1U-169.06 +/- .416
M1U- .150 +/- .001 CL- 0.003 CD- 1.0156

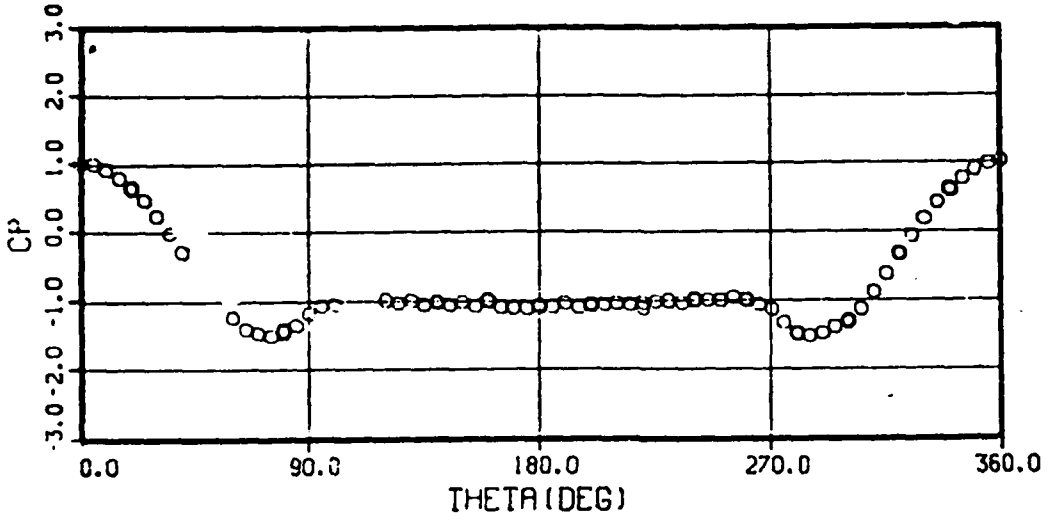


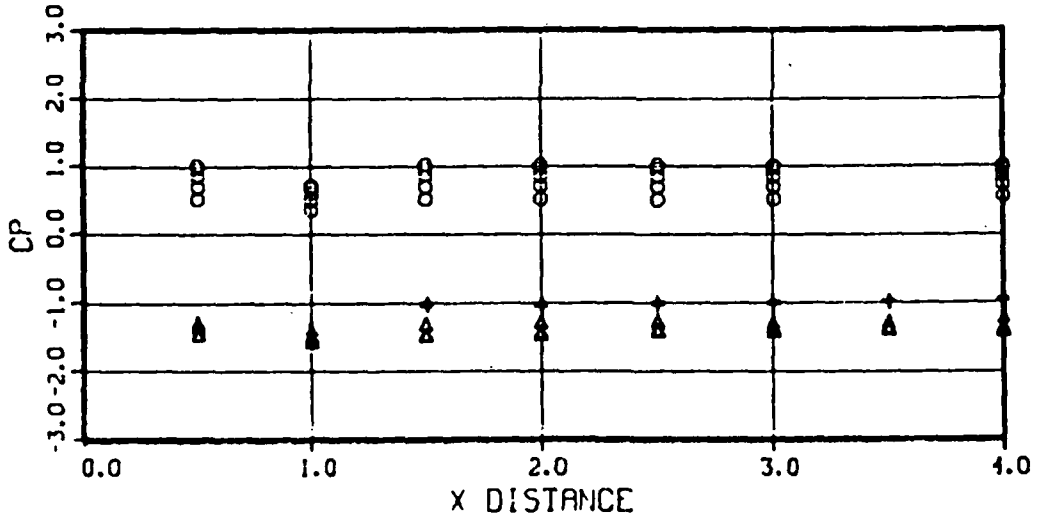


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 156 01U-227.4 +/- .84 RND1U-6.136 +/-.021
P1U-10093. +/- 6.20 V1U-202.39 +/- .298
M1U- .179 +/- .001 CL- 0.0003 CD- 1.0474

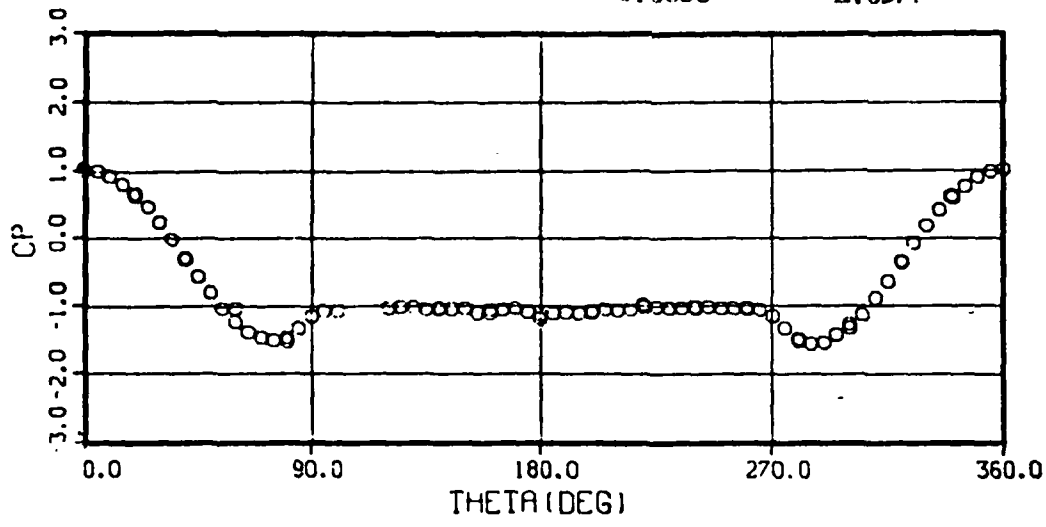


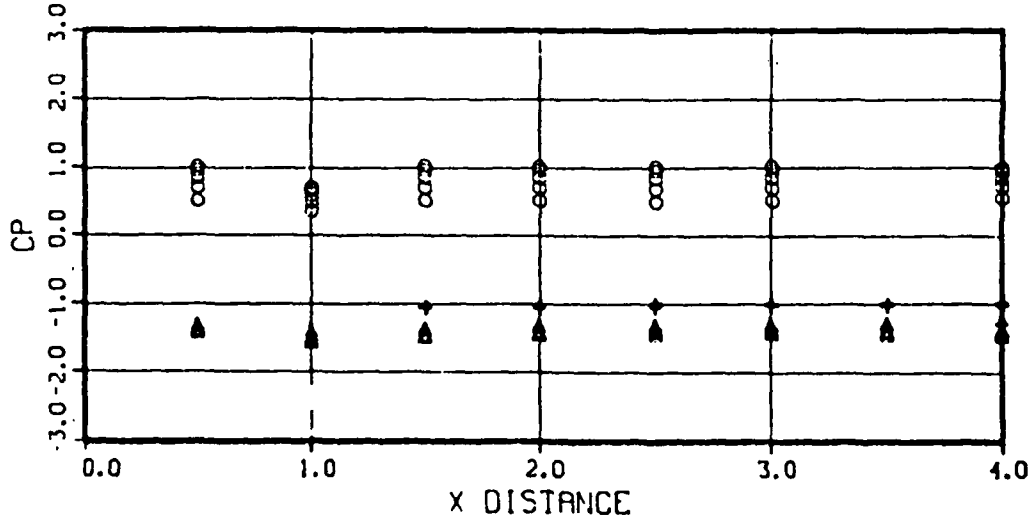


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

RUN 157 01U-281.3 +/- .48 RND1U-6.710 +/-.014
P1U-10044. +/- 3.80 V1U-226.99 +/- .218
M1U- .200 +/- .000 CL- 0.0096 CD- 1.0579

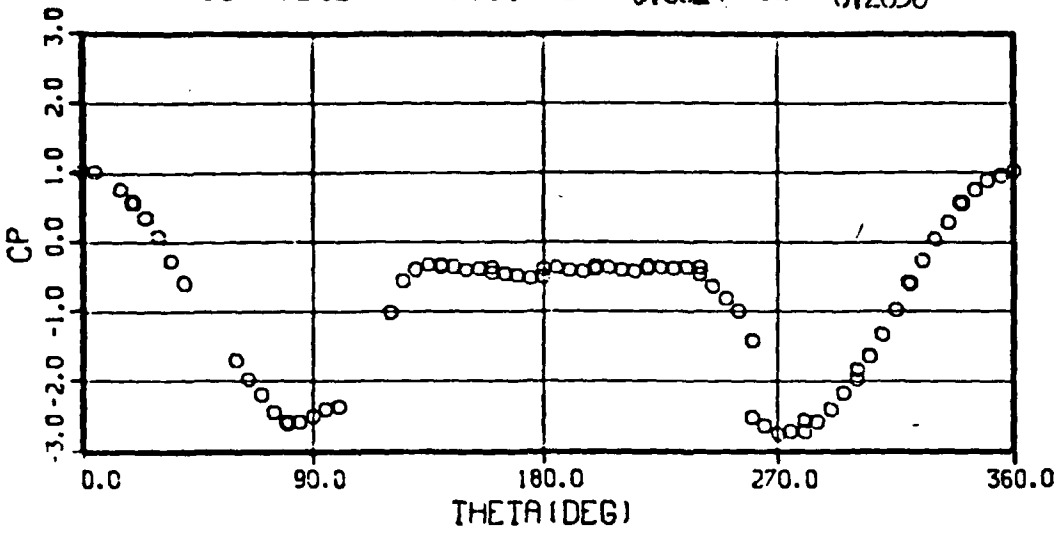


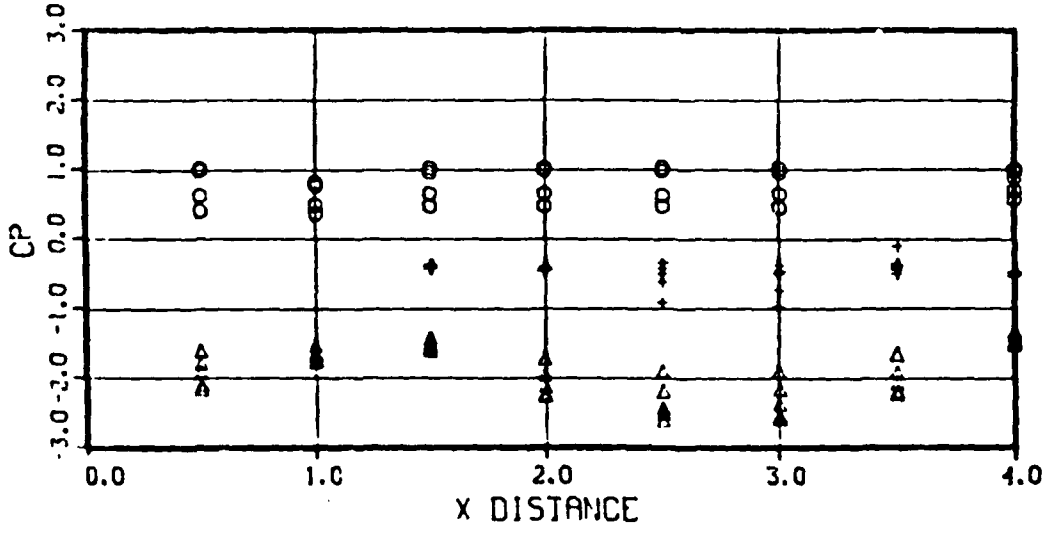


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 171 QIU- 19.7 +/- .08 RNDIU- .408 +/-.002
PIU- 478. +/- 3.80 VIU-269.46 +/- .620
MIU- .242 +/- .001 CL- -0.0624 CD- 0.2856

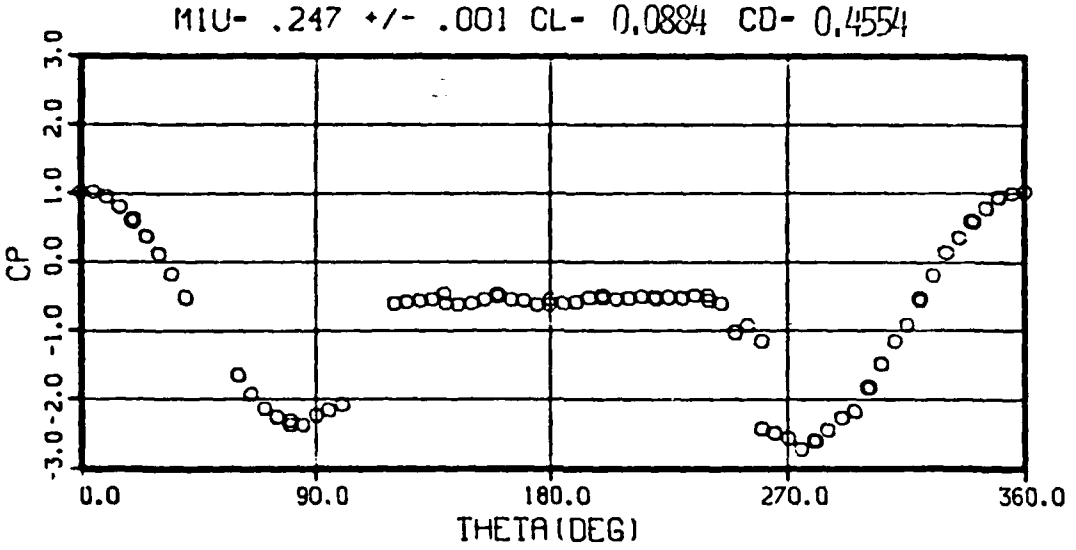


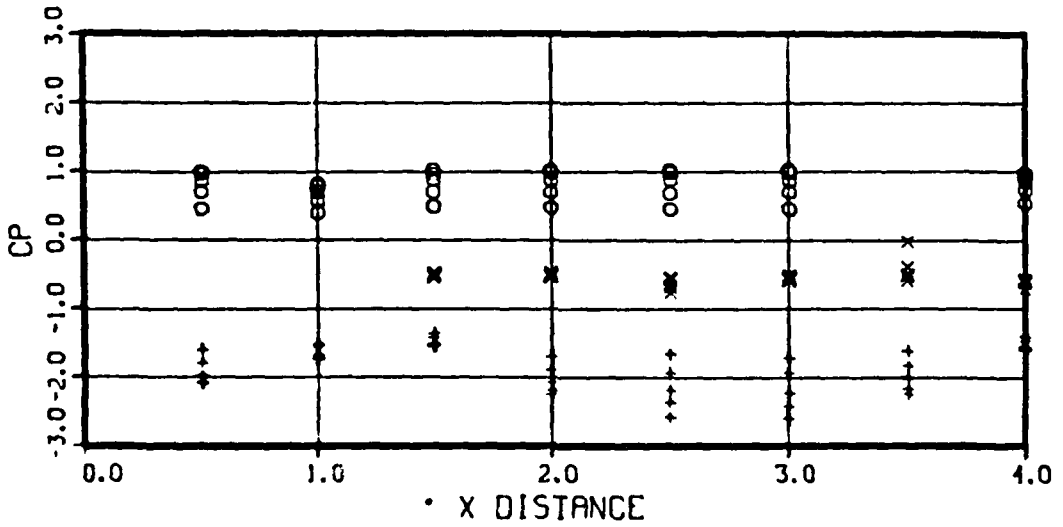


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 173 Q1U- 30.7 +/- .16 RND1U- .615 +/-.002
P1U- 722. +/- 3.80 V1U-276.23 +/- .426
M1U- .247 +/- .001 CL- 0.0884 CD- 0.4554

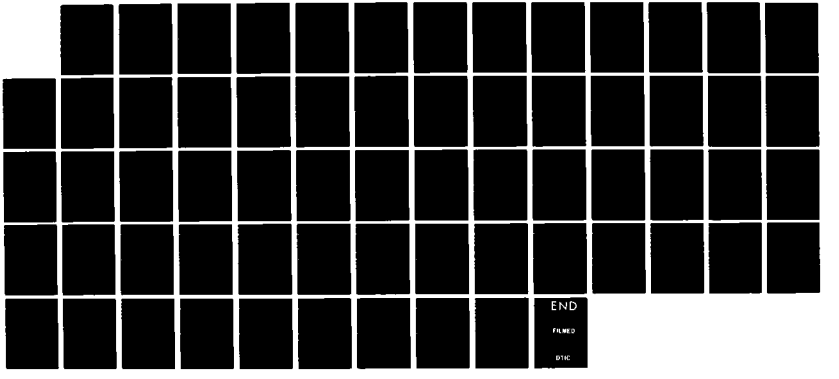


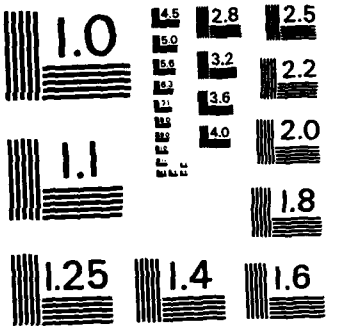


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

AD-A160 351 ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER AROUND SMOOTH & ROUGH..(U) ALABAMA A AND M UNIV NORMAL DEPT OF PHYSICS S S MURTY ET AL. JUL 85 3/3

UNCLASSIFIED N00014-83-K-0351 F/G 20/4 NL

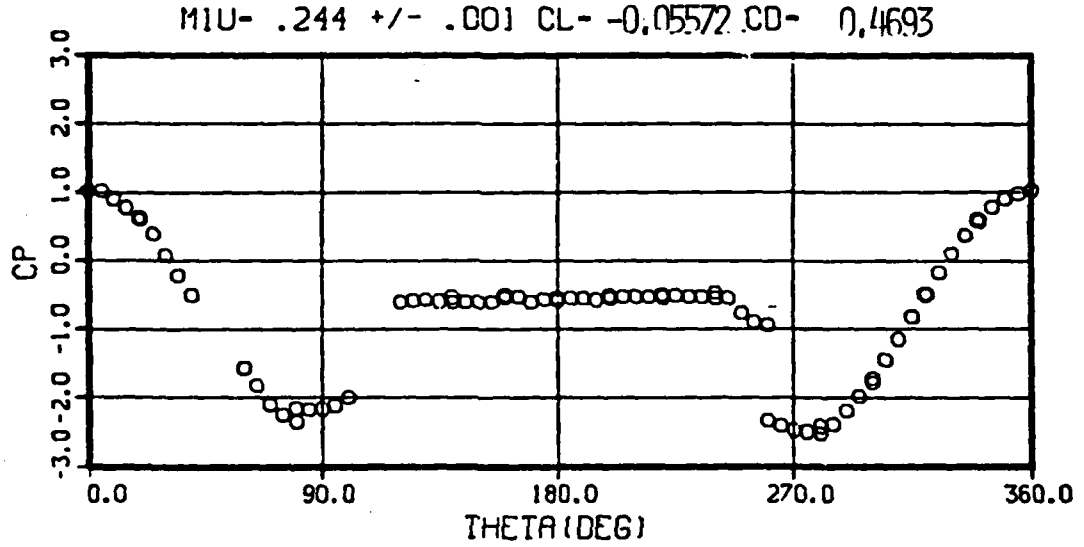


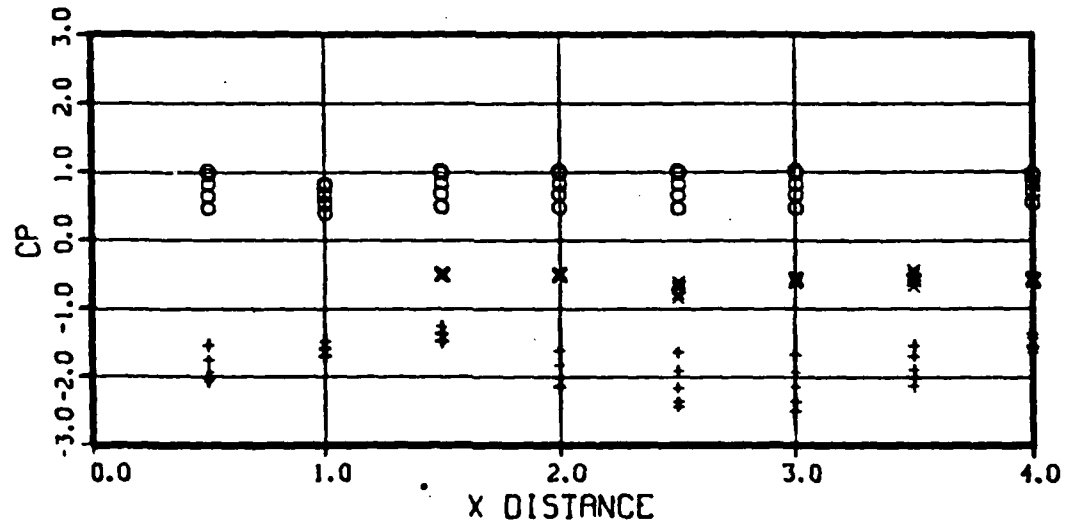


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

CYLINDER + NO. 250 MESH SCREEN

RUN 174 01U- 35.5 +/- .14 RND1U- .711 +/-.003
P1U- 848. +/- 3.80 V1U-274.39 +/- .330
M1U- .244 +/- .001 CL- -0.05572 CD- 0.4693

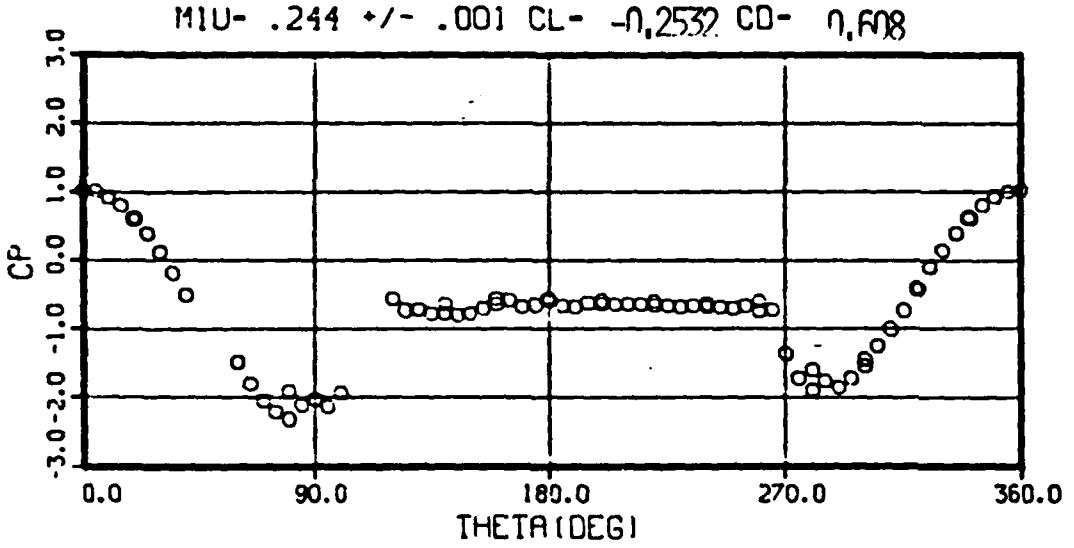


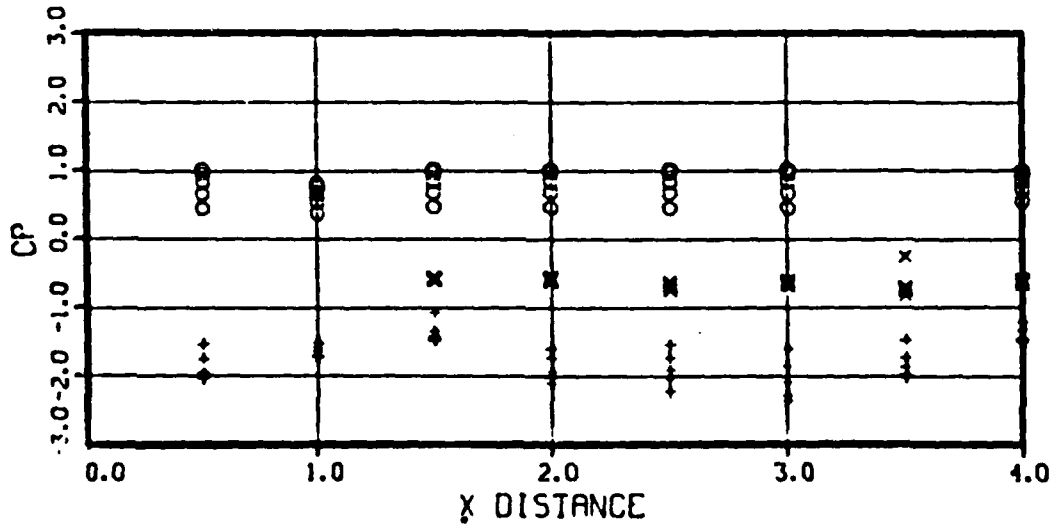


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 177 QIU- 51.2 +/- .30 RNDIU-1.017 +/-.004
PIU- 1225. +/- 3.80 VIU-275.51 +/- .490
MIU- .244 +/- .001 CL- -0.2532 CD- 0.608

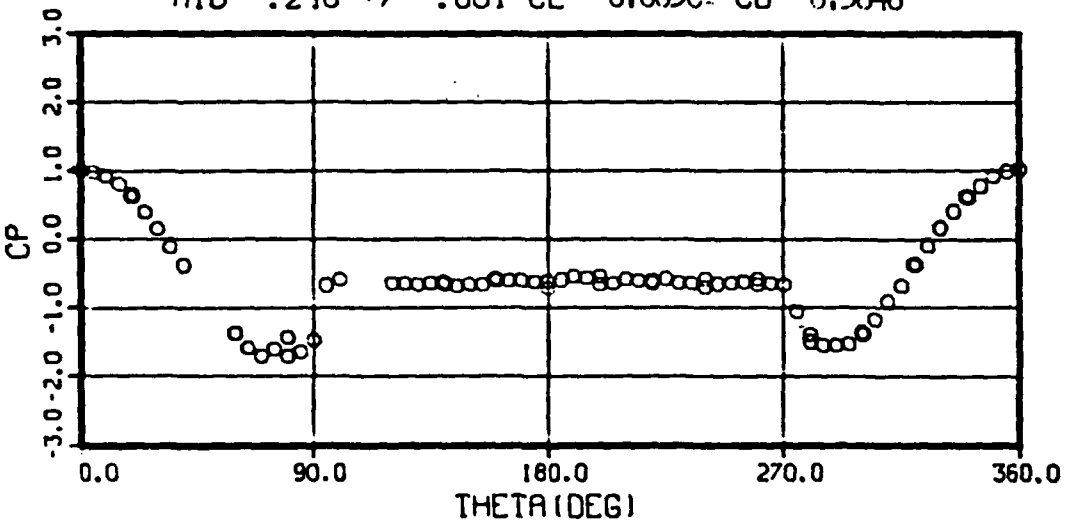


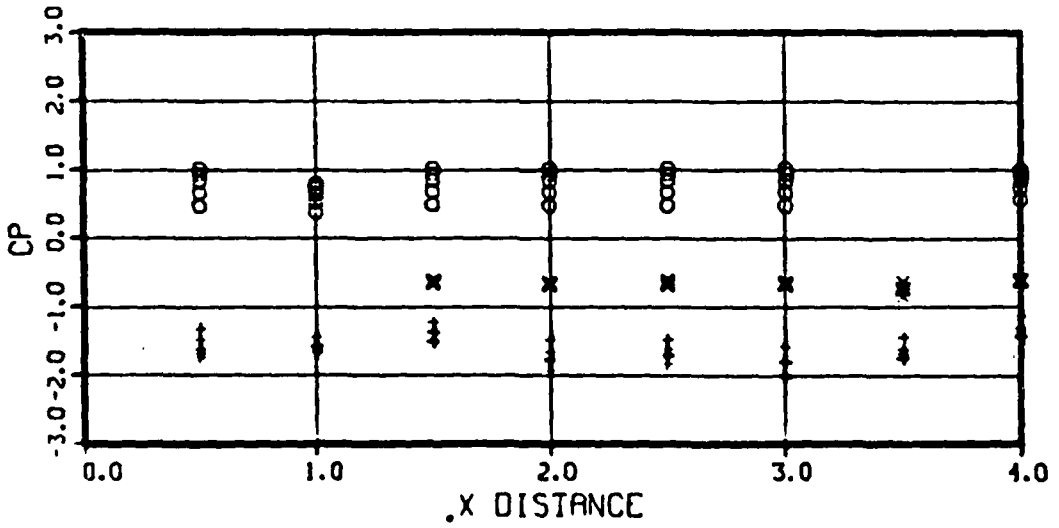


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 178 Q1U- 65.0 +/- .40 RND1U-1.273 +/-.006
P1U- 1534. +/- 3.20 V1U-278.07 +/- .584
M1U- .246 +/- .001 CL- -0.0036 CD- 0.5848

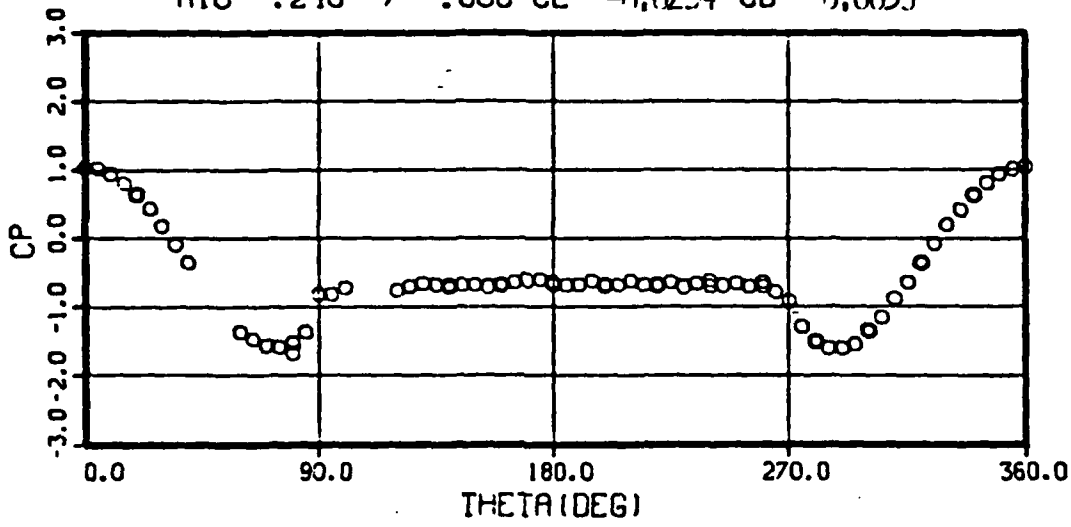


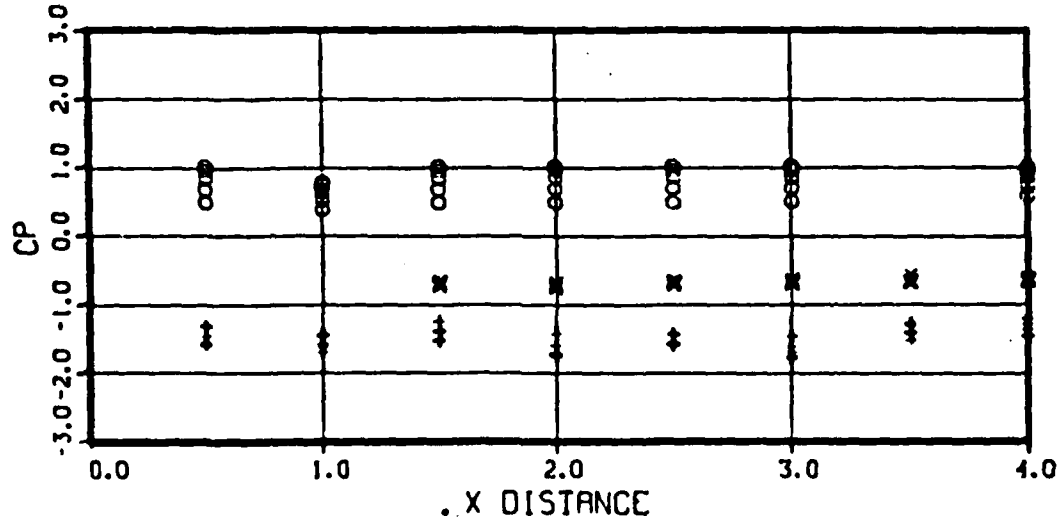


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 179 O1U- 78.5 +/- .16 RND1U-1.529 +/-.001
P1U- 1854. +/- 3.40 V1U-278.72 +/- .498
M1U- .246 +/- .000 CL- -0.0294 CD- 0.6639

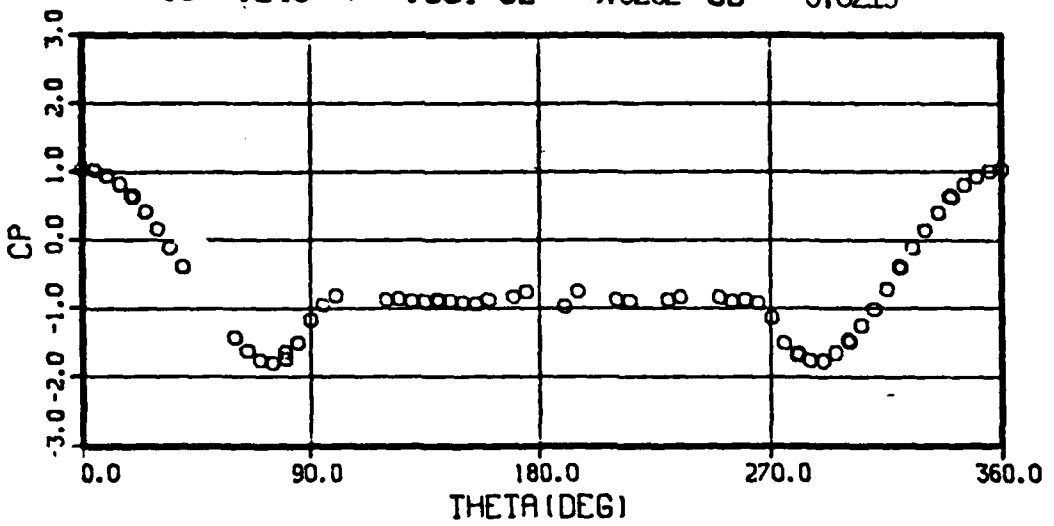


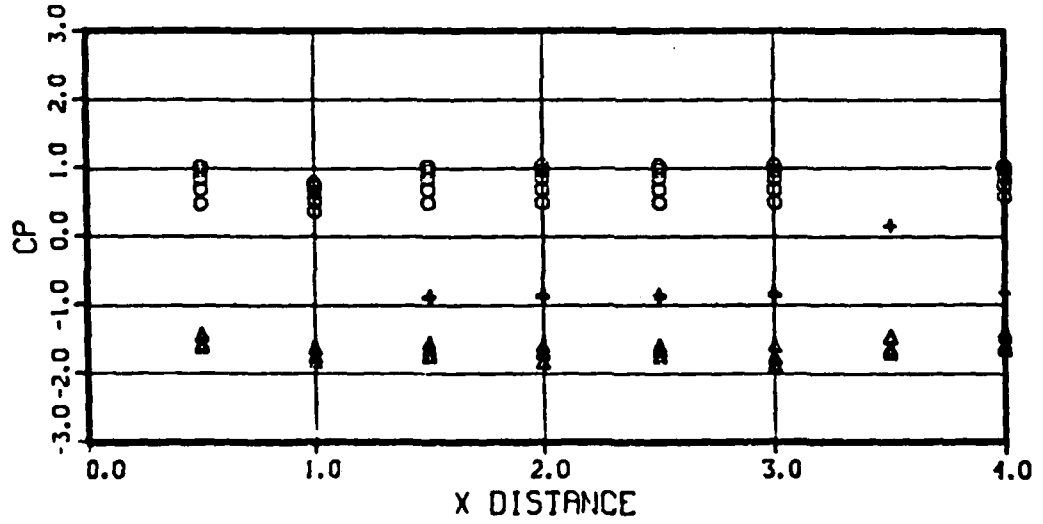


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 181 01U-102.9 +/- .68 RN01U-2.052 +/-.008
P1U- 2423. +/- 8.80 V1U-276.28 +/- .968
M1U- .246 +/- .001 CL- -0.0262 CD- 0.8219

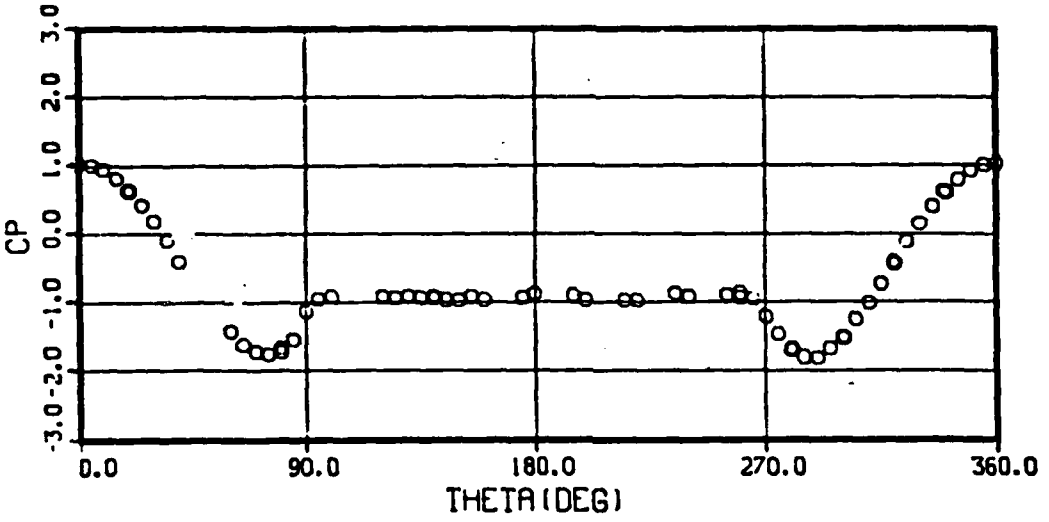


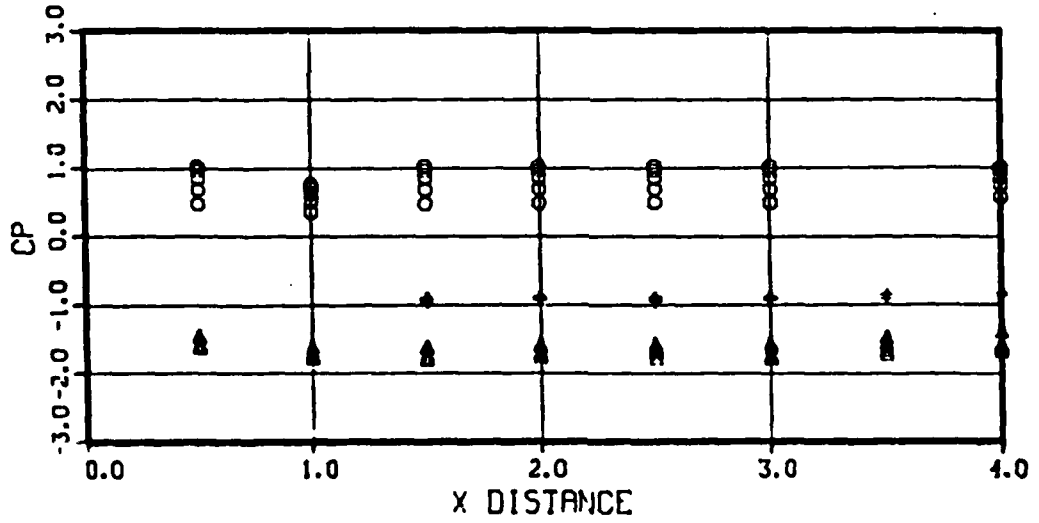


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 182 Q1U-133.2 +/- .64 RND1U-2.578 +/-.005
P1U- 3143. +/- 7.20 V1U-279.45 +/- .578
M1U- .246 +/- .000 CL- -0.026 CD- 0.8685

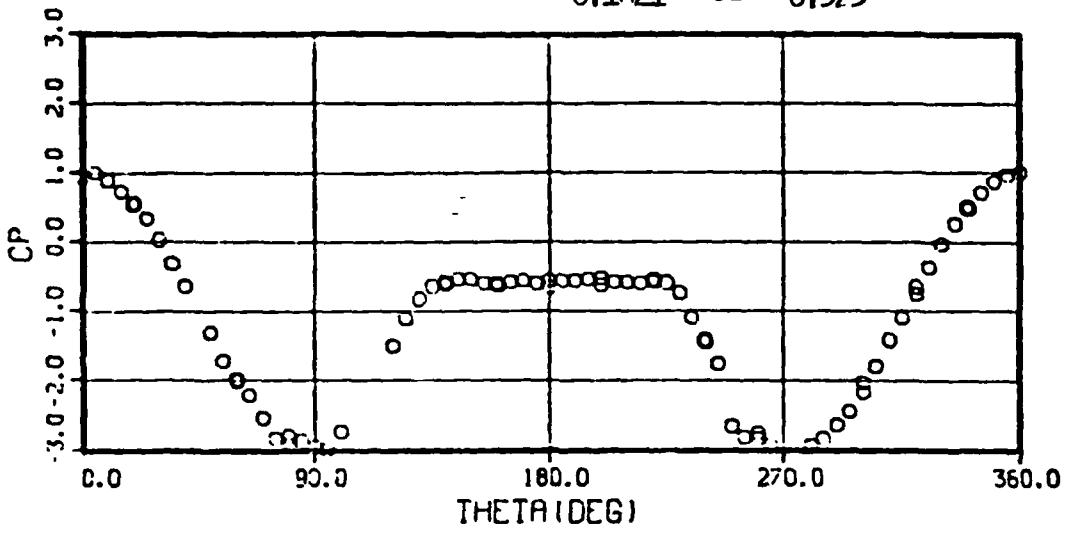


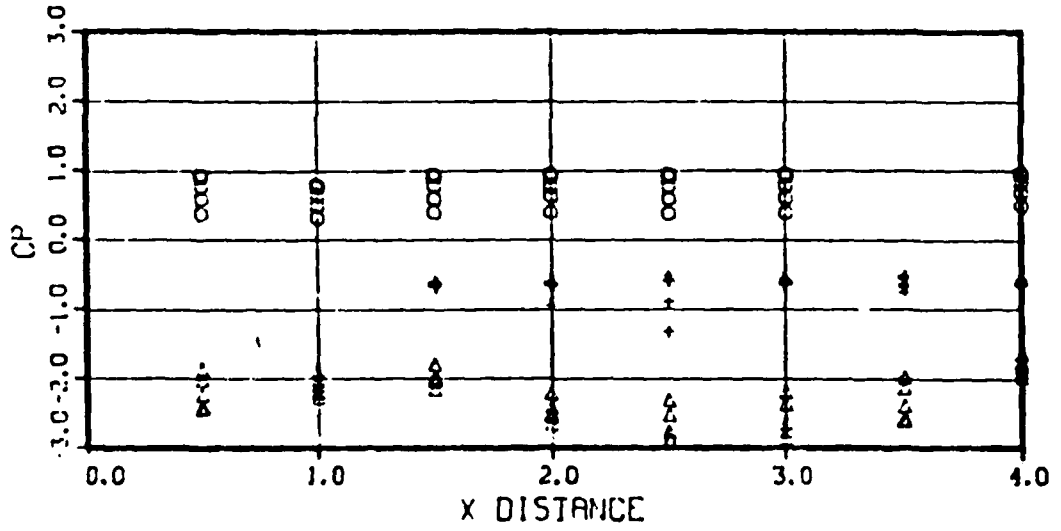


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 188 QIU- 20.1 +/- .82 RNDIU- .421 +/-.009
PIU- 501. +/- 4.00 VIU-266.32 +/- 4.716
MIU- .239 +/- .004 CL- 0.1021 CD- 0.523

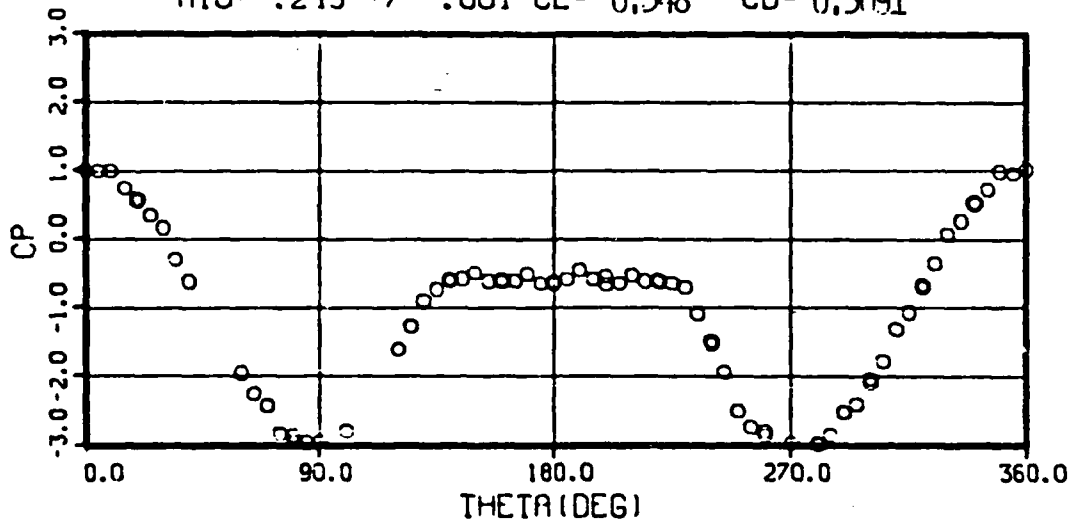


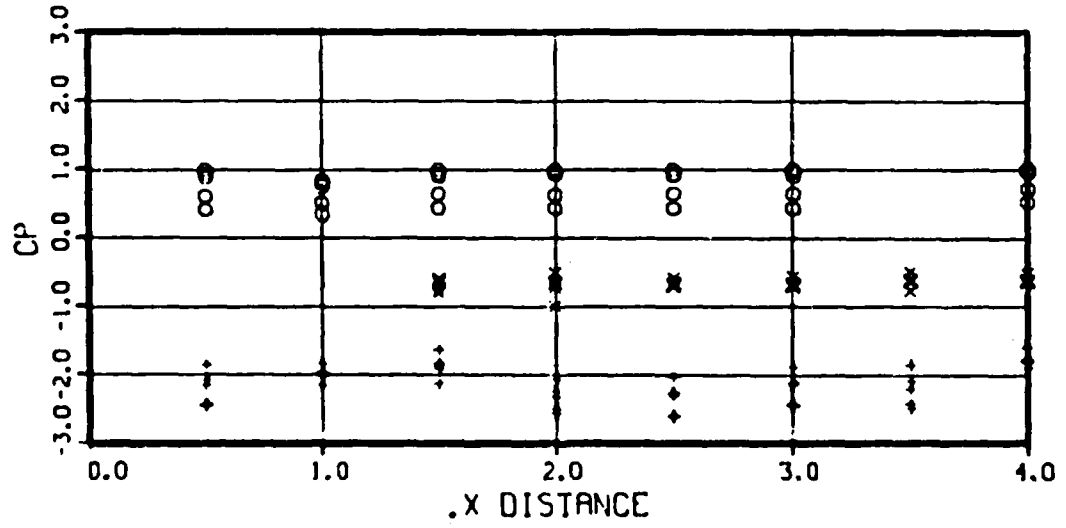


CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 189 O1U- 25.0 +/- .40 RND1U- .509 +/-.006
P1U- 604. +/- 4.00 V1U-272.05 +/- 1.488
M1U- .243 +/- .001 CL- 0,518 CD- 0,5091

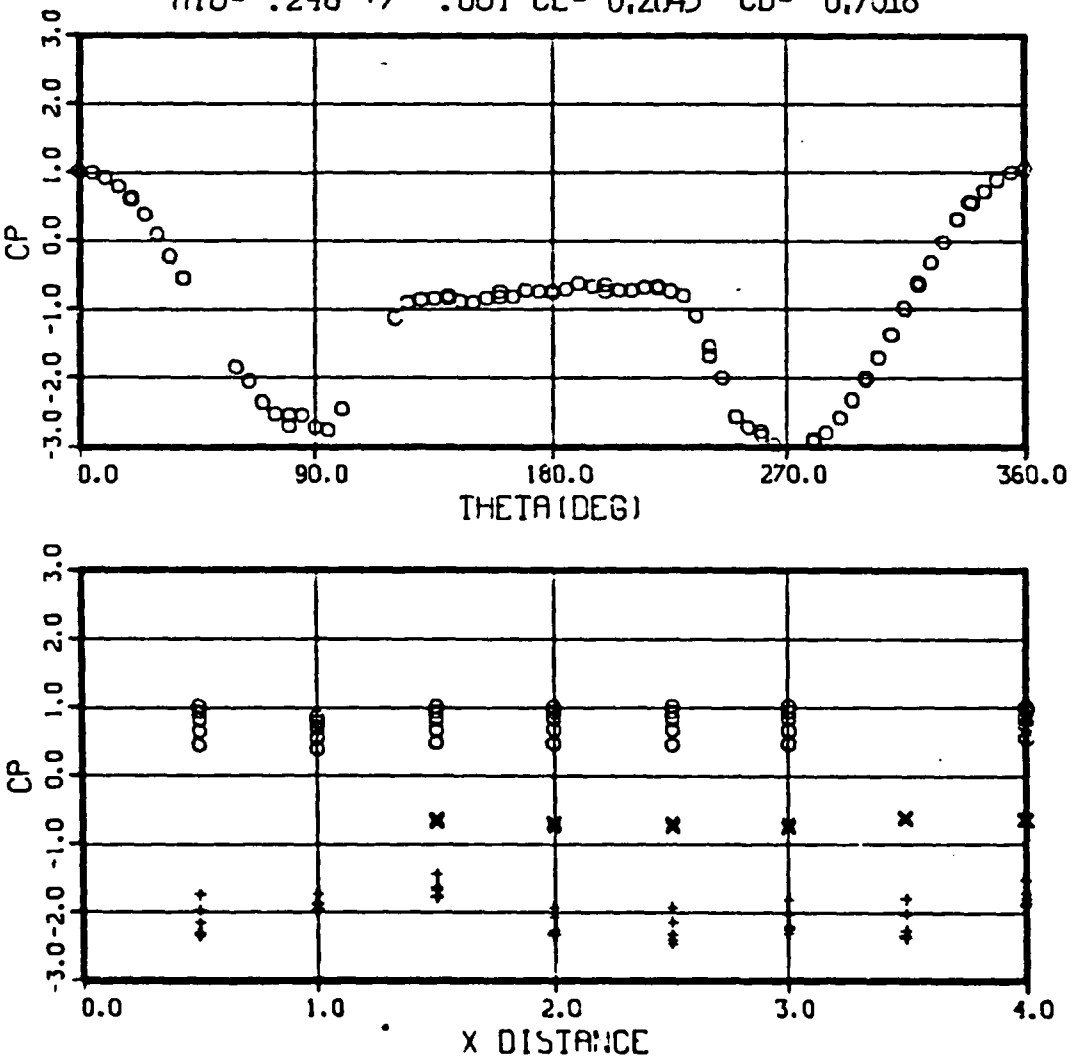




CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-C 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

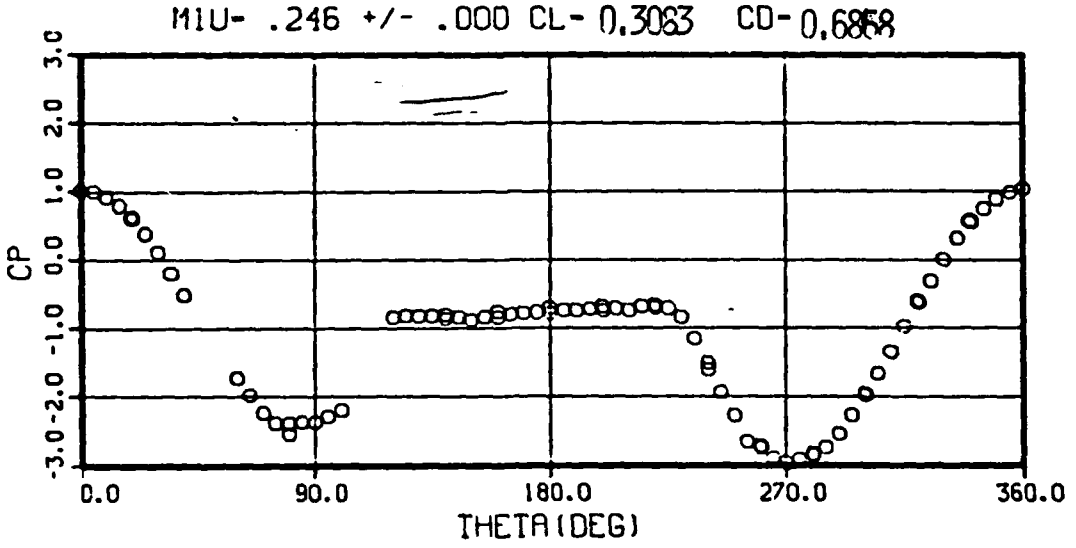
RUN 193 Q1U- 36.4 +/- .25 RND1U- .721 +/-.004
P1U- 858. +/- 4.80 V1U-277.10 +/- .536
M1U- .246 +/- .001 CL- 0.2045 CD- 0.7018

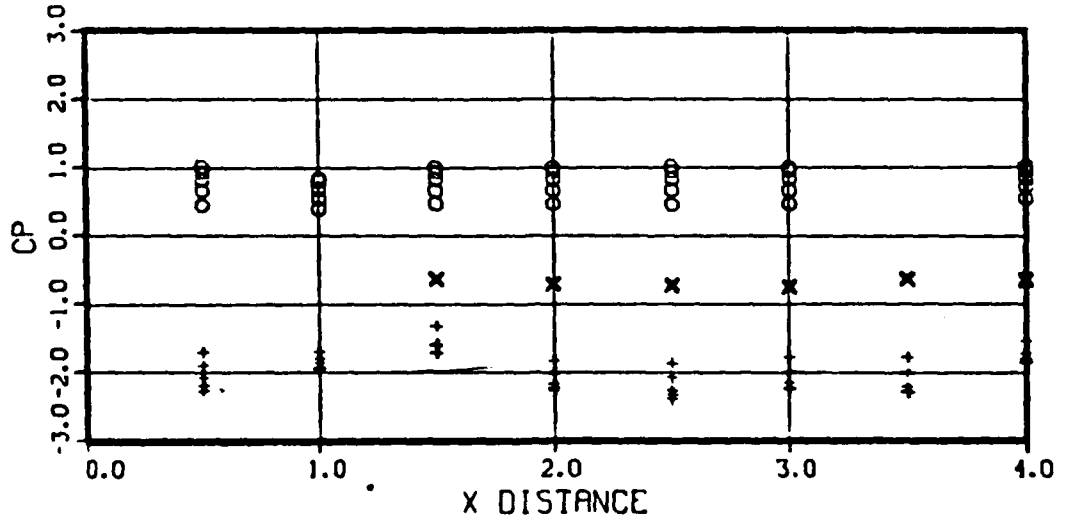


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 194 O1U- 41.7 +/- .18 RND1U- .823 +/-.004
P1U- 984. +/- 4.60 V1U-277.31 +/- .556
M1U- .246 +/- .000 CL- 0.3083 CD- 0.6858

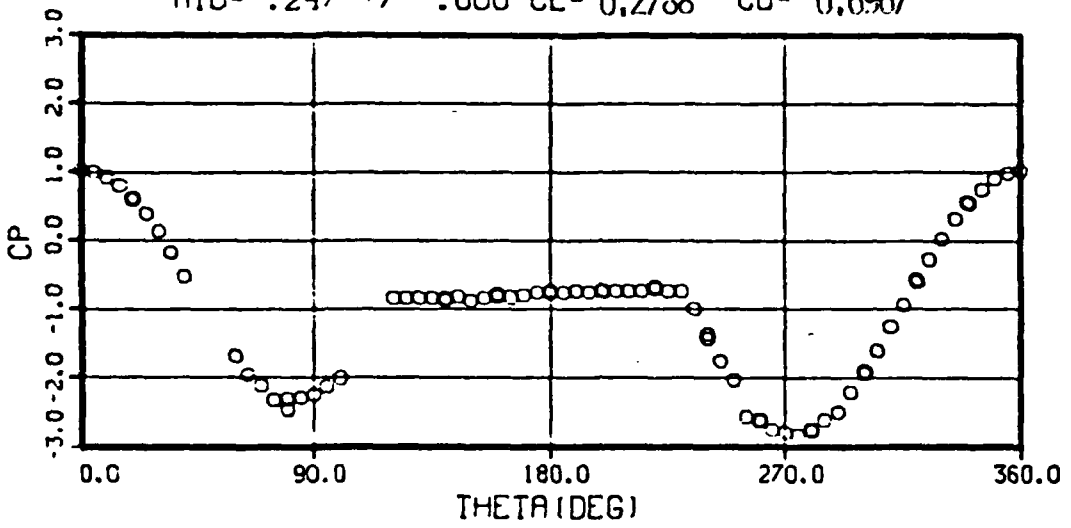


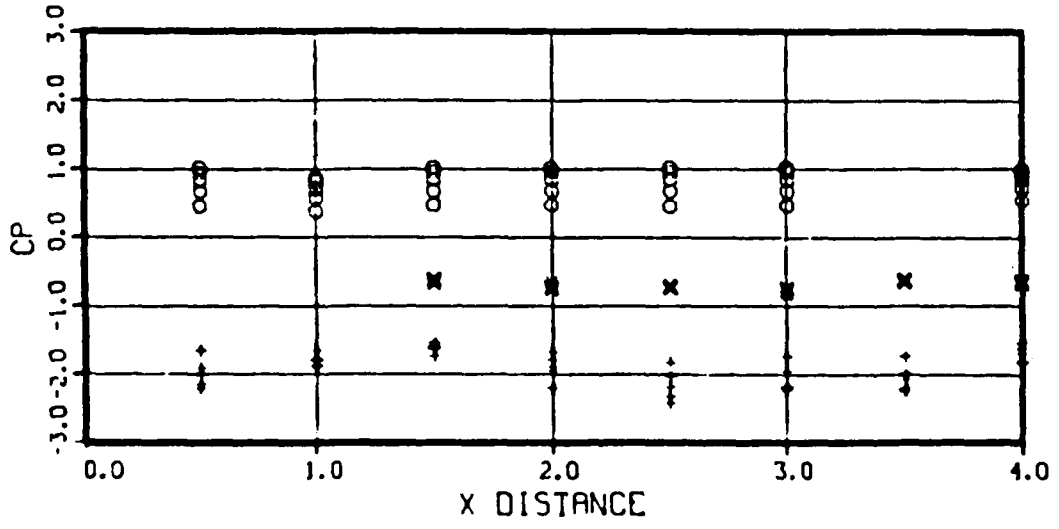


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO ~~4~~ ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 195 O1U- 47.1 +/- .20 RND1U- .923 +/-.004
P1U- 1103. +/- 4.00 V1U-278.65 +/- .242
M1U- .247 +/- .000 CL- 0,2738 CD- 0,6967

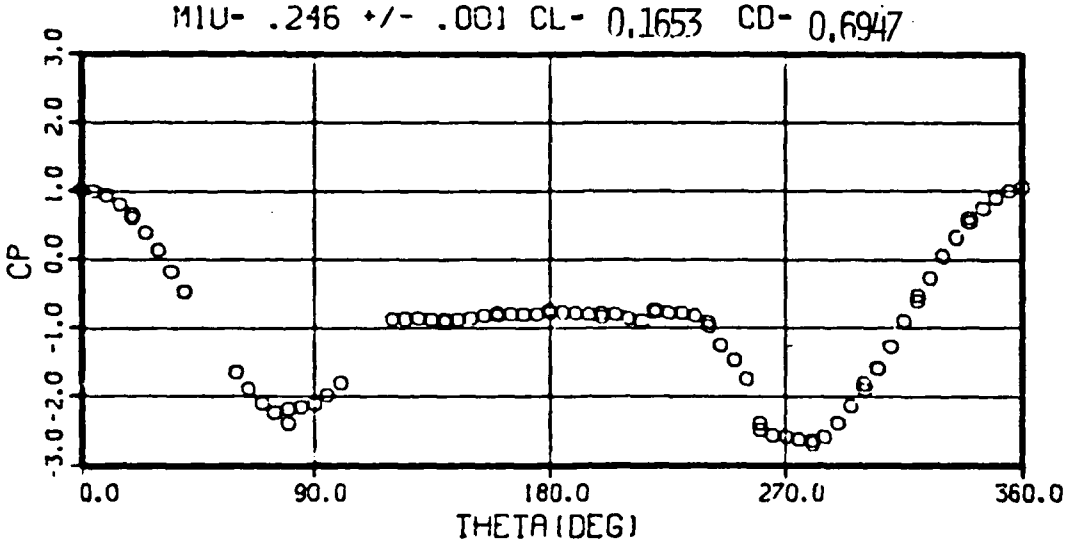


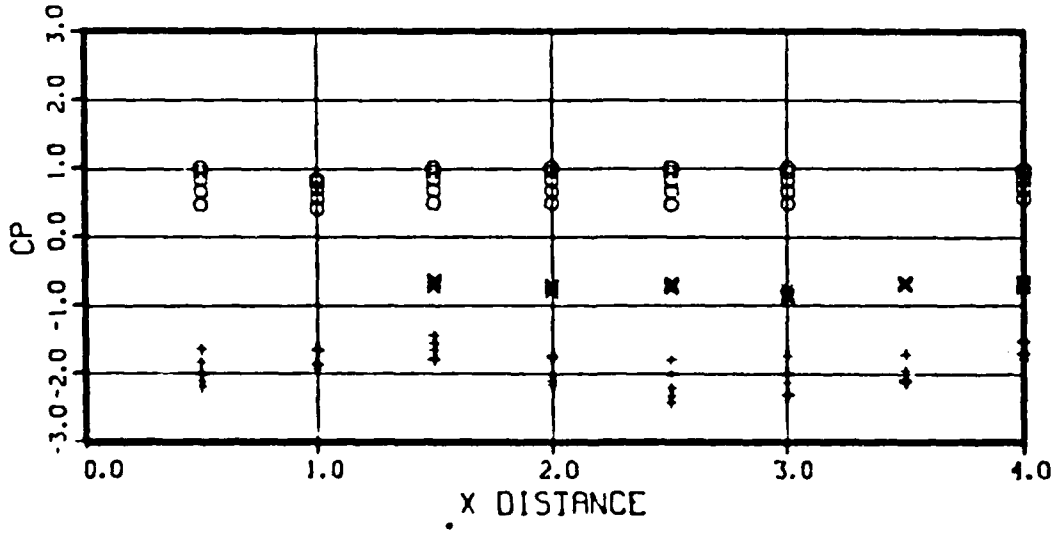


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 196 QIU- 52.3 +/- .28 RNDIU-1.025 +/-.006
PIU- 1232. +/- 7.60 VIU-278.25 +/- .558
MIU- .246 +/- .001 CL- 0.1653 CD- 0.6947

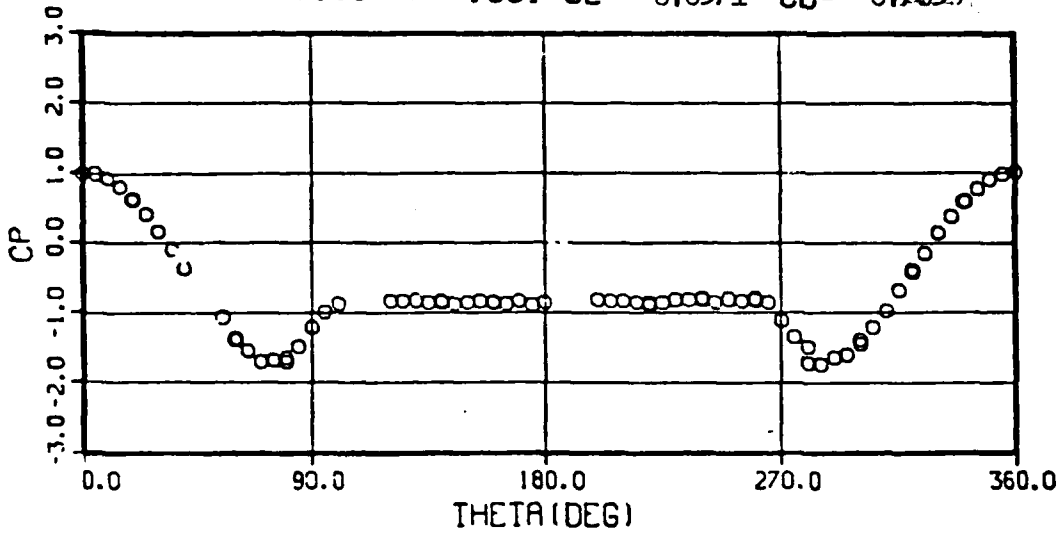


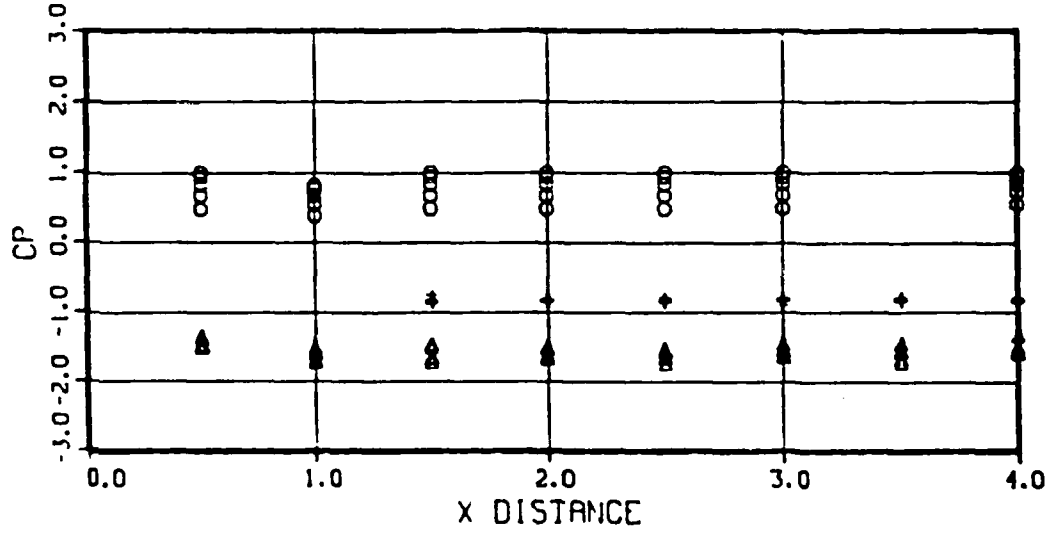


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 40EG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 212 01U- 71.9 +/- .34 RND1U-2.982 +/-.008
P1U- 7722. +/- 5.00 V1U-130.80 +/- .292
M1U- .115 +/- .001 CL- -0.0371 CD- 0.7959

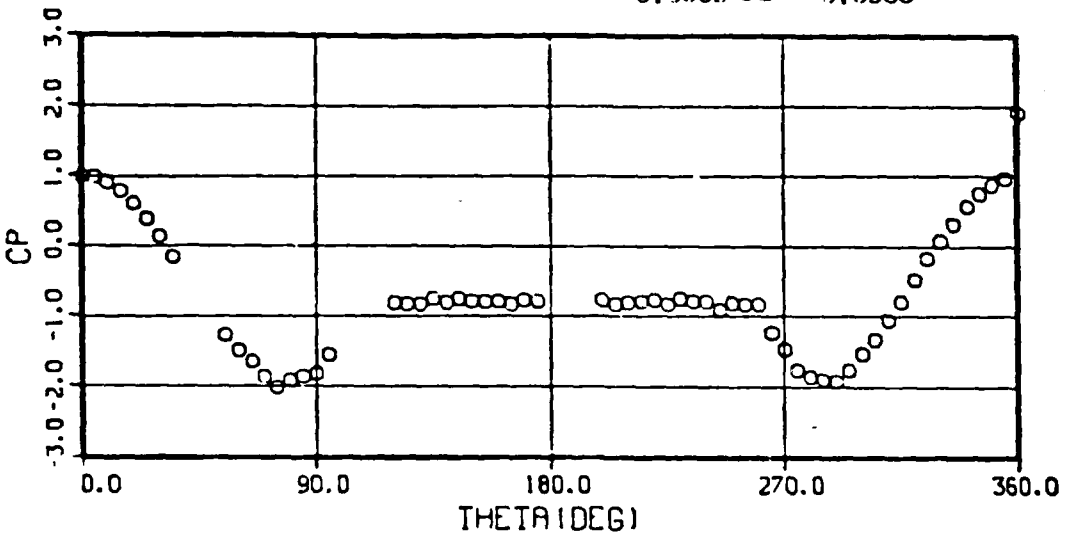


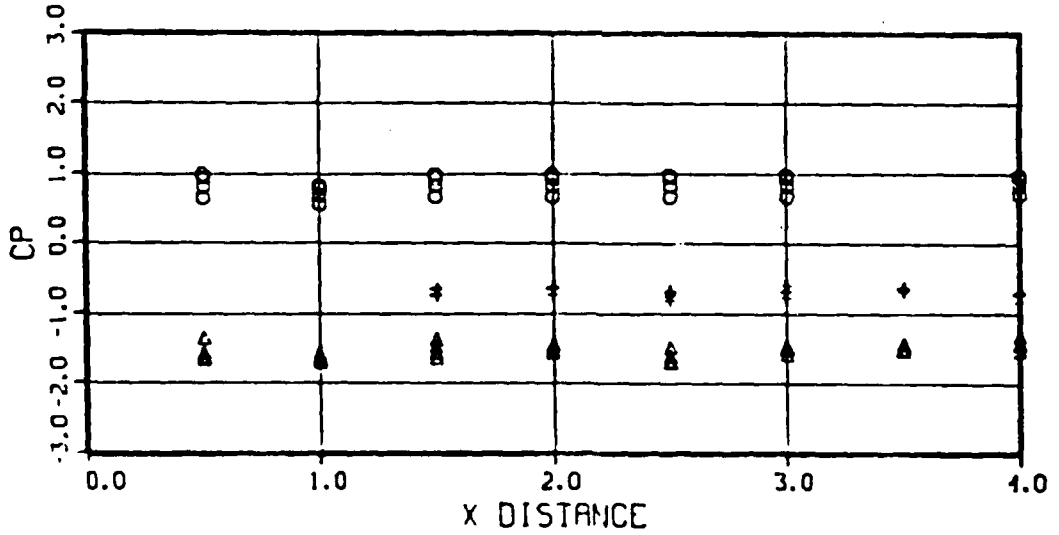


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF .4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 211 01U- 21.0 +/- 20.96 RND1U-1.445 +/-*****
P1U- 6211. +/- 6210.60 V1U- 62.94 +/- 62.940
M1U- .055 +/- .055 CL- -0.0689 CD- 0.6988

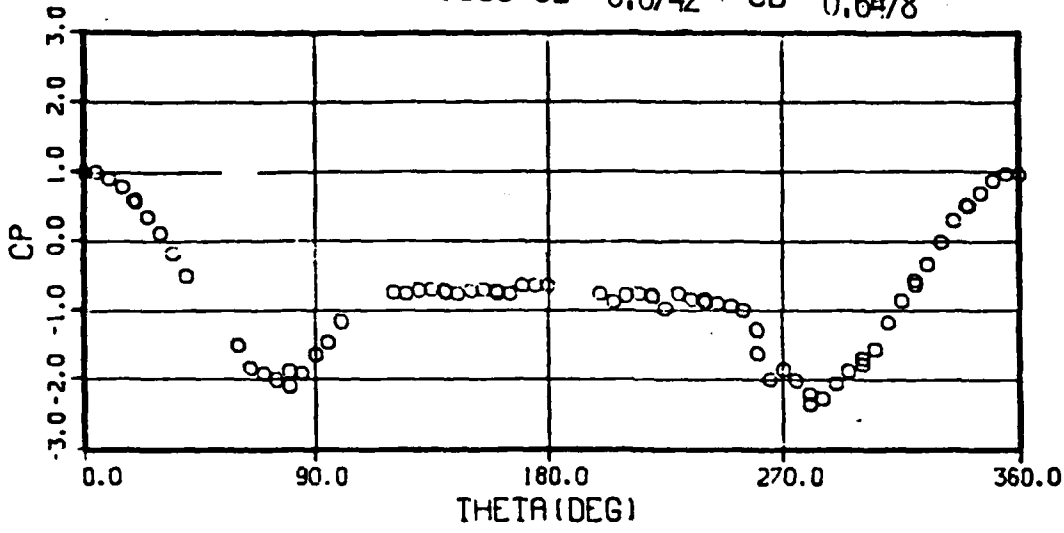


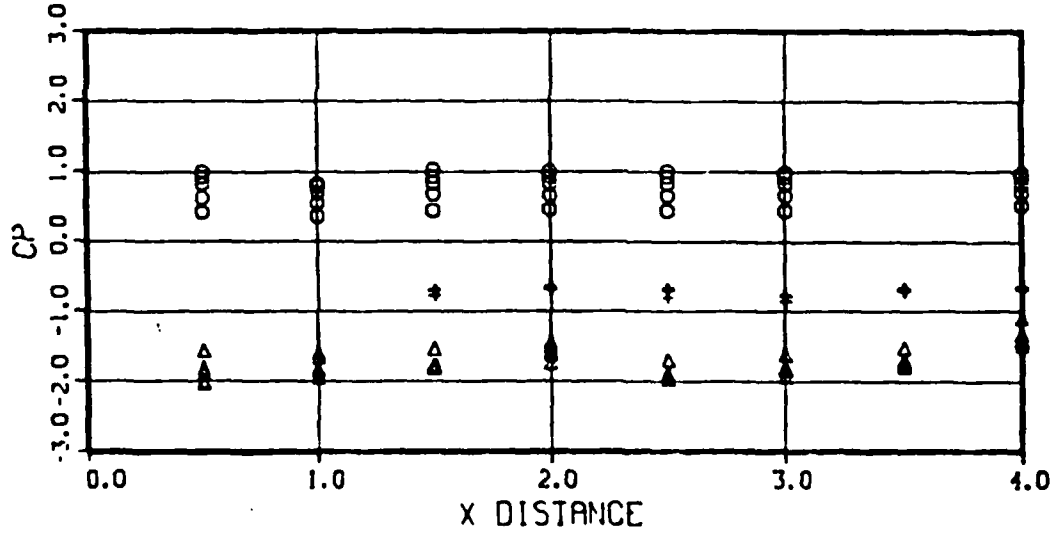


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 210 01U- 11.5 +/- .06 RND1U-1.194 +/-.003
P1U- 7780. +/- 10.80 V1U- 51.96 +/- .128
M1U- .046 +/- .000 CL- 0.0742 CD- 0.6478

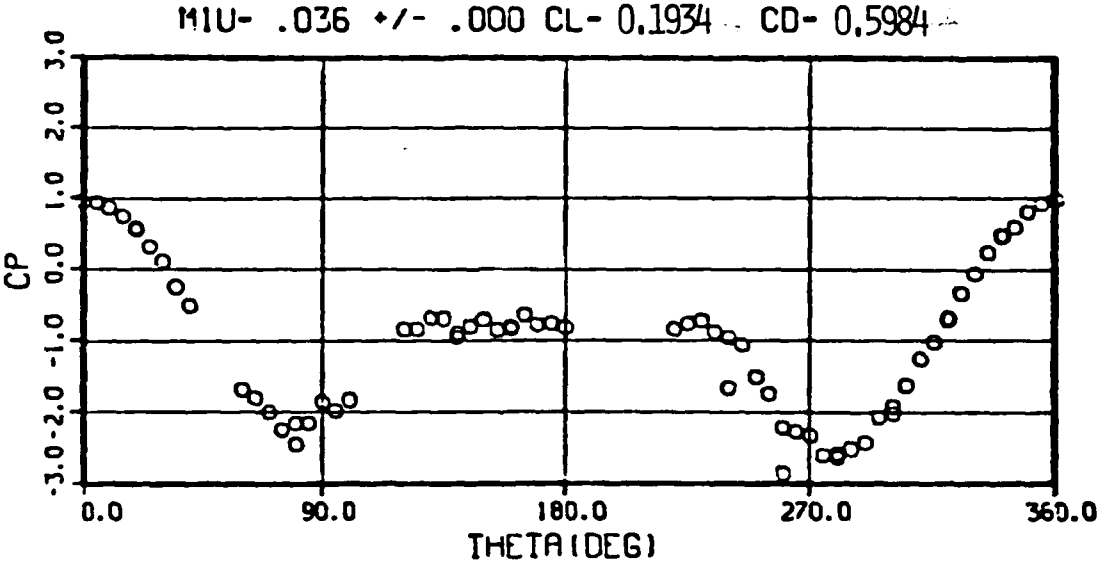


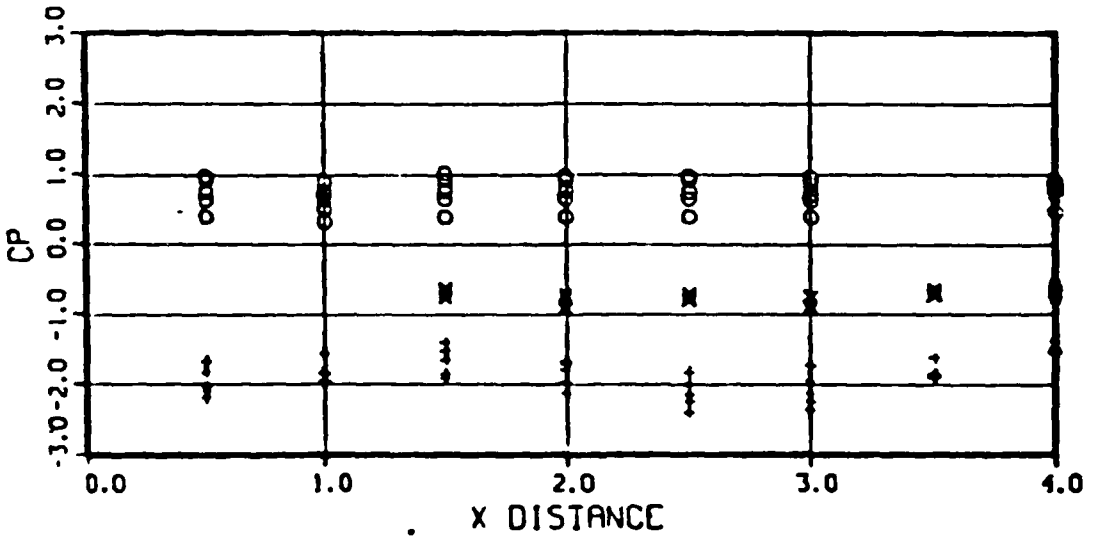


LEGEND
o - 4 DEG
Δ - 24 DEG
+ - 124 DEG

CYLINDER + NO. 250 MESH SCREEN

RUN 209 O1U- 7.2 +/- .00 RND1U- .944 +/-.001
P1U- 7781. +/- 33.20 V1U- 41.24 +/- .054
M1U- .036 +/- .000 CL- 0.1934 CD- 0.5984

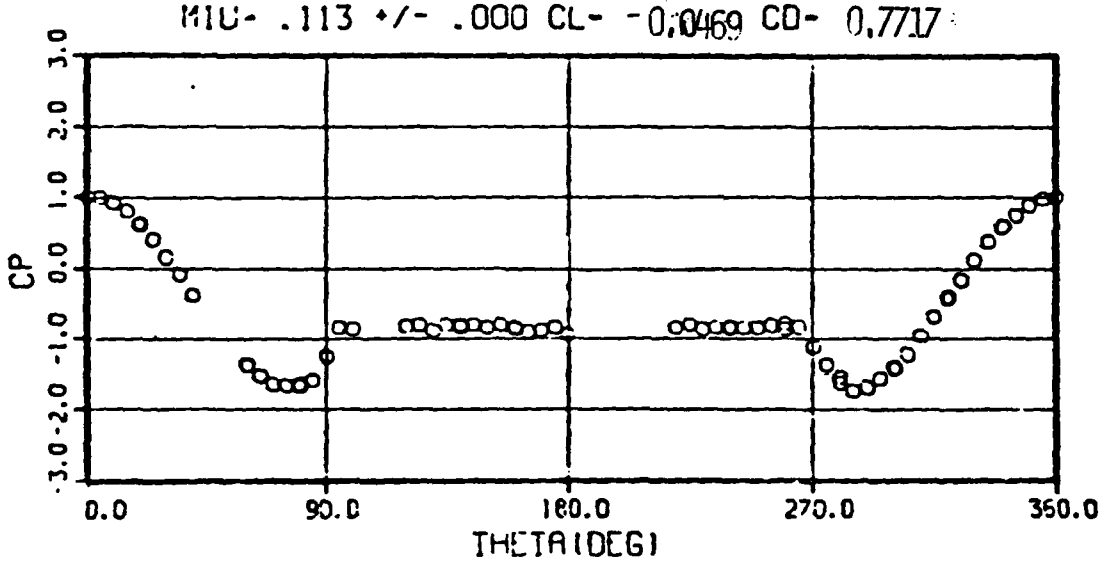


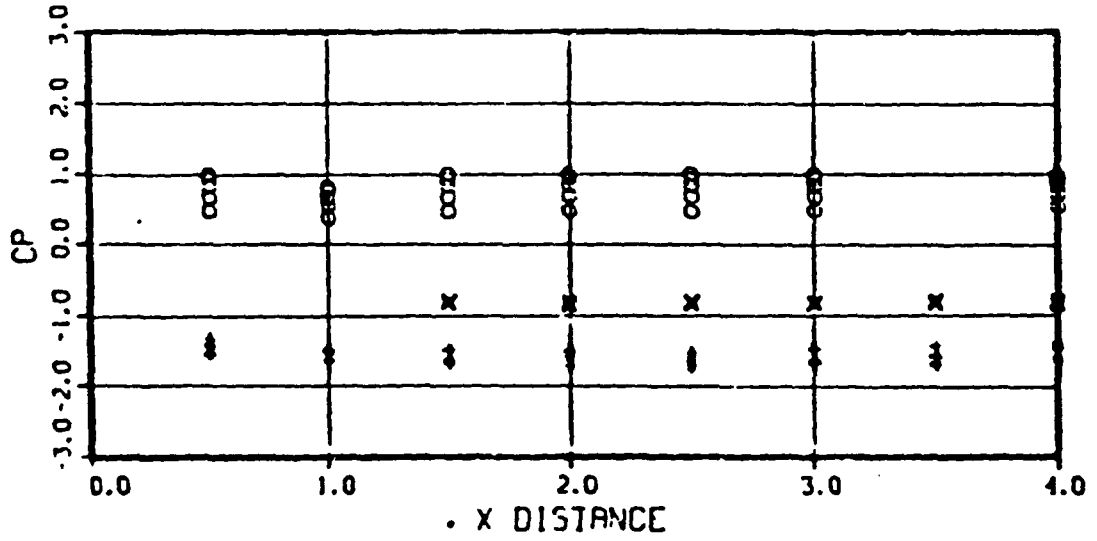


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 208 DIU- 68.3 +/- .48 RNDIU-2.887 +/-.007
PIU- 7682. +/- 25.40 VIU-127.98 +/- .332
MIU- .113 +/- .000 CL- -0.0469 CD- 0.7717

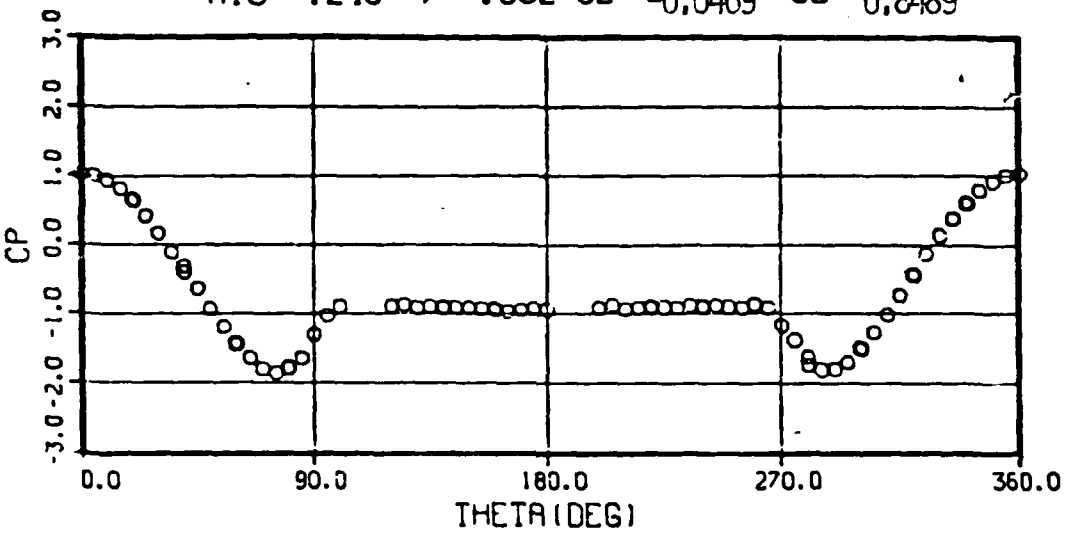


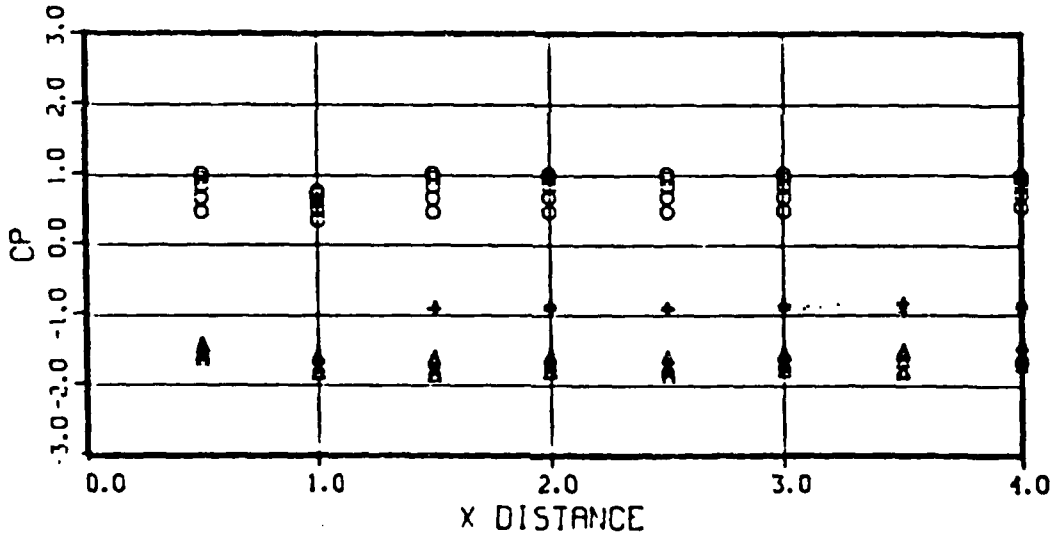


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 206 O1U-387.9 +/- 4.98 RND1U-7.009 +/-.046
P1U- 9014. +/- 7.00 V1U-288.41 +/- 1.848
M1U- .248 +/- .002 CL- -0.0469 CD- 0.8489

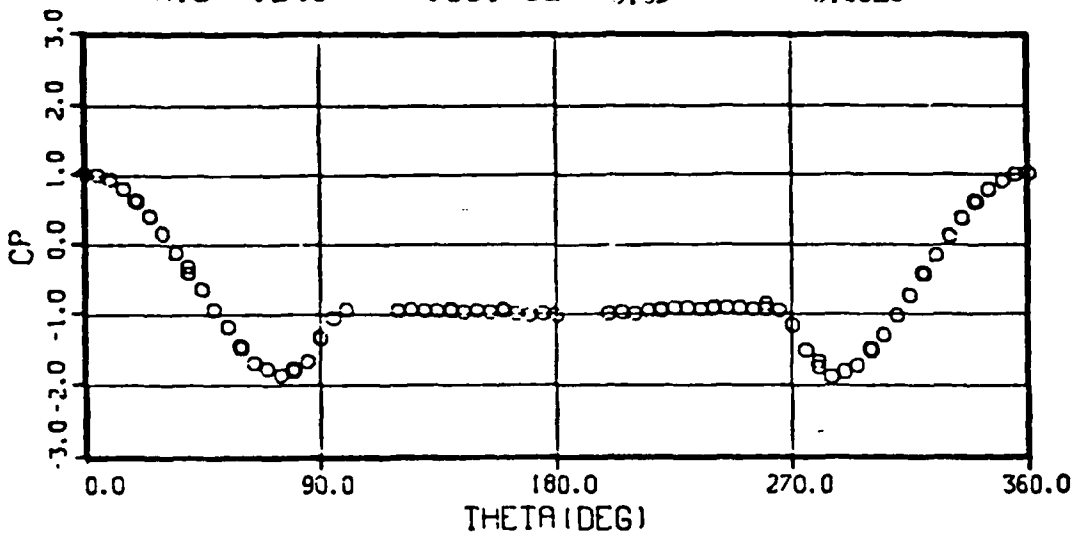


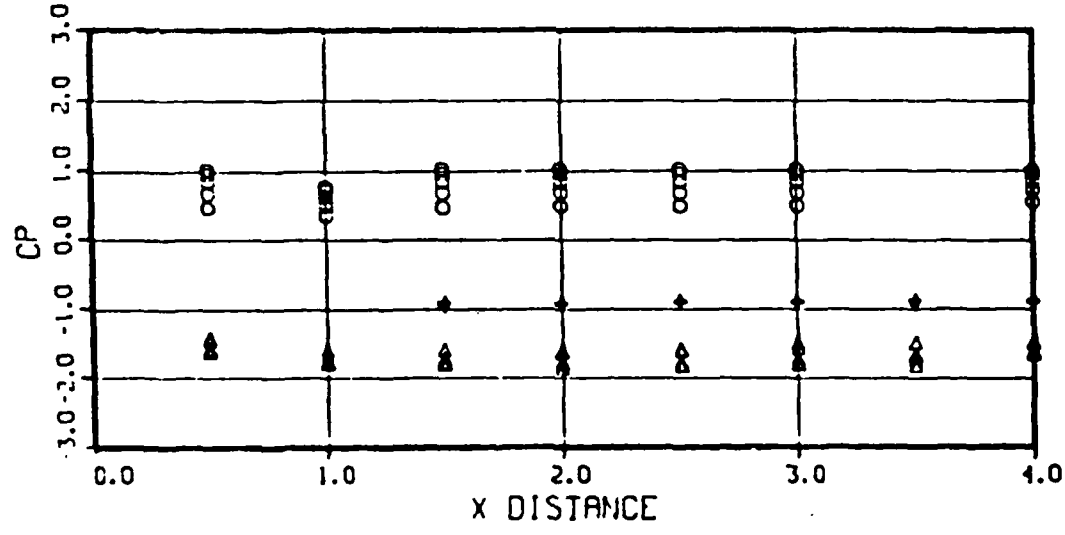


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 205 O1U-340.9 +/- 2.84 RND1U-6.192 +/-.028
P1U- 7882. +/- 6.60 V1U-288.26 +/- 1.118
M1U- .249 +/- .001 CL- -0,03 CD- 0,8918

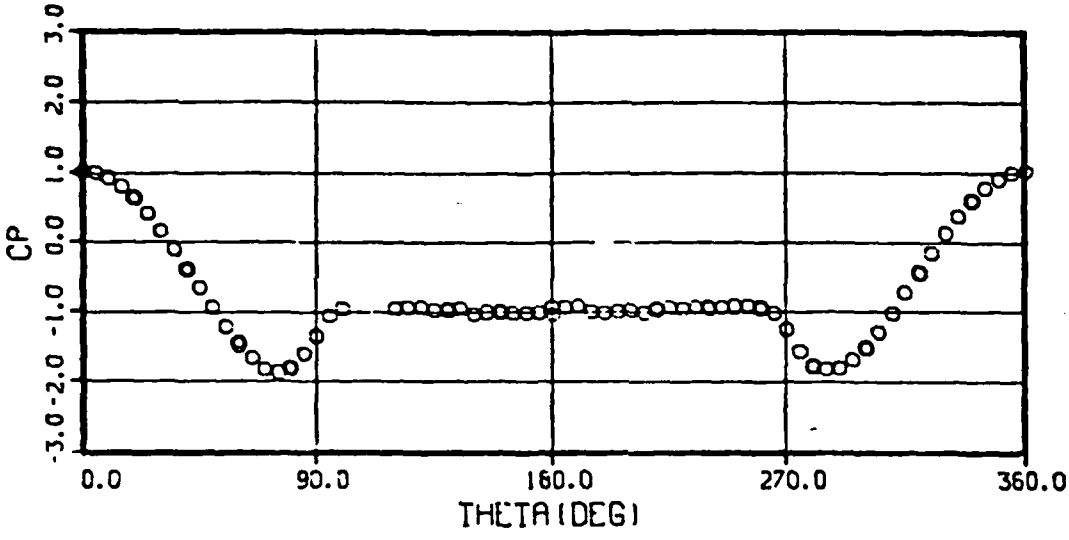


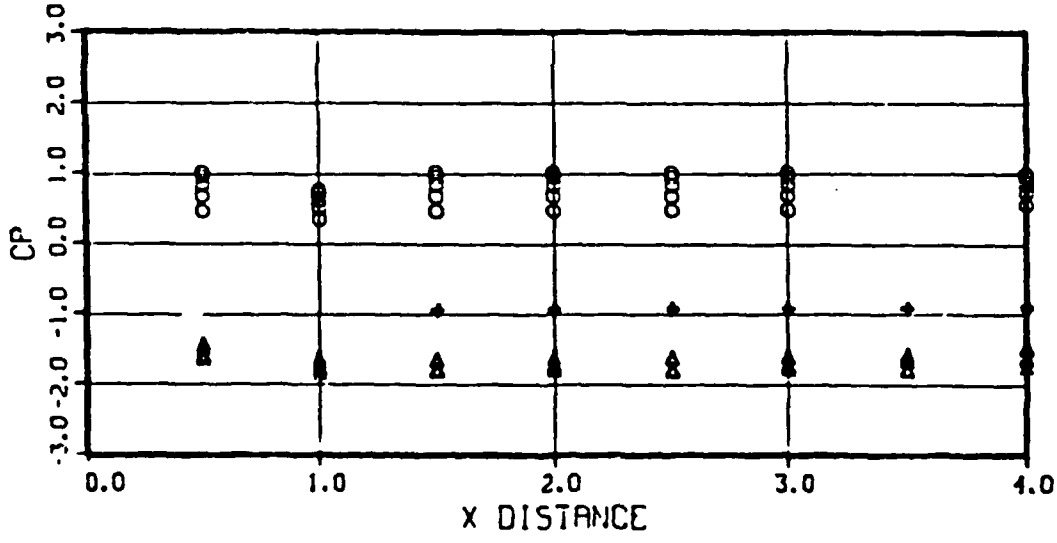


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 204 QIU-279.5 +/- .56 RNDIU-5.143 +/-.006
PIU- 6506. +/- 6.20 VIU-286.20 +/- .334
MIU- .248 +/- .001 CL- -0.026 CD-0.8898

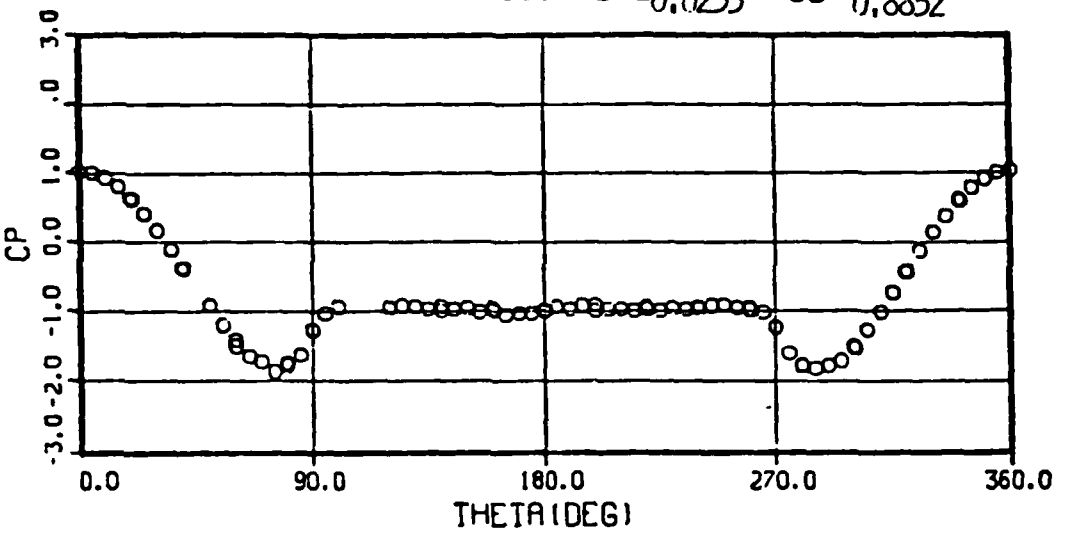


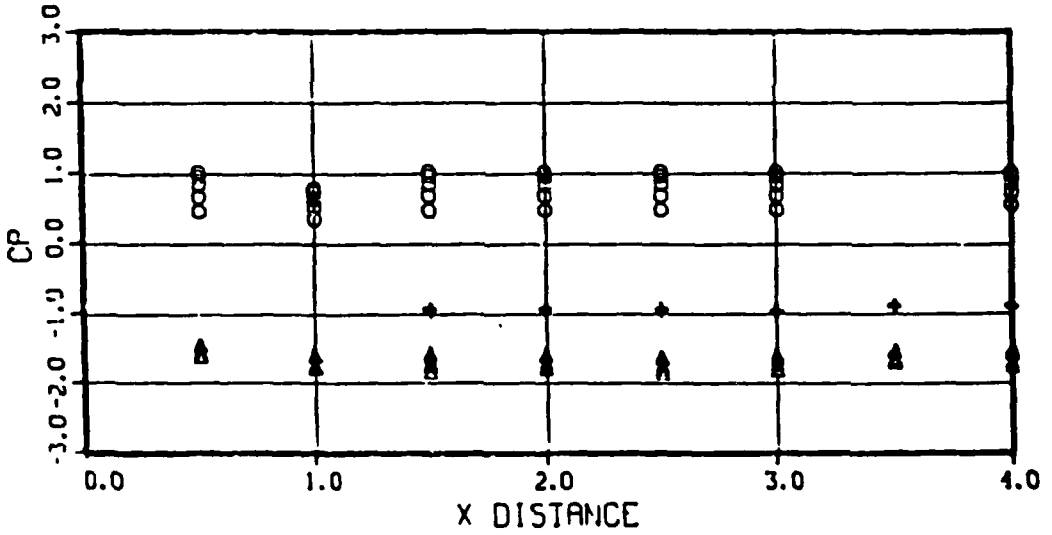


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 203 01U-221.3 +/- 1.42 RND1U-4.109 +/-.012
P1U- 5138. +/- 11.20 V1U-285.47 +/- .892
M1U- .248 +/- .001 CL-0.0235 CD-0.8852

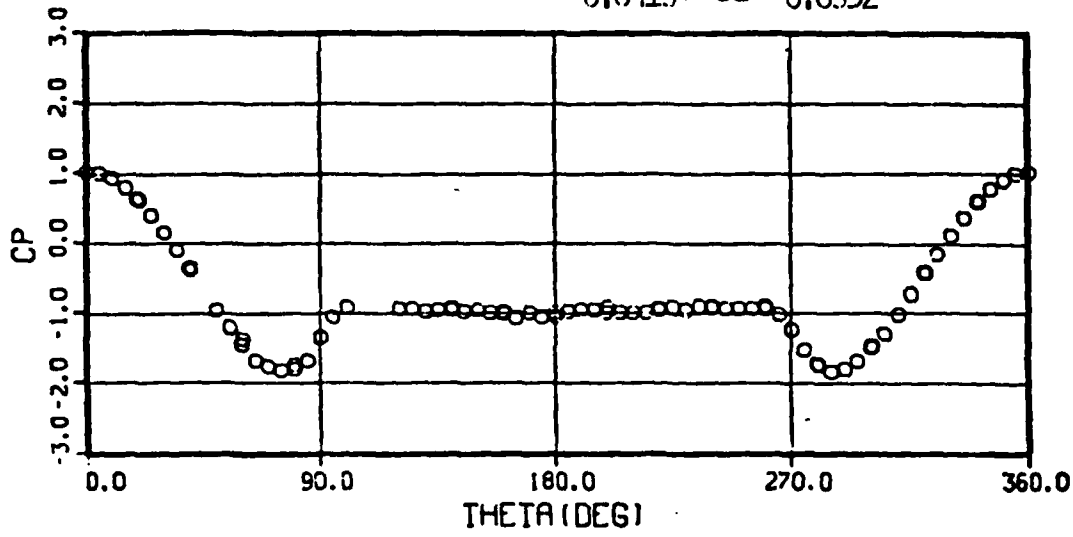


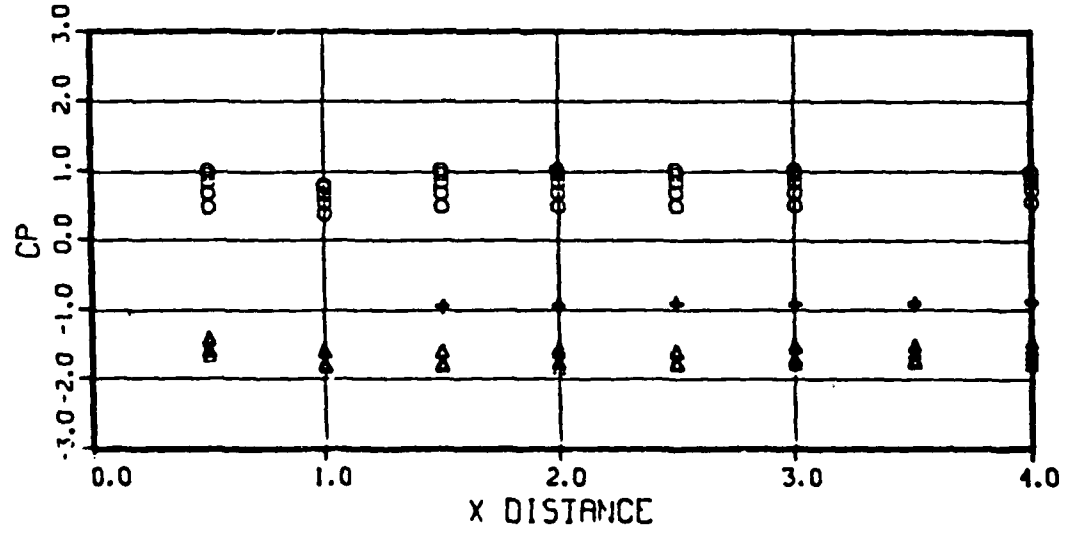


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 202 O1U-165.9 +/- 1.14 RND1U-3.109 +/-.012
P1U- 3851. +/- 1.20 V1U-284.33 +/- .954
M1U- .248 +/- .001 CL- -0.0419 CD- 0.8952

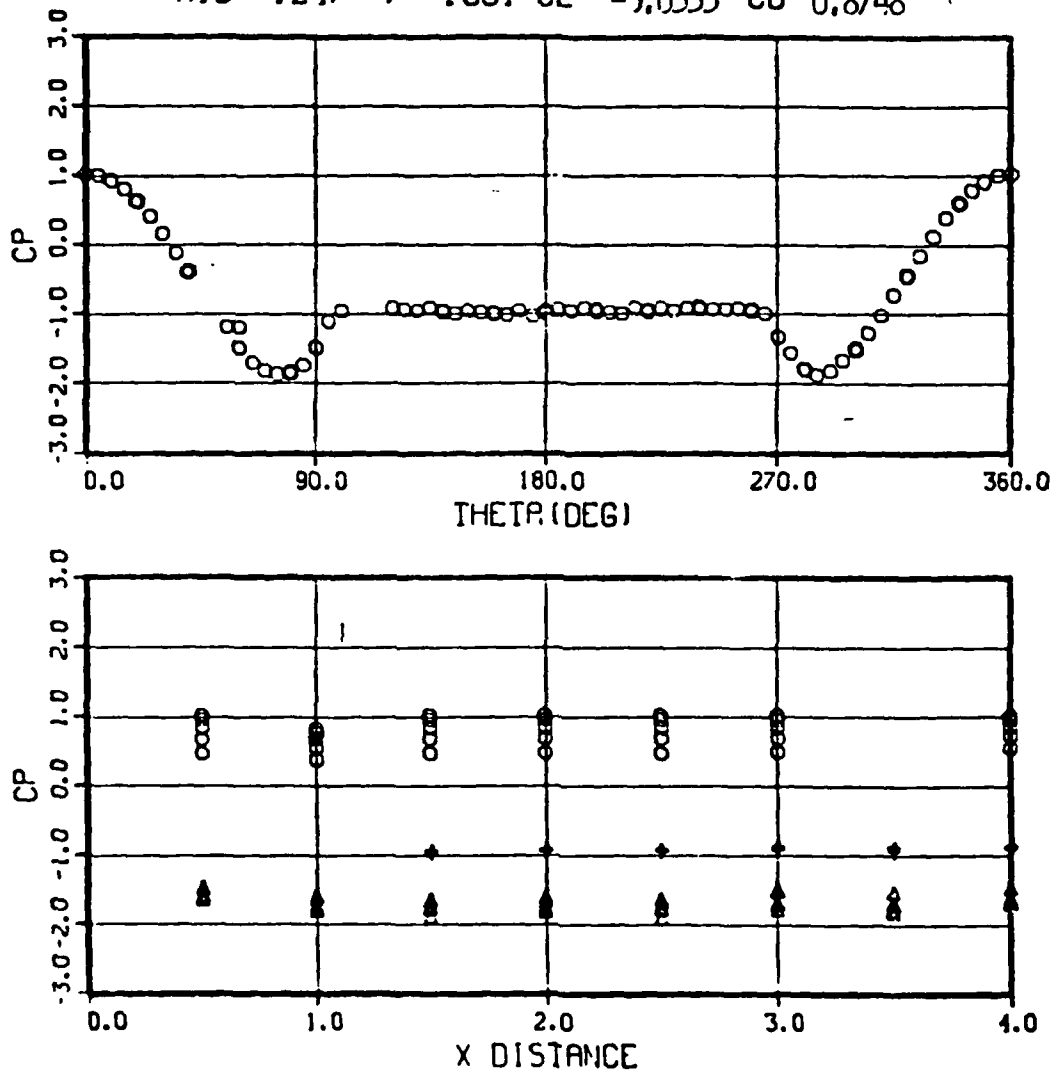




CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

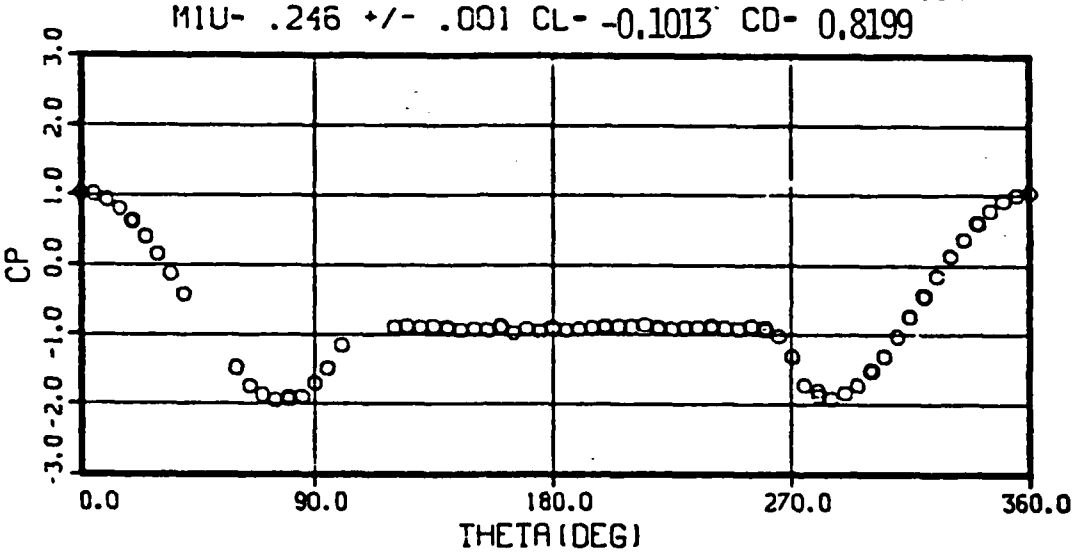
RUN 201 QIU-136.4 +/- .68 RNDIU-2.571 +/-.006
PIU- 3198. +/- 2.00 VIU-282.90 +/- .768
MIU- .247 +/- .001 CL- -0.0553 CD- 0.8748

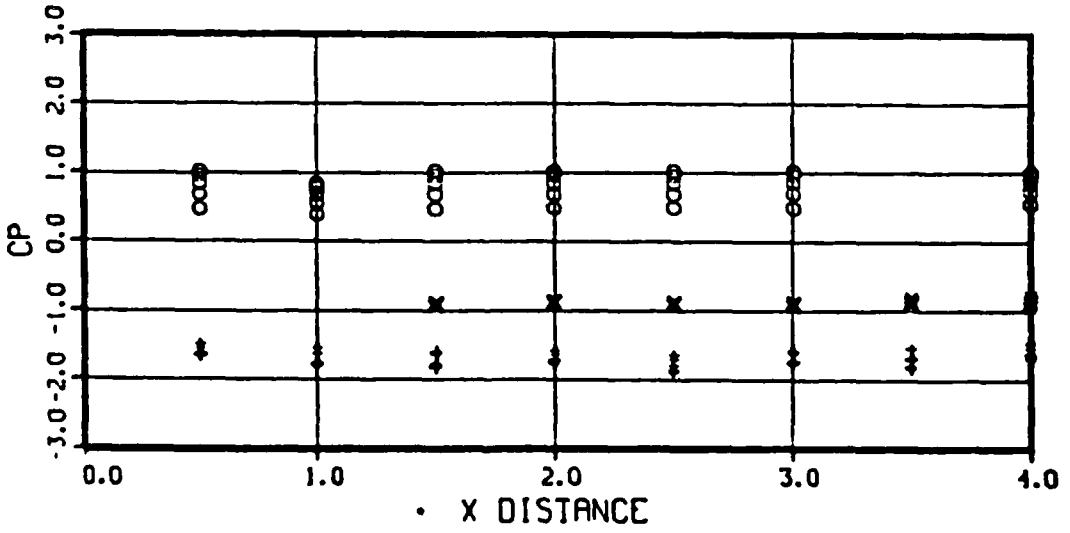


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 200 01U-108.9 +/- .50 RND1U-2.076 +/-.006
P1U- 2563. +/- 6.80 V1U-281.32 +/- .486
M1U- .246 +/- .001 CL- -0.1013 CD- 0.8199

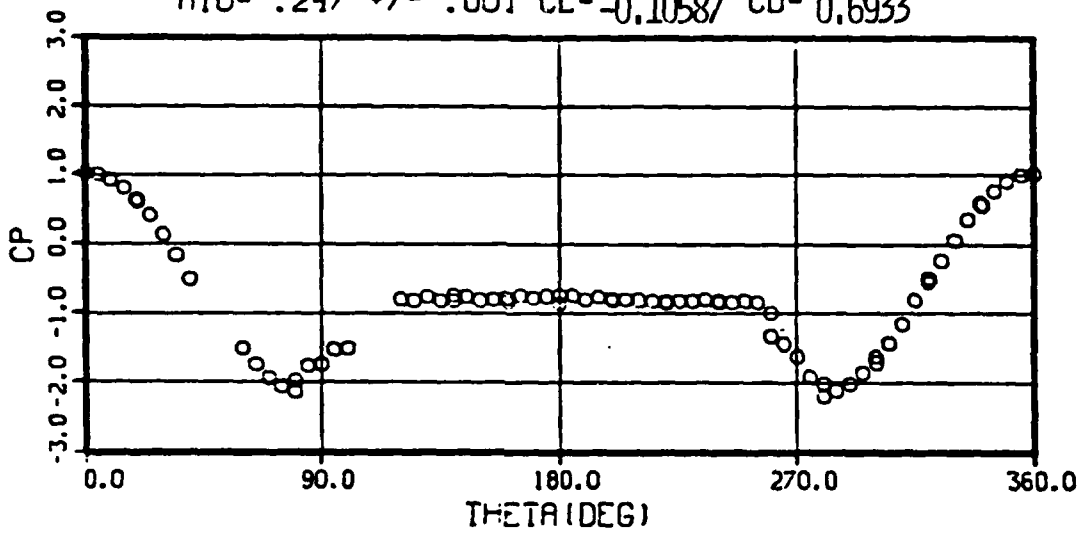


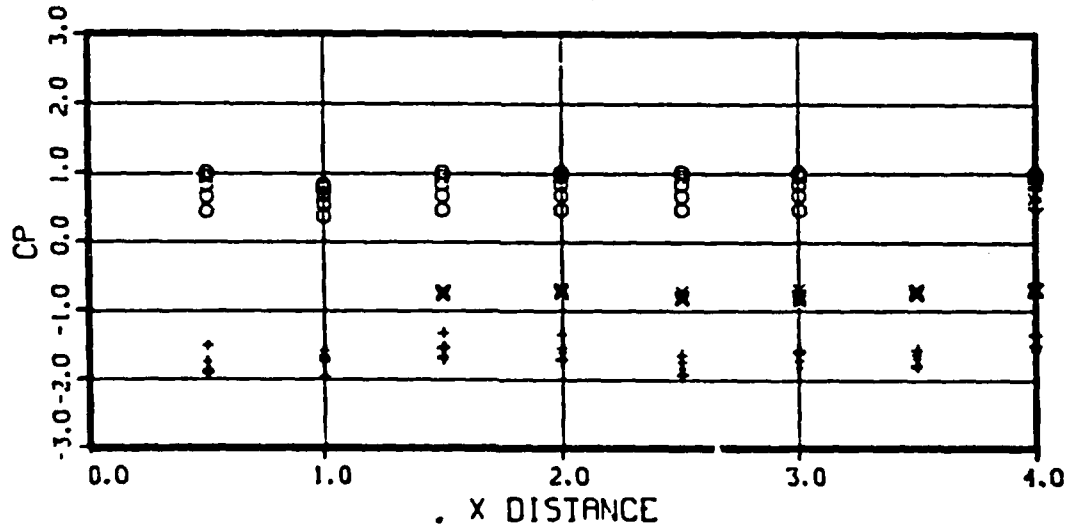


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 199 01U- 77.7 +/- .36 RND1U-1.532 +/-.003
P1U- 1822. +/- 2.60 V1U-277.92 +/- .558
M1U- .247 +/- .001 CL--0.10587 CD- 0.6933

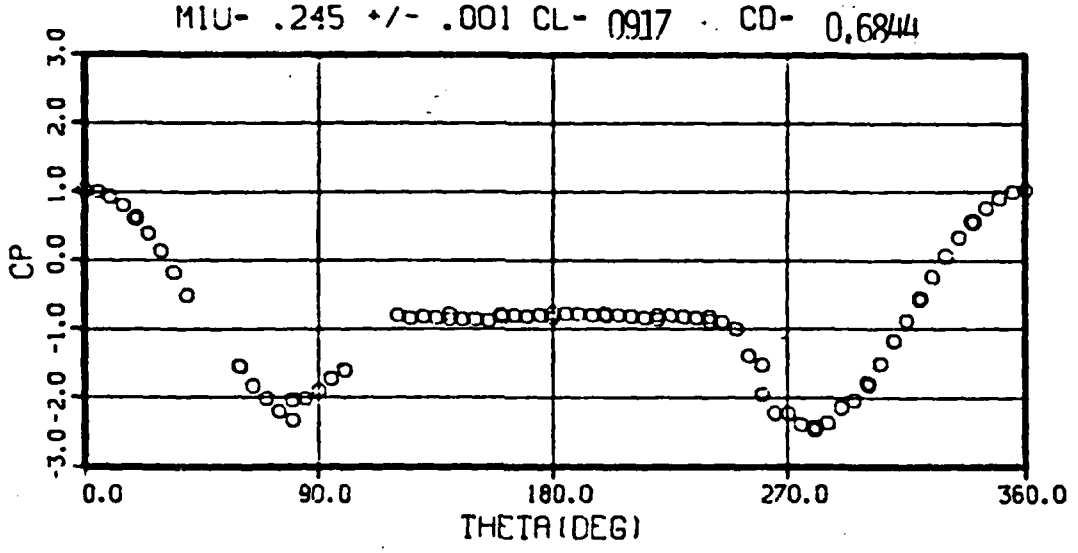


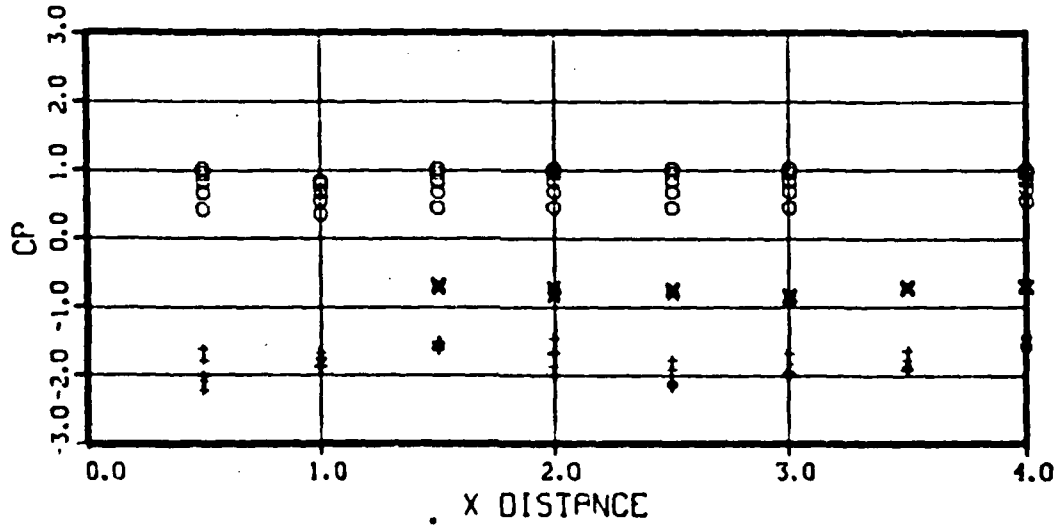


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 198 01U- 62.9 +/- .00 RND1U-1.267 +/-.001
P1U- 1492. +/- 2.60 V1U-274.69 +/- .098
M1U- .245 +/- .001 CL- 0917 CD- 0.6844





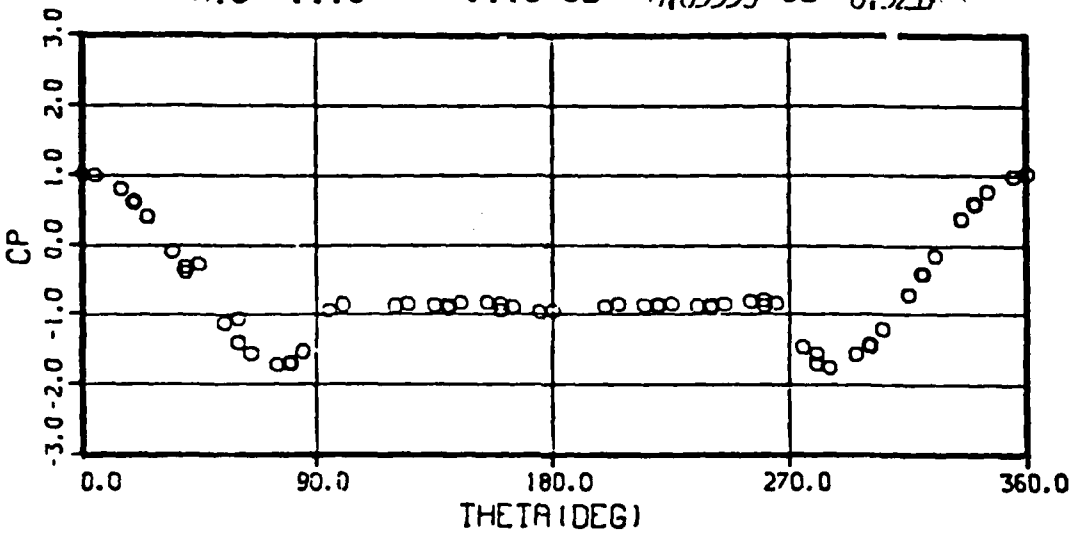
CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O E4DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

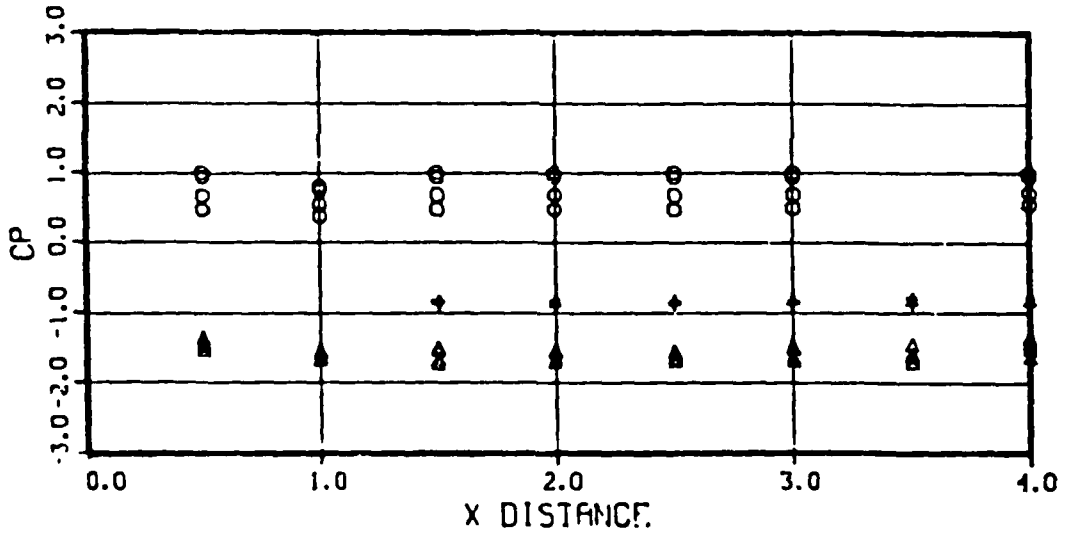
CYLINDER + NO. 250 MESH SCREEN

RUN 213 O1U- 82.5 +/- 82.50 RND1U-2.845 +/-*****

P1U- 6167. +/- 6156.60 V1U-125.54 +/- *******

M1U- .110 +/- .110 CL- -0.05539 CD- 0.5217

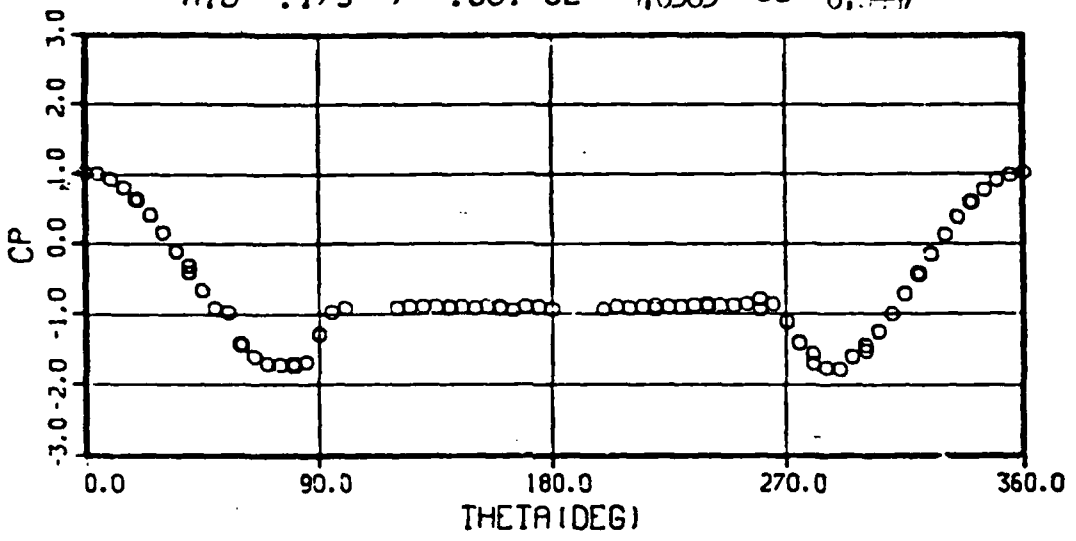


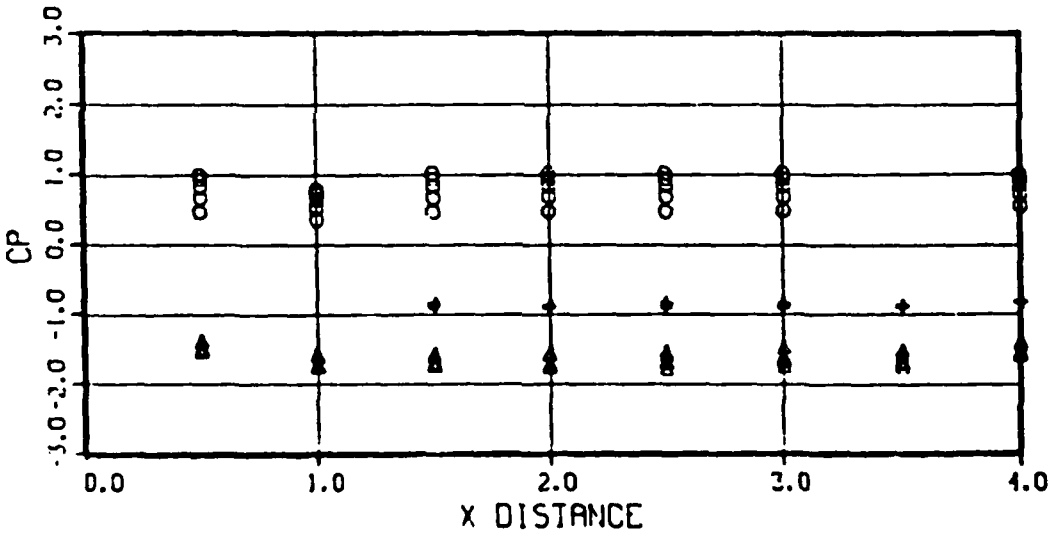


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 214 O1U-160.4 +/- .92 RND1U-4.405 +/-.011
P1U- 7656. +/- 4.00 V1U-196.65 +/- .648
M1U- .173 +/- .001 CL- -0.0583 CD- 0.9447

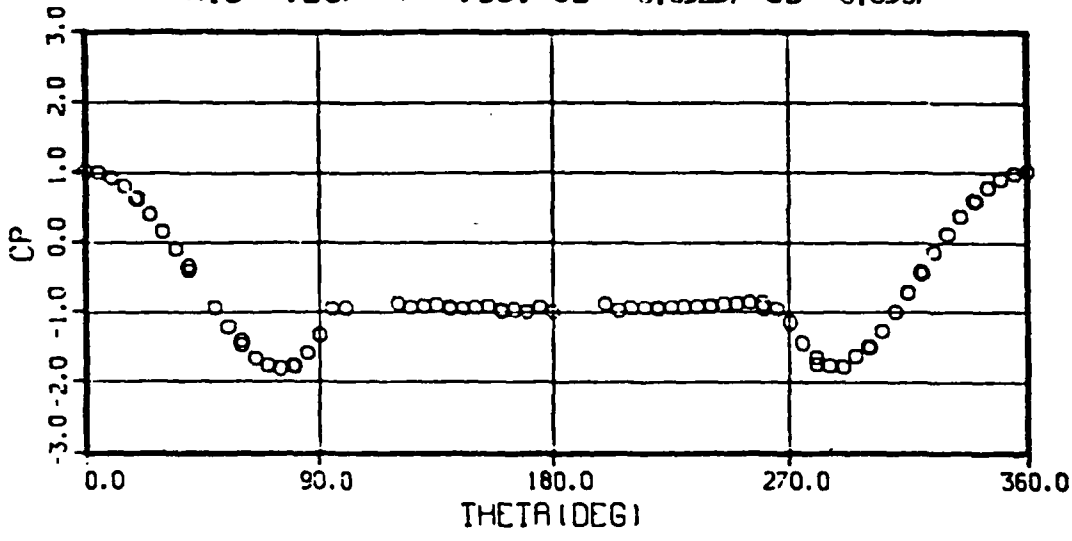


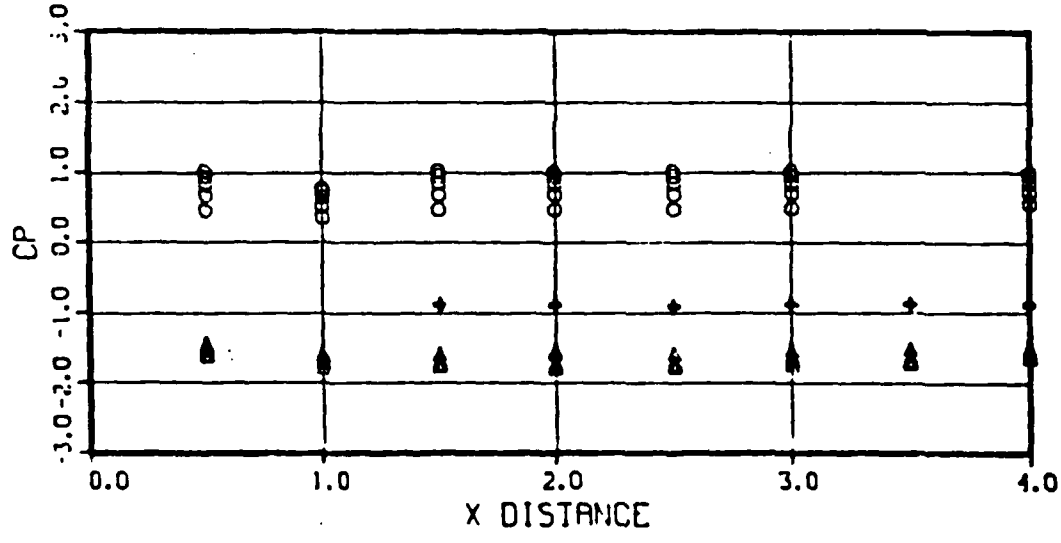


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 215 OIU-227.8 +/- .76 RNDIU-5.208 +/-.016
PIU- 7608. +/- 1.60 VIU-235.51 +/- .310
MIU- .207 +/- .001 CL- -0.05237 CD- 0.8597

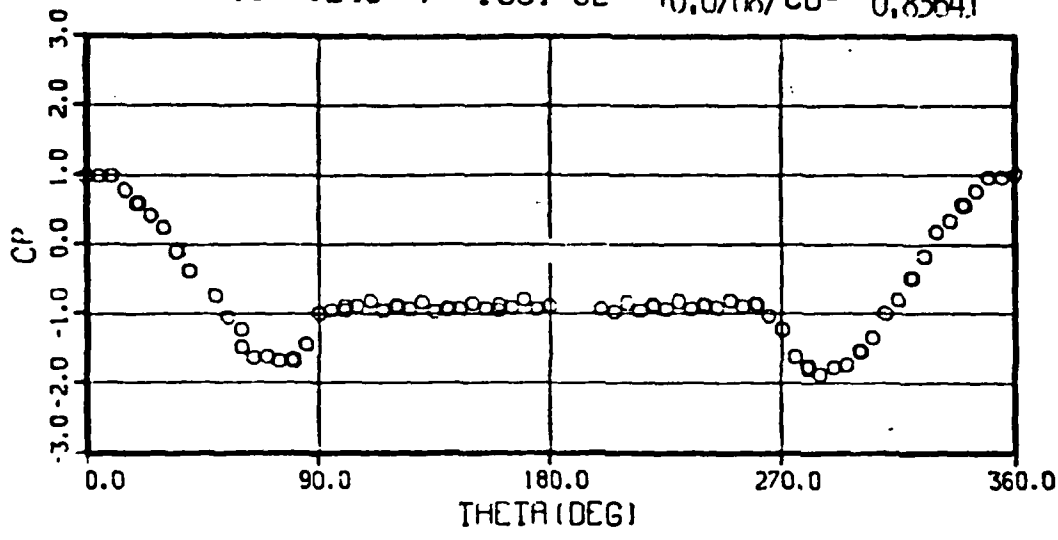


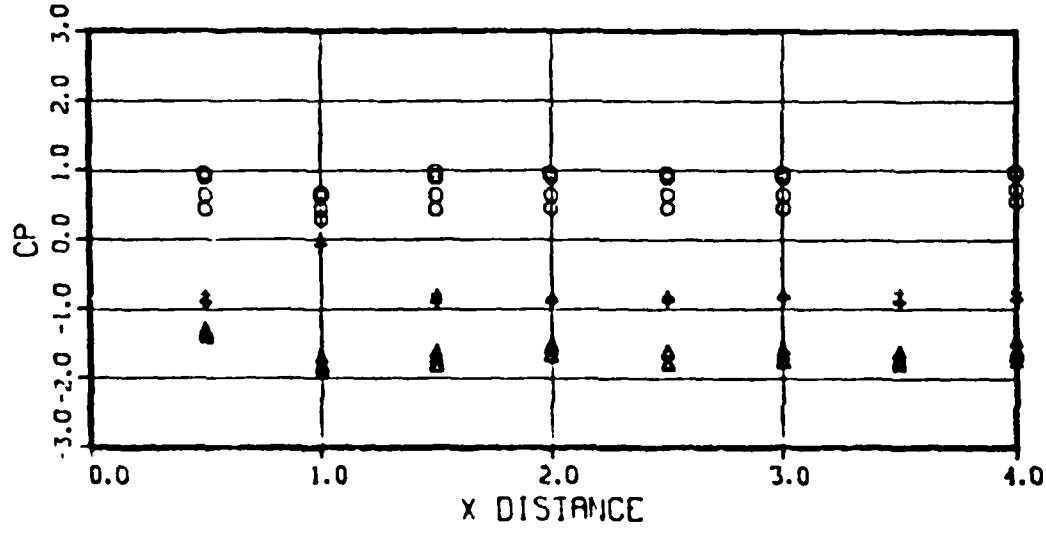


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 226 QIU- 21.8 +/- .62 RNDIU- .435 +/-.010
PIU- 515. +/- 19.00 VIU-276.14 +/- .352
MIU- .246 +/- .001 CL- +0.07087CD- 0.83641

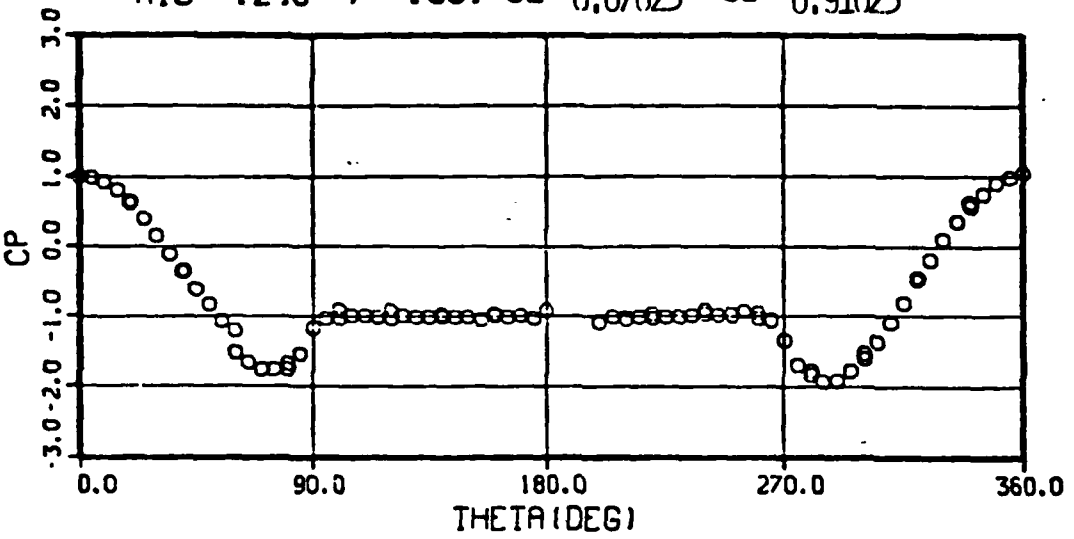


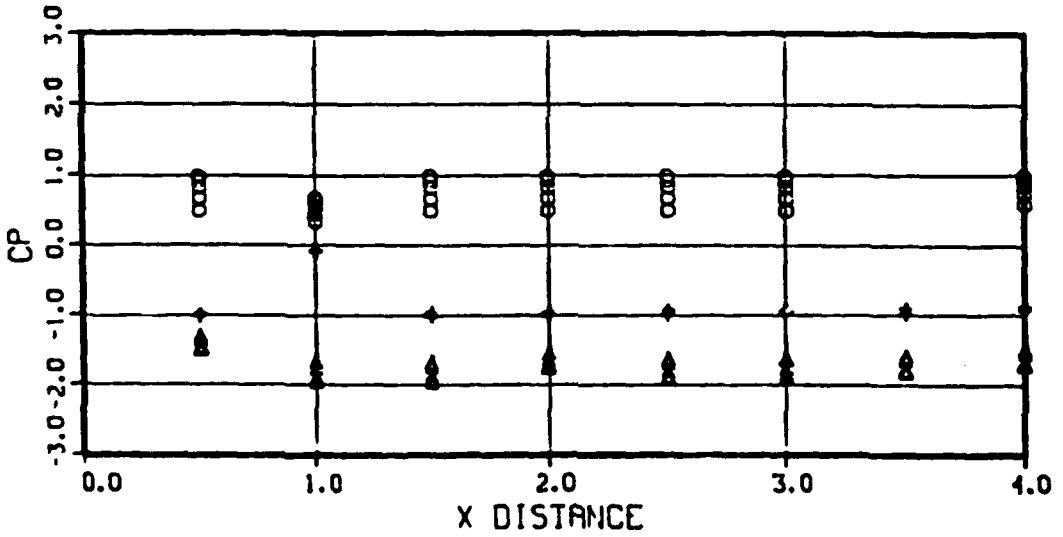


CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 227 O1U- 25.9 +/- .14 RND1U- .506 +/-.003
P1U- 603. +/- 4.20 V1U-279.26 +/- .536
M1U- .248 +/- .001 CL- 0.07025 CD- 0.91023

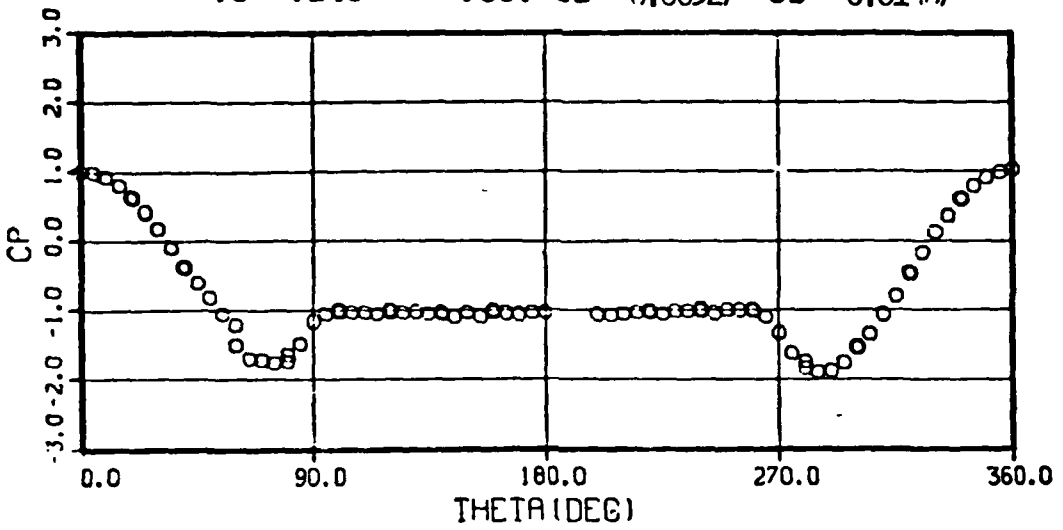


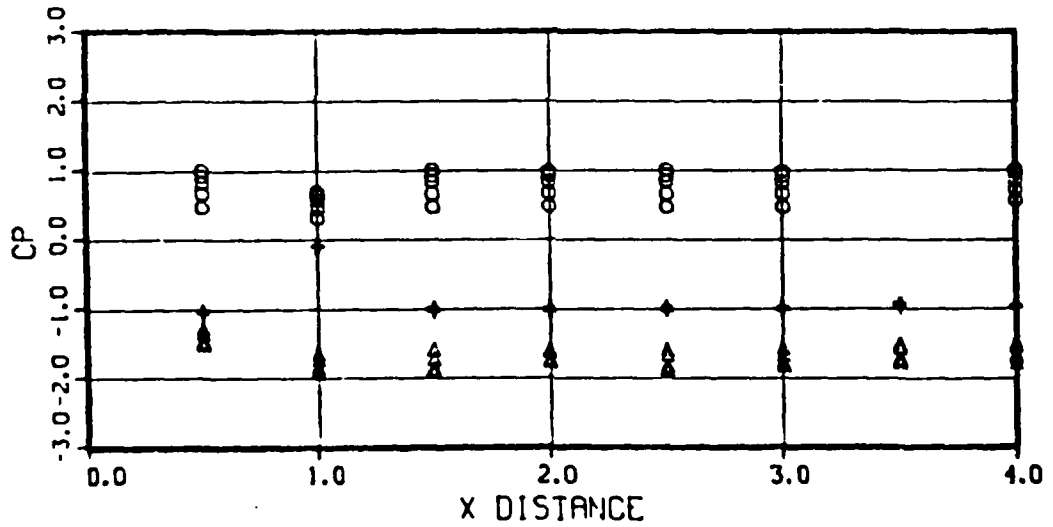


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 228 O1U- 32.0 +/- .22 RND1U- .617 +/-.003
P1U- 736. +/- 3.80 V1U-282.04 +/- .848
M1U- .249 +/- .001 CL- 0.06327 CD- 0.81407

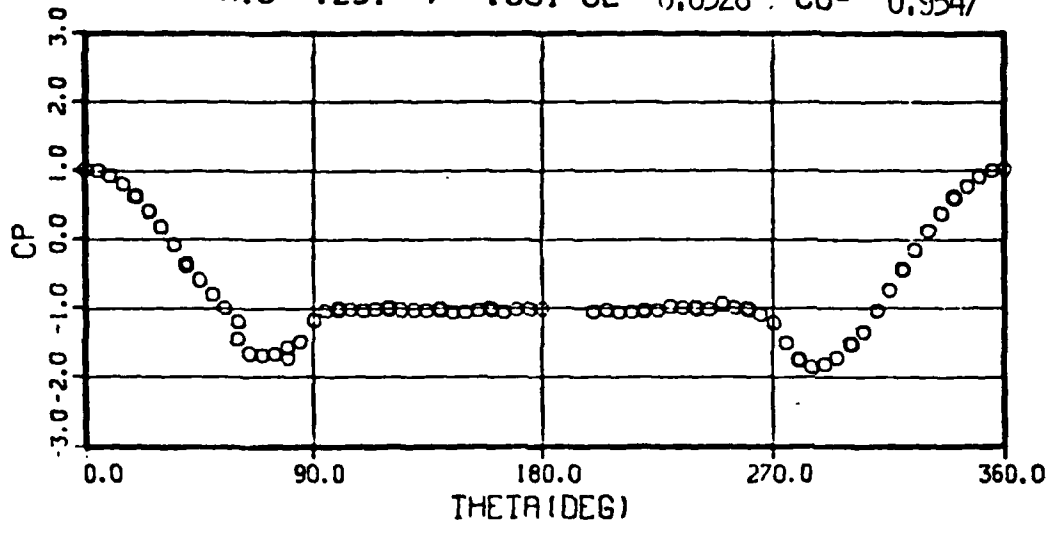


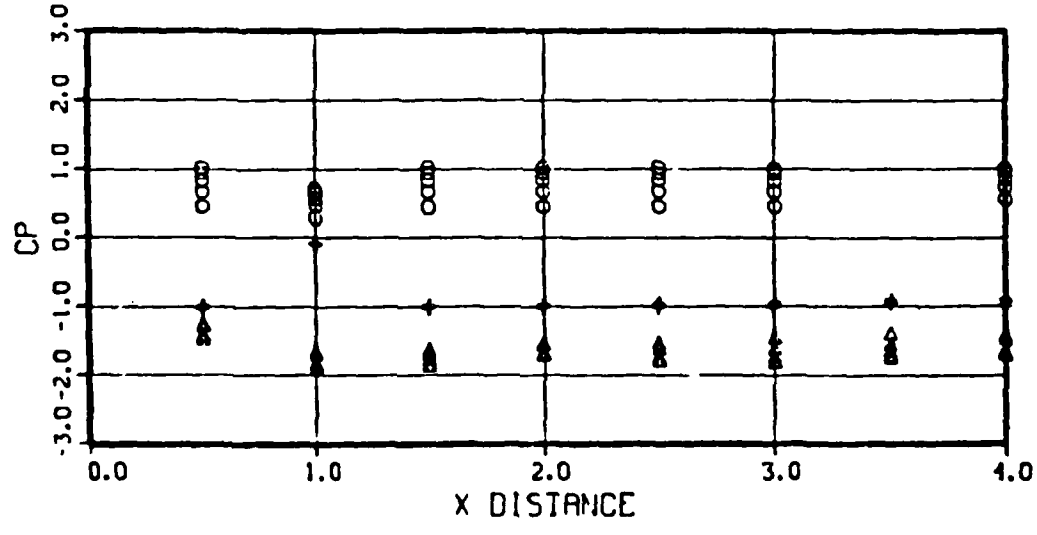


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 229 01U- 37.8 +/- .24 RND1U- .722 +/-.003
P1U- 860. +/- 3.20 V1U-284.15 +/- .660
M1U- .251 +/- .001 CL- 0.0528 CD- 0.9547

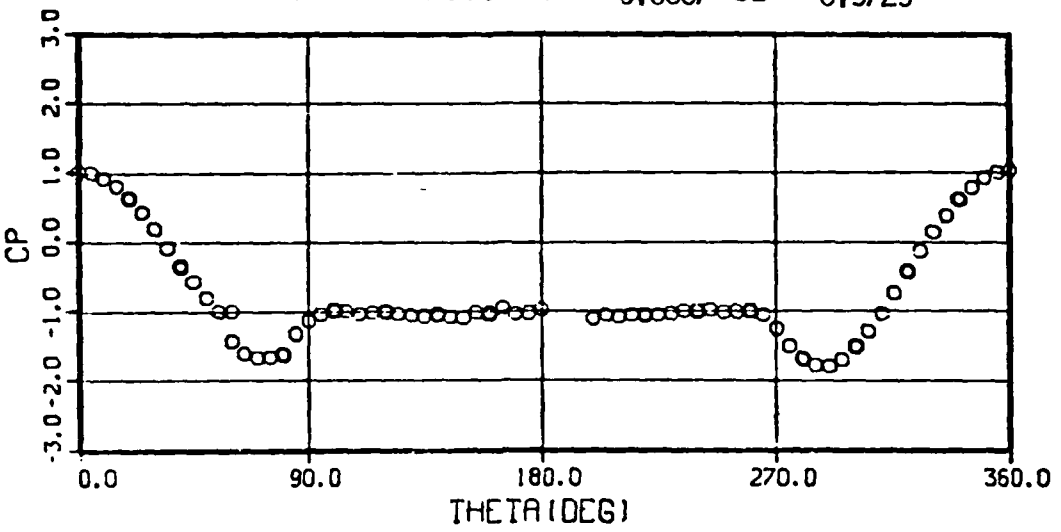


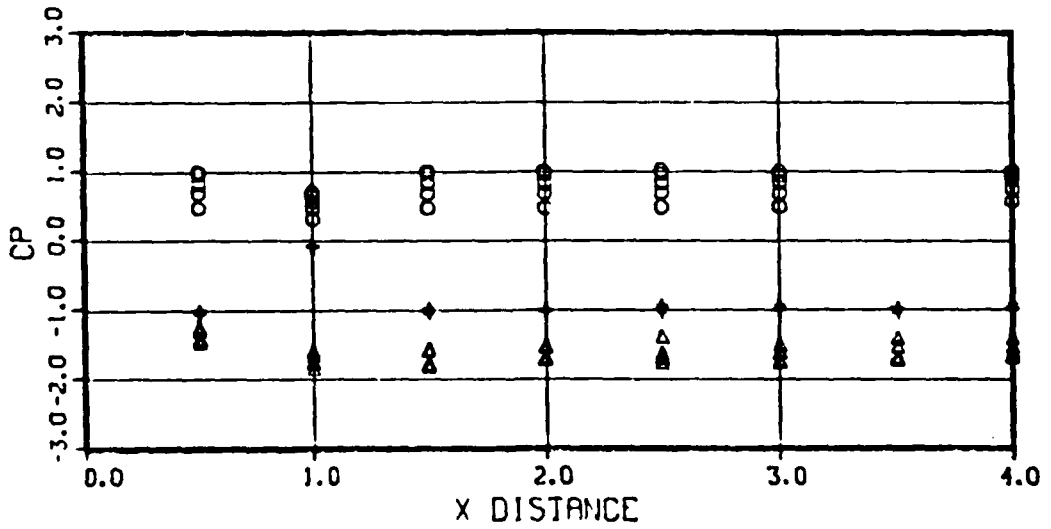


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 230 O1U- 43.3 +/- .34 RND1U- .829 +/-.007
P1U- 997. +/- 9.40 V1U-282.59 +/- .808
M1U- .249 +/- .001 CL- 0.0607 CD- 0.9729

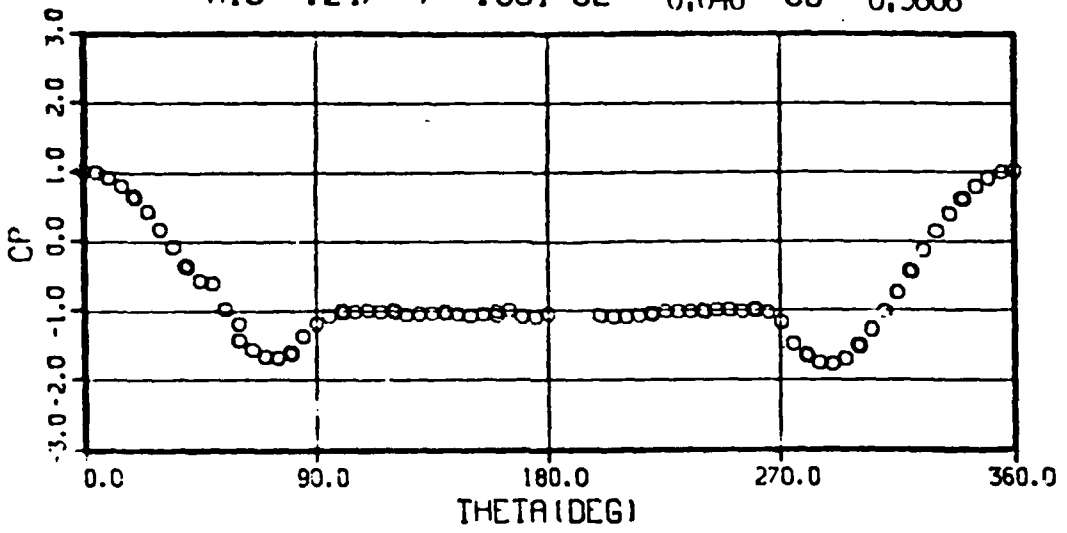


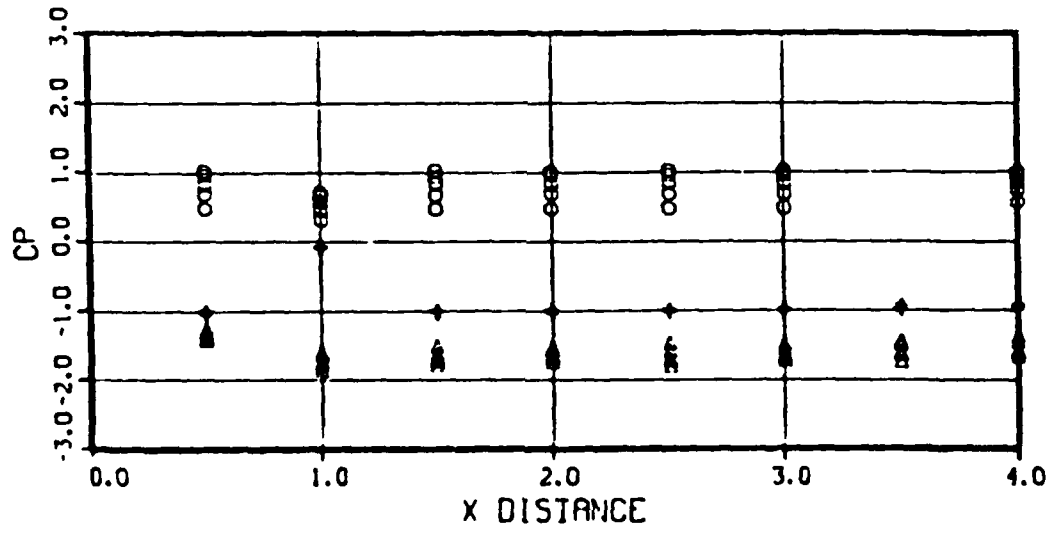


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 231 O1U- 48.0 +/- .10 RND1U- .925 +/-.003
P1U- 1118. +/- 3.20 V1U-281.04 +/- .512
M1U- .247 +/- .001 CL- 0.046 CD- 0.9868

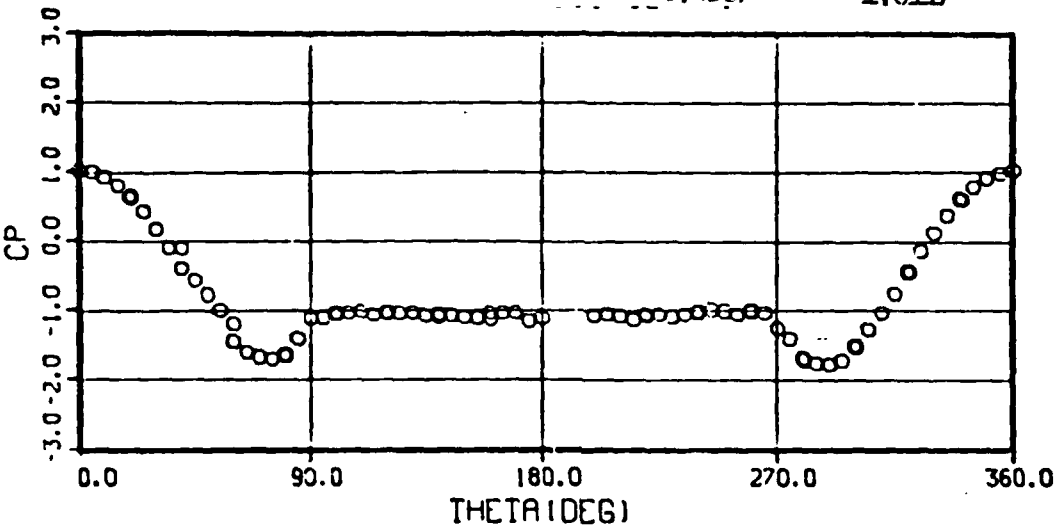


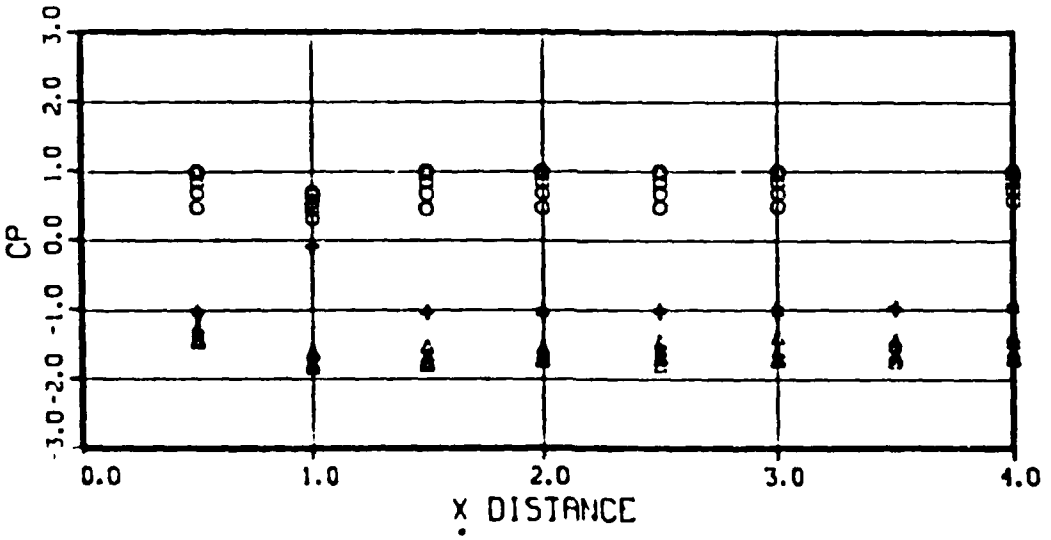


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 232 QIU- 53.5 +/- .16 RNDIU-1.027 +/-.003
PIU- 1241. +/- 3.40 VIU-281.62 +/- .712
MIU- .248 +/- .001 CL- 0.0597 CD- 1.0117

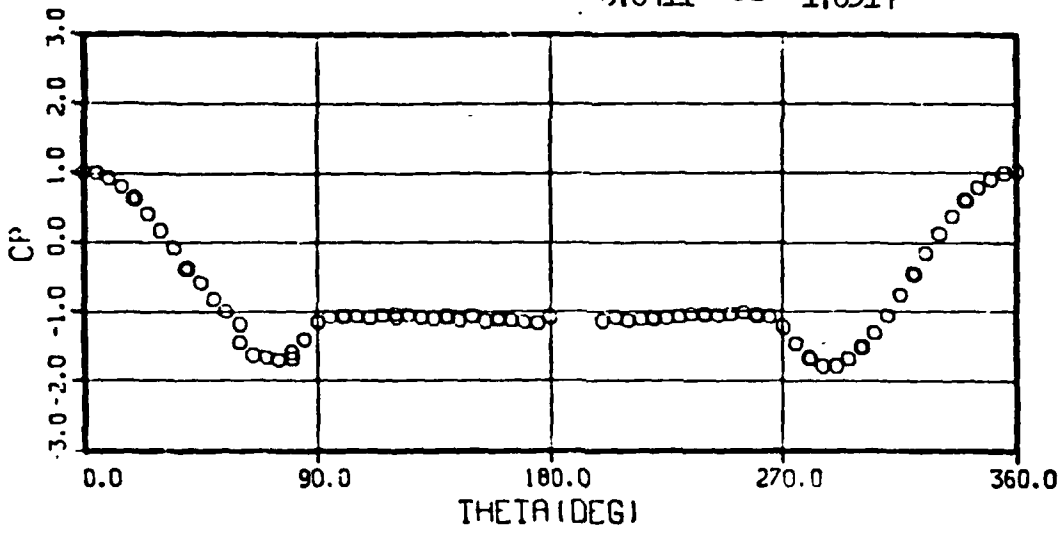


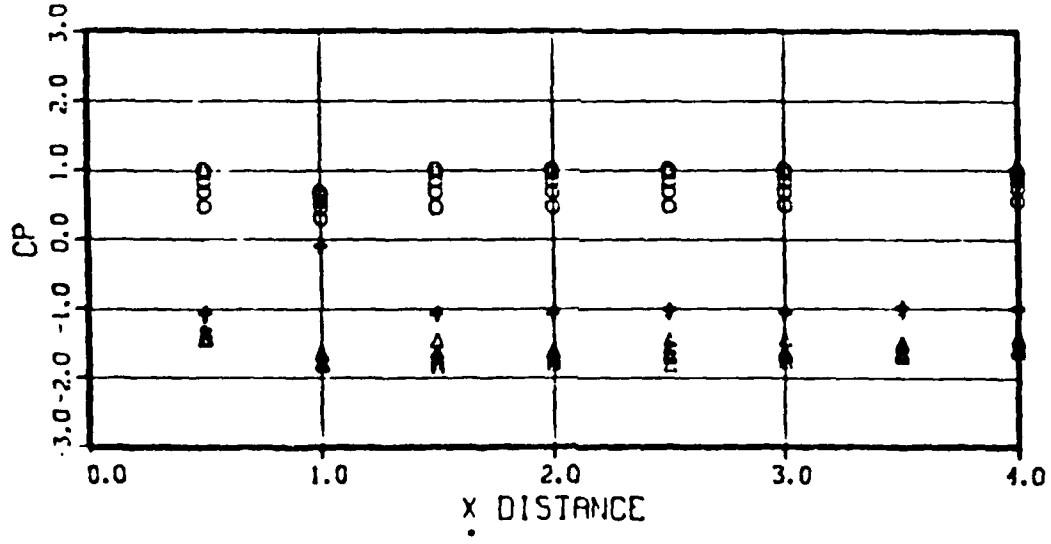


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 233 OIU- 66.5 +/- .26 RNDIU-1.277 +/-.002
PIU- 1553. +/- 2.60 VIU-281.32 +/- .748
MIU- .247 +/- .001 CL- 0.0411 CD- 1.0314

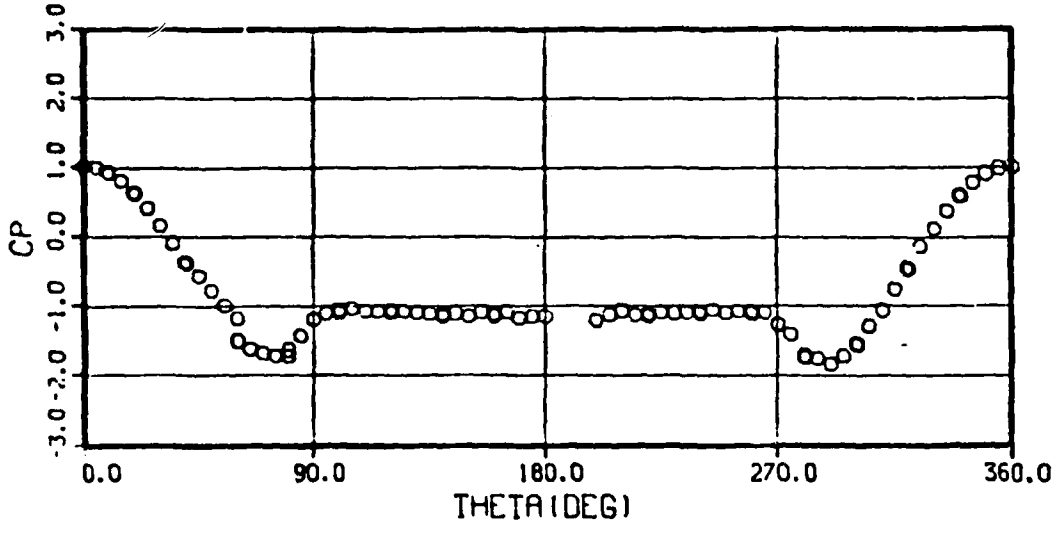


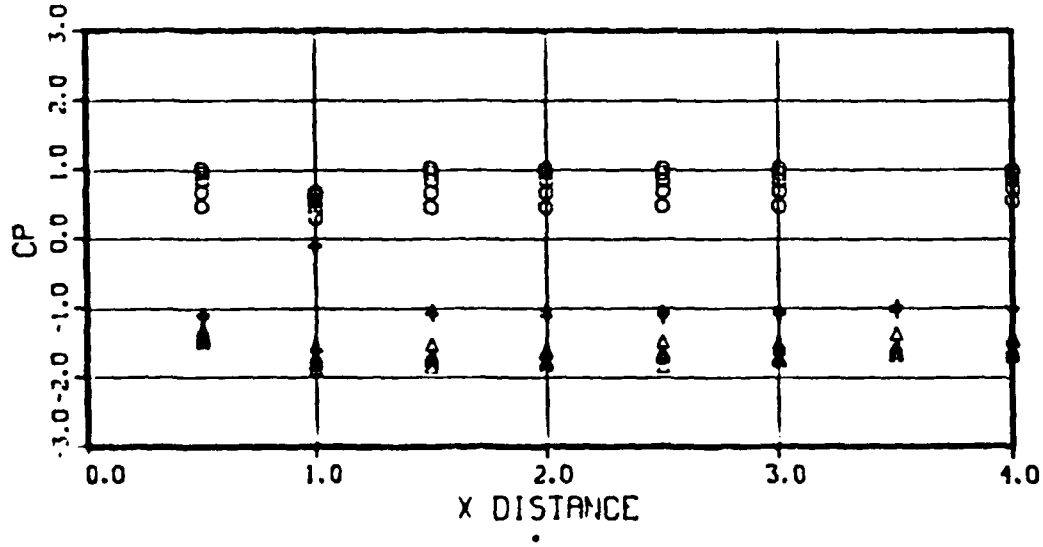


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 234 Q1U- 79.7 +/- .60 RND1U-1.530 +/-.009
P1U- 1869. +/- 5.40 V1U-280.82 +/- .958
MIL- .247 +/- .001 CL- 0.047 CD- 1.0468

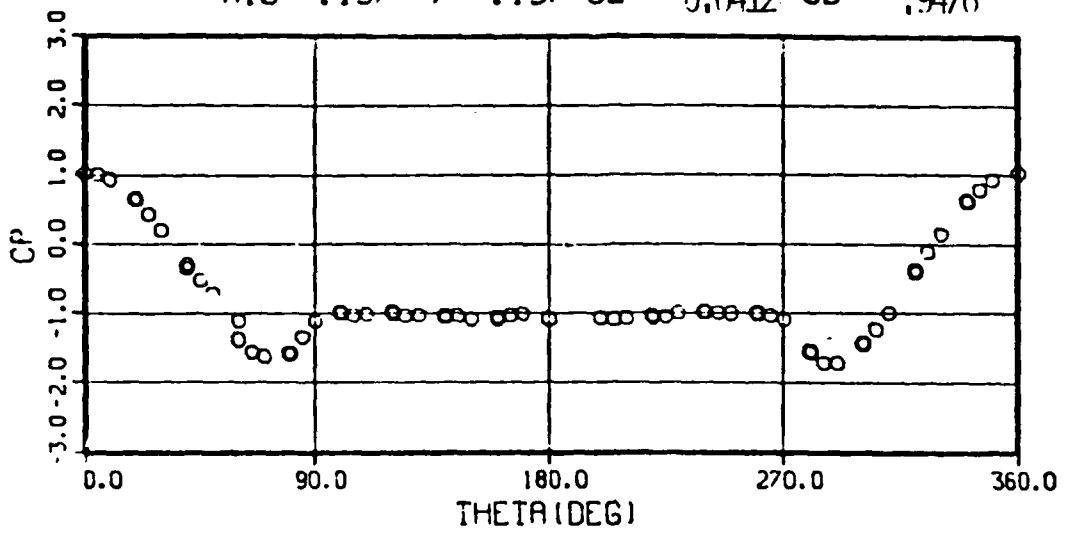


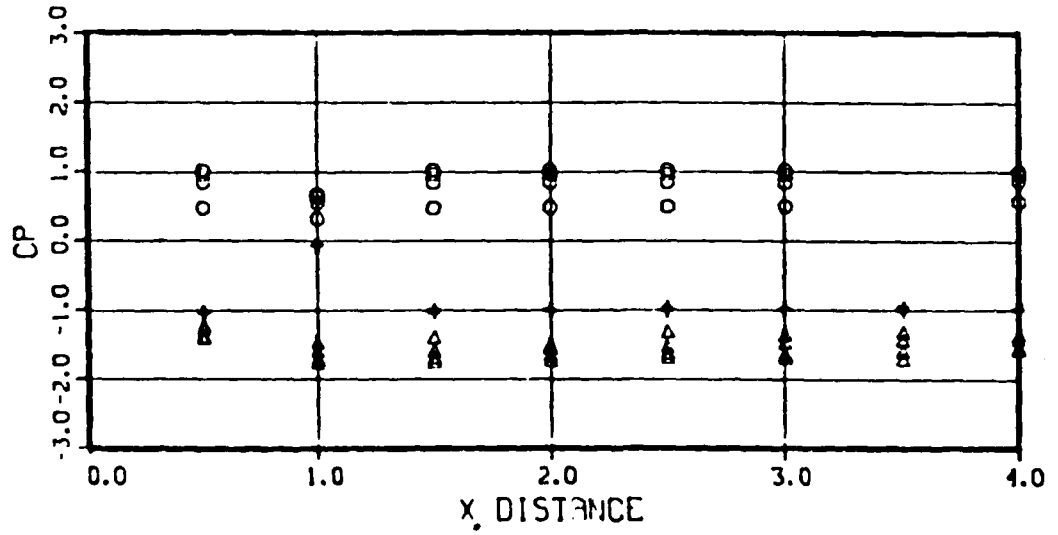


CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 235 OIU- 74.7 +/- 74.74 RNDIU-1.432 +/-*****
PIU- 1756. +/- 1755.60 VIU-224.71 +/- ******
MIU- .197 +/- .197 CL- 0.0412 CD- .9476

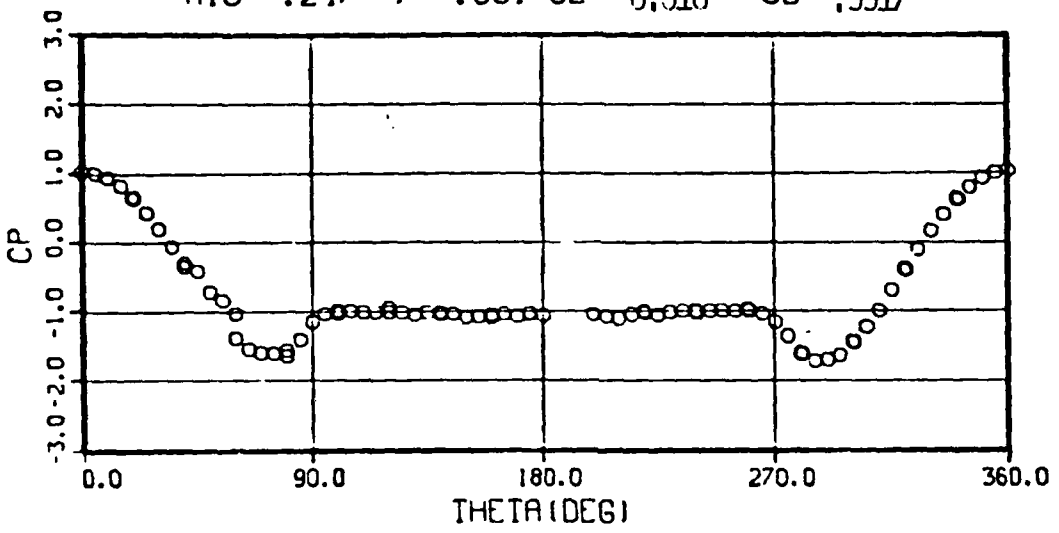


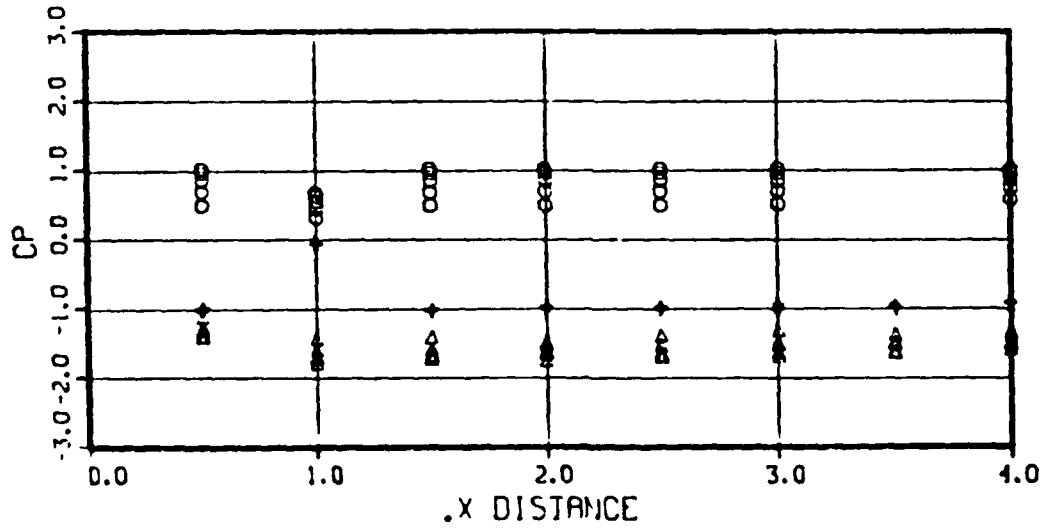


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

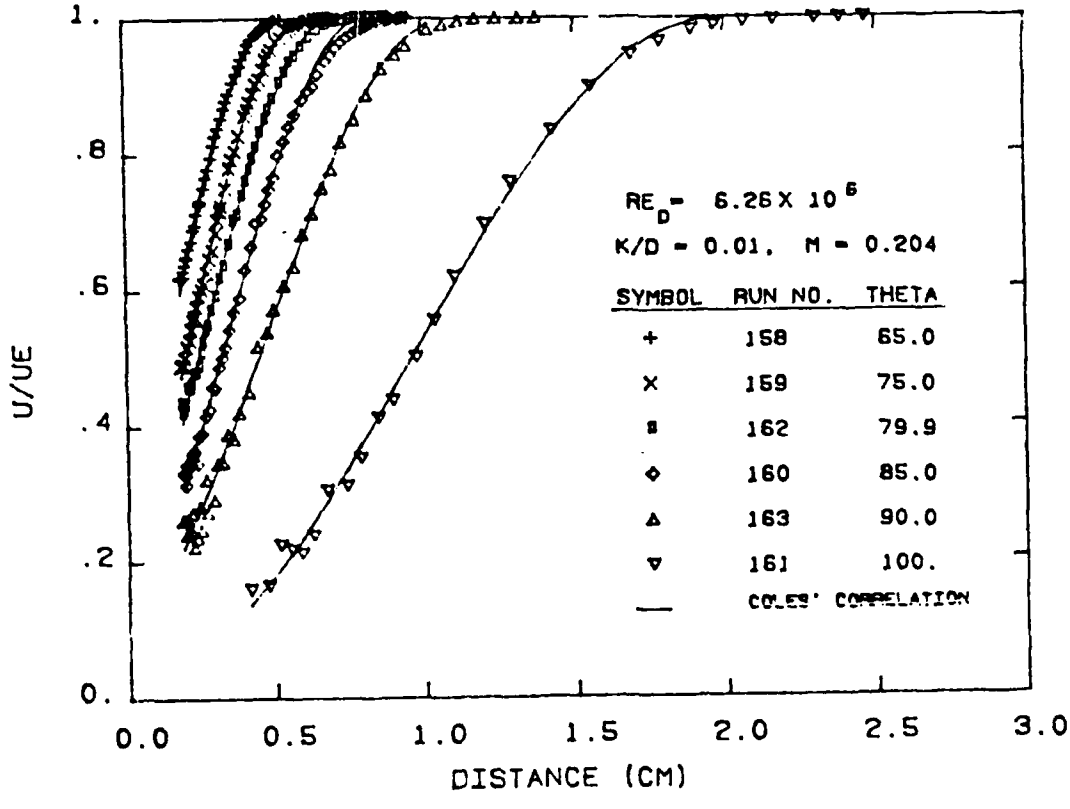
RUN 236 01U-108.0 +/- .52 RND1U-2.056 +/-.004
P1U- 2519. +/- 6.00 V1U-282.16 +/- .782
M1U- .247 +/- .001 CL- 0.016 CD- .9917

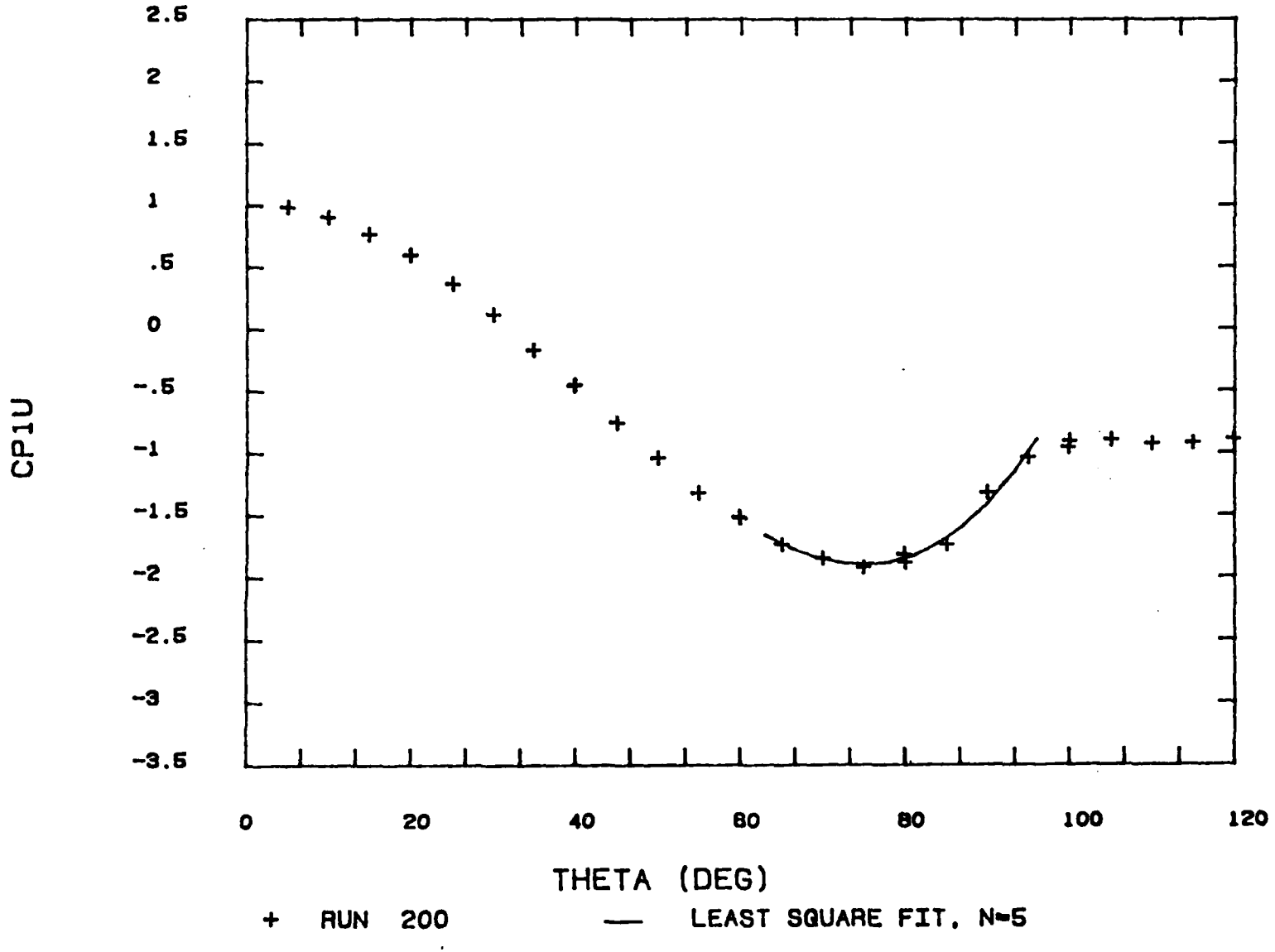


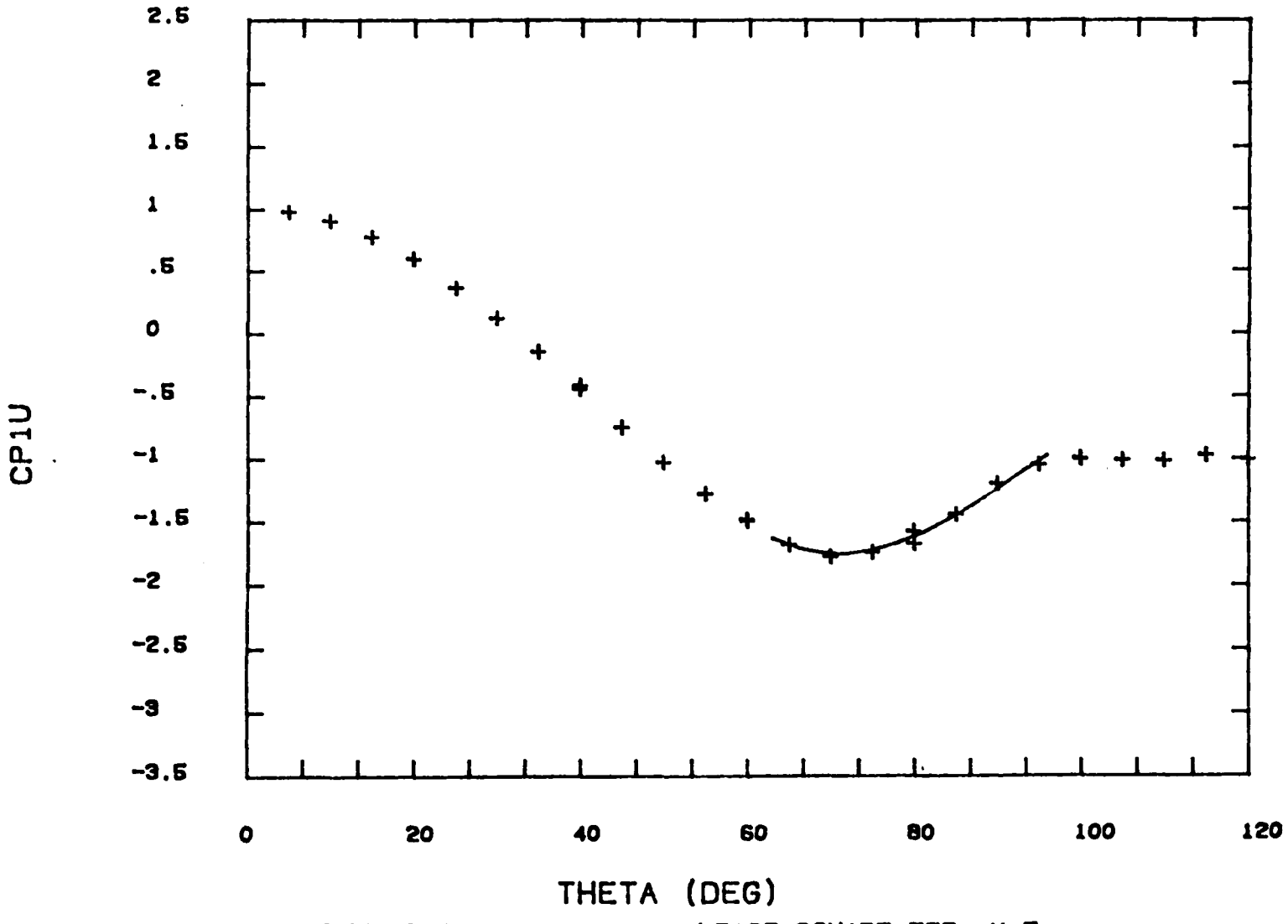


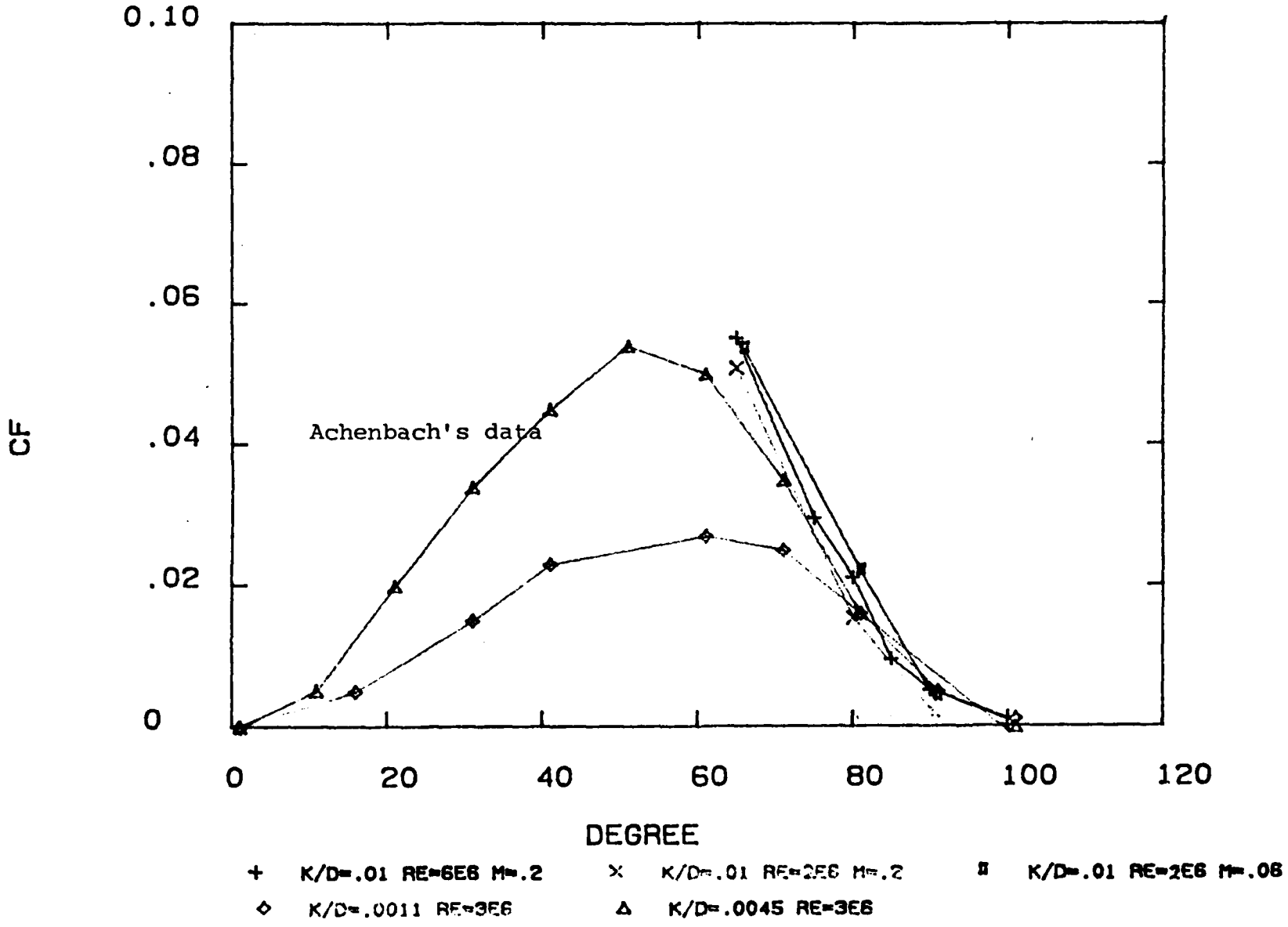
CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

PHI	6.500E+01	7.500E+01	7.999E+01	8.501E+01	9.005E+01	1.002E+02
RUN	158	159	162	160	163	161
RE	6.279E+06	6.243E+06	6.234E+06	6.175E+06	6.298E+06	6.277E+06
M	2.039E-01	2.047E-01	2.047E-01	2.045E-01	2.042E-01	2.043E-01
K/D	1.000E-02	1.000E-02	1.000E-02	1.000E-02	1.000E-02	1.000E-02
UI	7.109E+01	7.148E+01	7.187E+01	7.153E+01	7.167E+01	7.166E+01
UE	1.089E+02	1.126E+02	1.131E+02	1.097E+02	1.073E+02	1.046E+02
NU	3.580E-06	3.620E-06	3.650E-06	3.670E-06	3.600E-06	3.610E-06
RESID	6.800E-03	7.100E-03	8.200E-03	1.010E-02	1.860E-02	1.550E-02
YMIN	1.836E-01	1.862E-01	1.887E-01	1.913E-01	1.887E-01	4.173E-01
YMAX	3.866E-01	4.630E-01	5.494E-01	6.256E-01	8.237E-01	1.560E+00
PI	3.978E-01	1.072E+00	1.486E+00	2.828E+00	4.141E+00	3.583E+01
DU*	2.133E+01	2.056E+01	2.014E+01	1.915E+01	1.846E+01	1.390E+01
K+	1.040E+04	7.580E+03	6.380E+03	4.250E+03	3.210E+03	4.940E+02
DELTA	4.894E-01	5.894E-01	6.868E-01	8.005E-01	1.069E+00	1.973E+00
CF	5.500E-02	2.950E-02	2.100E-02	9.500E-03	5.200E-03	1.000E-04
U*	1.179E+01	8.679E+00	7.356E+00	4.924E+00	3.649E+00	5.640E-01
DEL*	8.540E-02	1.331E-01	1.734E-01	2.390E-01	3.586E-01	7.418E-01
THETA	5.950E-02	8.050E-02	9.820E-02	1.191E-01	1.591E-01	2.676E-01
H	1.436E+00	1.653E+00	1.766E+00	2.007E+00	2.254E+00	2.772E+00
RTHETA	1.810E+04	2.500E+04	3.040E+04	3.570E+04	4.740E+04	7.750E+04
BETA	-1.288E-01	1.022E-01	4.681E-01	1.969E+00	6.014E+00	3.954E+02




CP1U
2.5
2
1.5
1
.5
0
-.5
-1
-1.5
-2
-2.5
-3
-3.5
0
20
40
60
80
100
120
THETA (DEG)
+ RUN 200
— LEAST SQUARE FIT, N=5


2.5
2
1.5
1
.5
0
-.5
-1
-1.5
-2
-2.5
-3
-3.5
CP1U
0
20
40
60
80
100
120
THETA (DEG)
+ RUN 242
— LEAST SQUARE FIT, N=5


0.10
.08
.06
.04
.02
0
CF
Achenbach's data
0
20
40
60
80
100
120
DEGREE
+ K/D=.01 RE=6E6 M=.2
× K/D=.01 RE=3E6 M=.2
K/D=.01 RE=2E6 M=.08
◇ K/D=.0011 RE=3E6
△ K/D=.0045 RE=3E6

PART II

BOUNDARY LAYER PROFILES

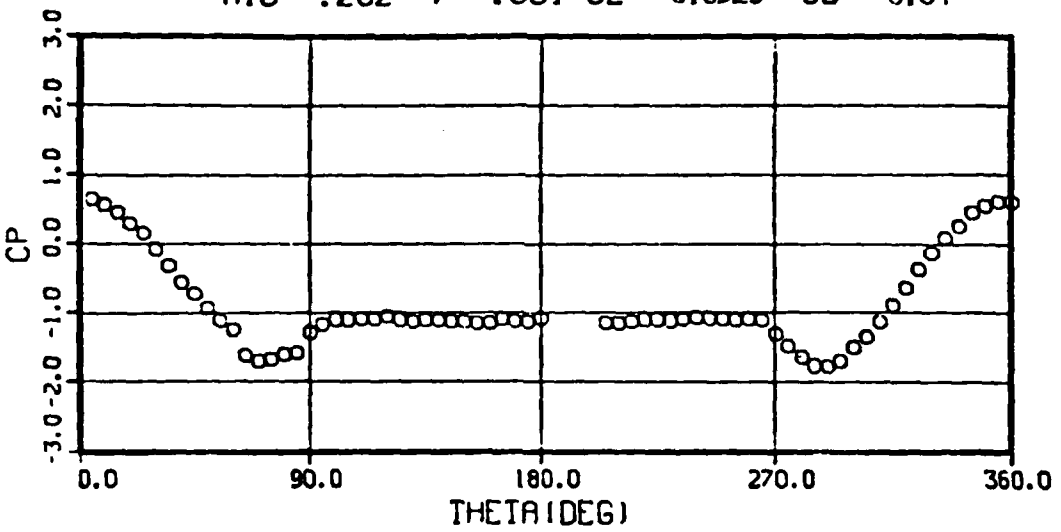
Part II consists of plots and analysis of boundary layer profiles performed by PRi. Data analysis on the boundary layer profiles consists of determining the applicability of conventional similarity laws to smooth and rough cylinder turbulent boundary layers. This is accomplished by casting the data in terms of the law-of-the-wall and law-of-the-wake similarity laws.

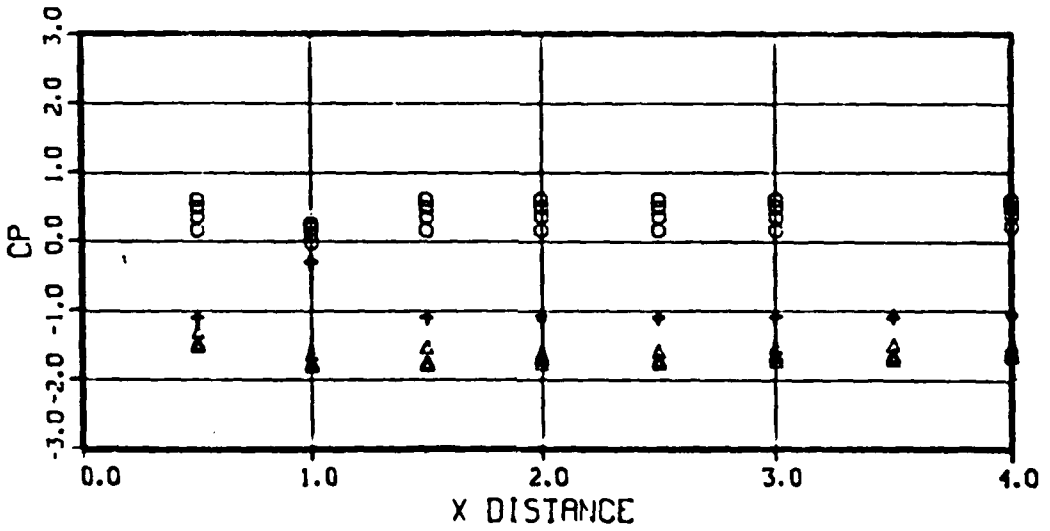
APPENDIX C

BOUNDARY LAYER PROFILES AND DATA

CYLINDER + NO. 60 MESH SCREEN

RUN 244 O1U-270.8 +/- 1.00 RND1U-5.991 +/-.015
P1U- 9426. +/- 20.50 V1U-235.63 +/- .500
M1U- .202 +/- .001 CL- 0.0329 CD- 0.84

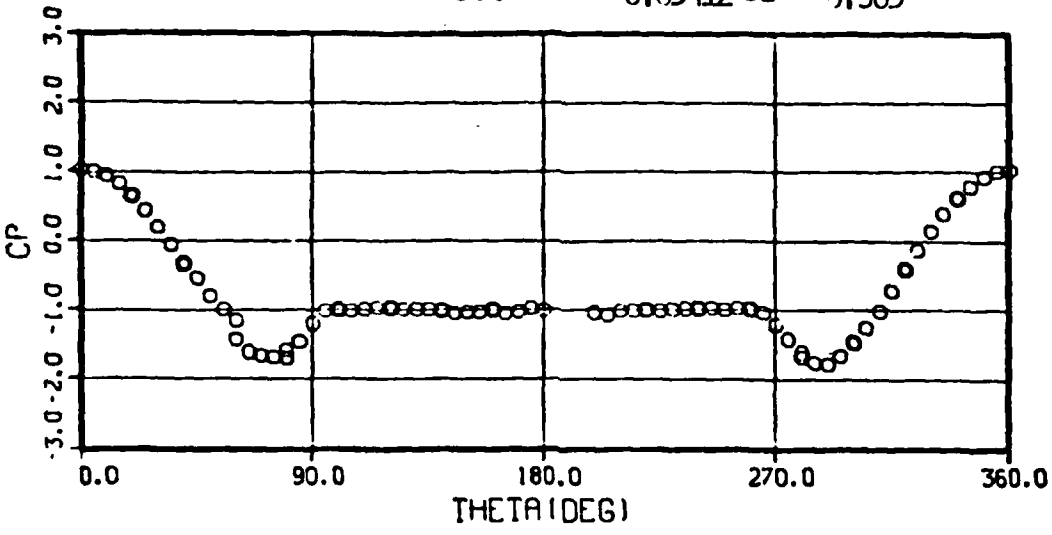


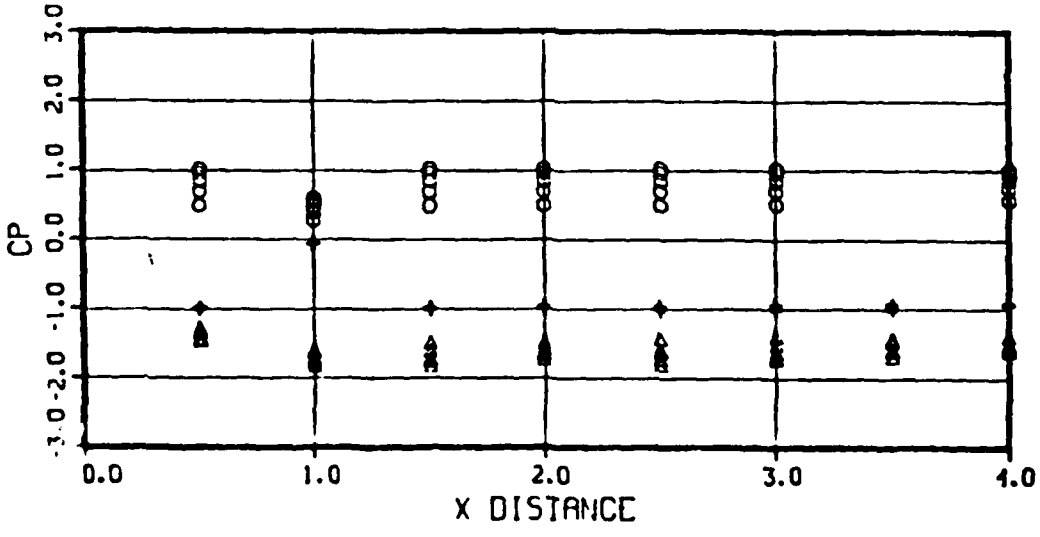


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 243 D1U-405.0 +/- 2.16 RND1U-7.297 +/-.034
P1U- 9440. +/- 12.40 V1U-288.51 +/- .794
M1U- .247 +/- .001 CL- 0.03412 CD- 0.965

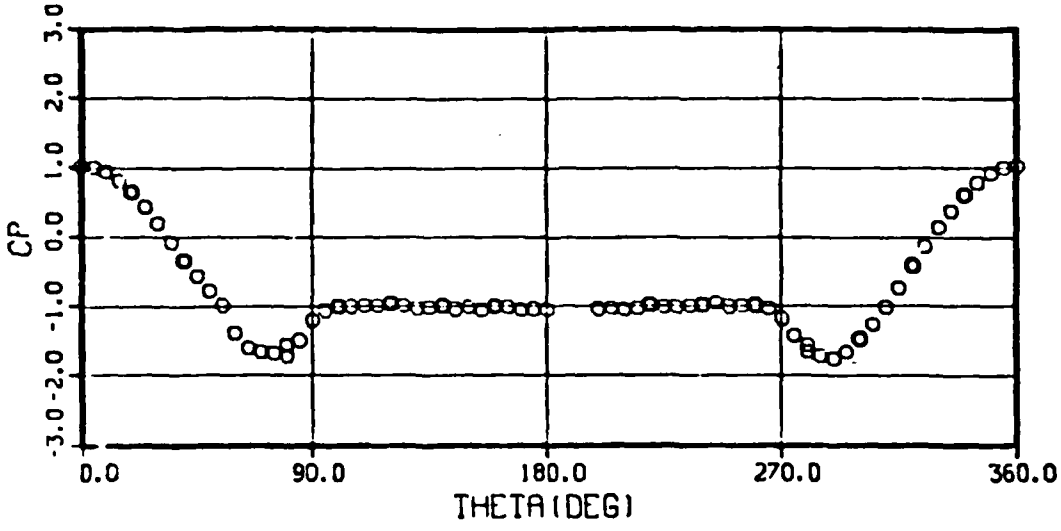


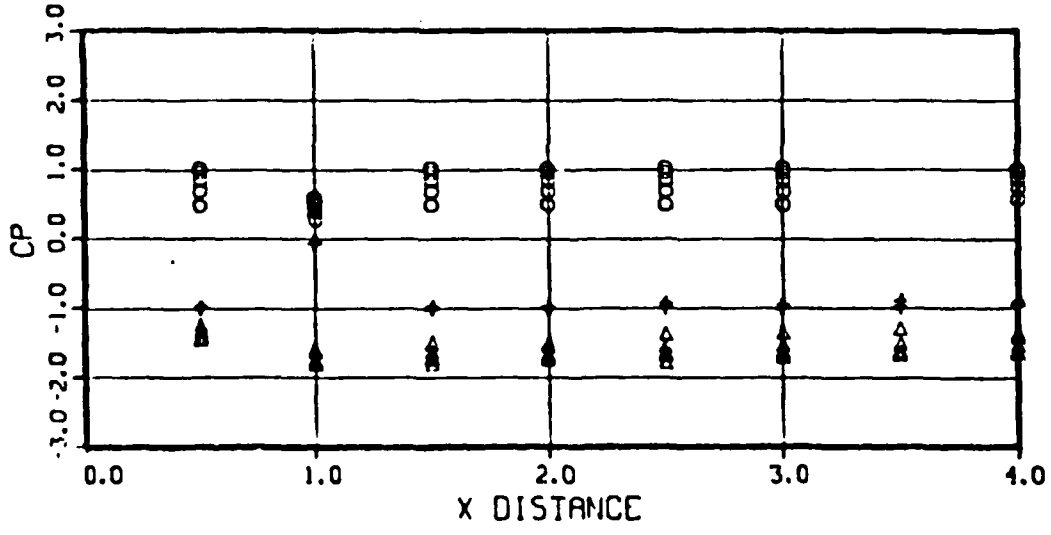


CP VALUES ALONG LONGITUDINAL RAYS AT POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X. THE 5 SETS OF POINTS AT EACH LOCATION CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 242 O1U-334.3 +/- 2.62 RND1U-6.121 +/-.025
P1U- 7827. +/- 4.00 V1U-285.29 +/- 1.118
M1U- .247 +/- .001 CL- 0.0359 CD- 0.9693

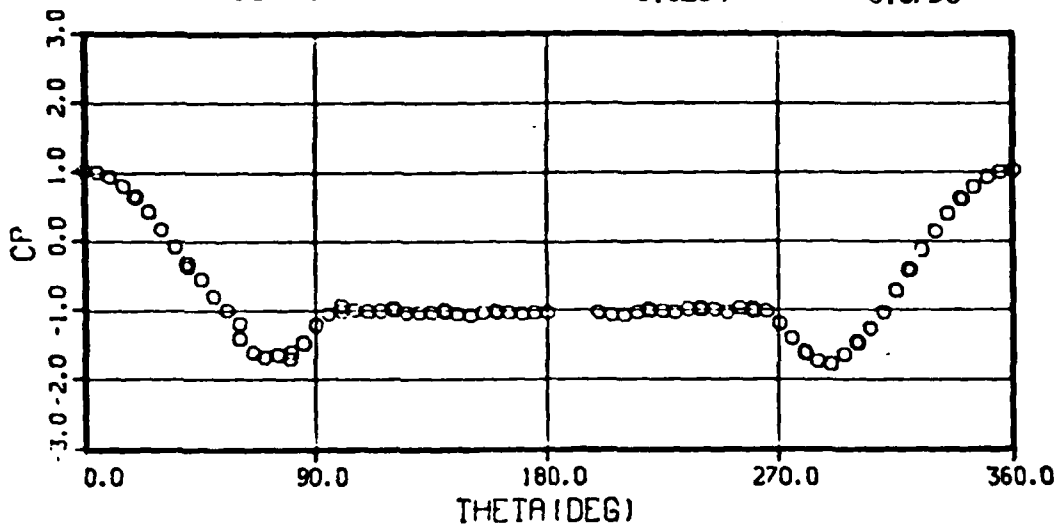


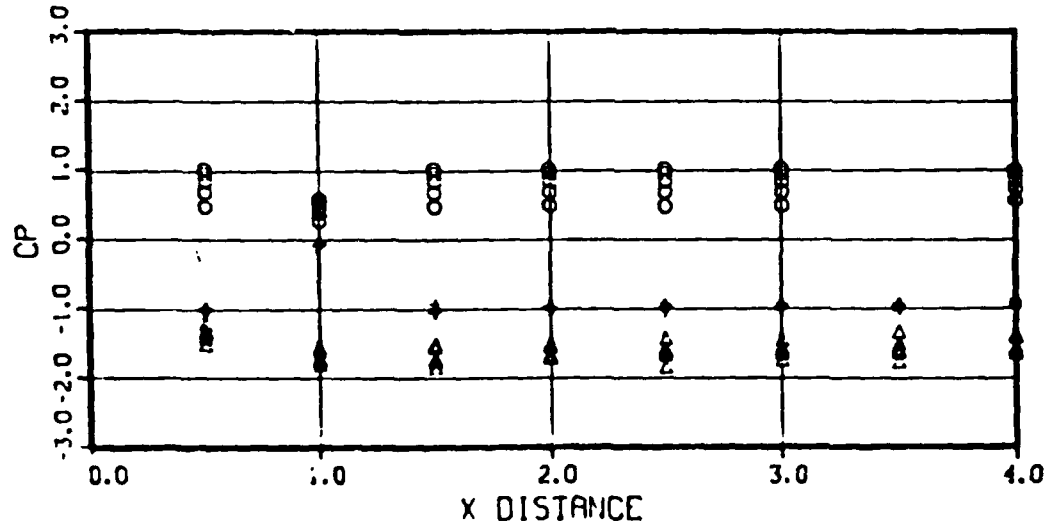


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 60 MESH SCREEN

RUN 241 QIU-275.2 +/- 2.48 RNDIU-5.097 +/-.030
PIU- 6454. +/- 14.20 VIU-284.81 +/- .946
MIU- .247 +/- .001 CL- 0.0294 CD- 0.9736

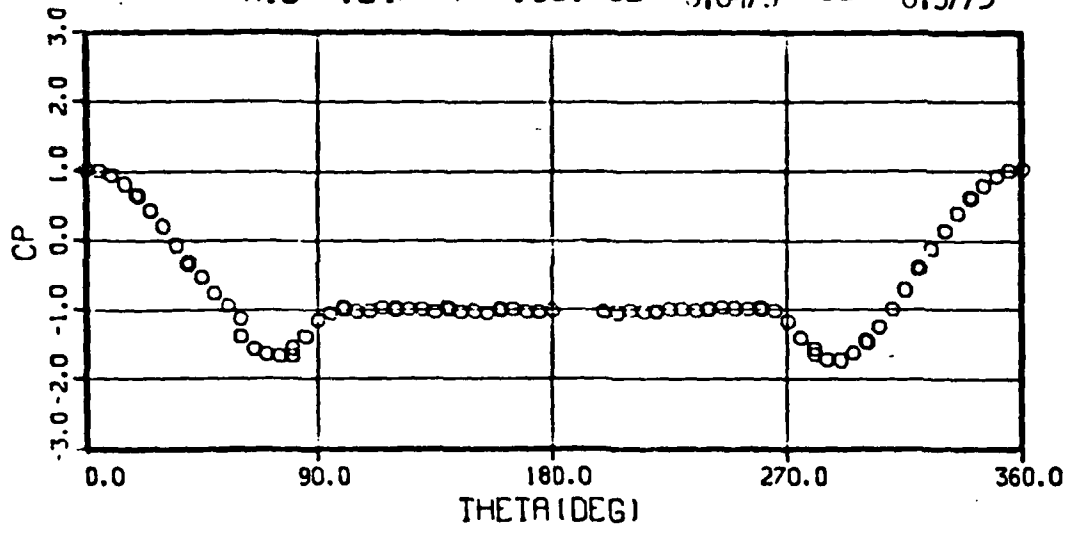


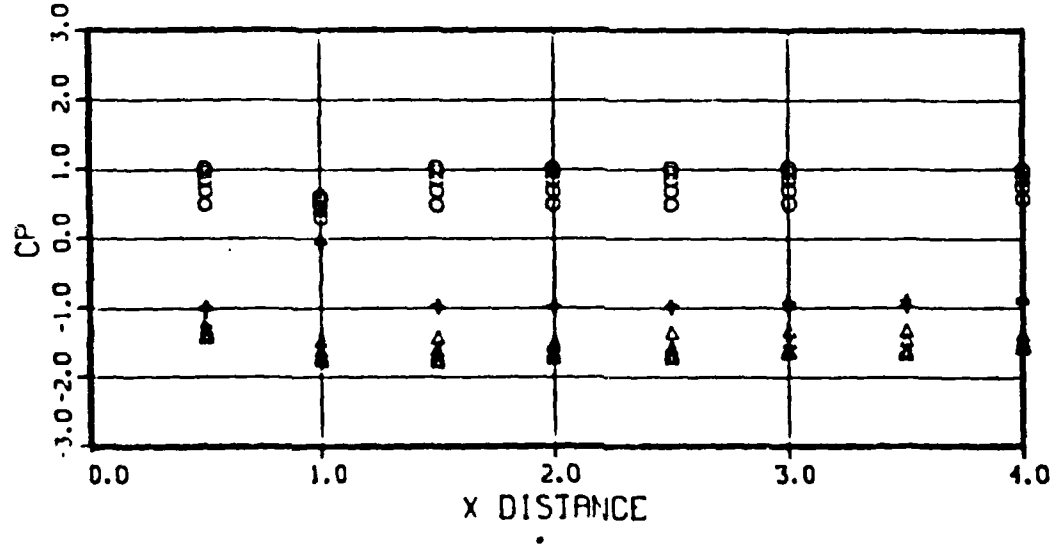


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-• 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 240 O1U-220.1 +/- 2.02 RND1U-4.114 +/-.016
P1U- 5155. +/- 4.40 V1U-283.91 +/- 1.424
M1U- .247 +/- .001 CL- 0.0479 CD- 0.9773

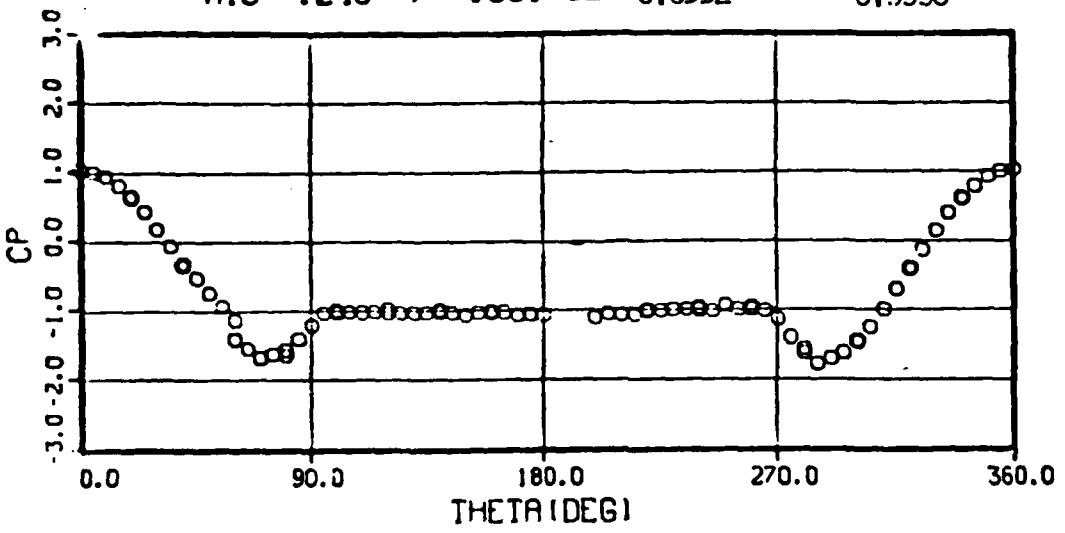


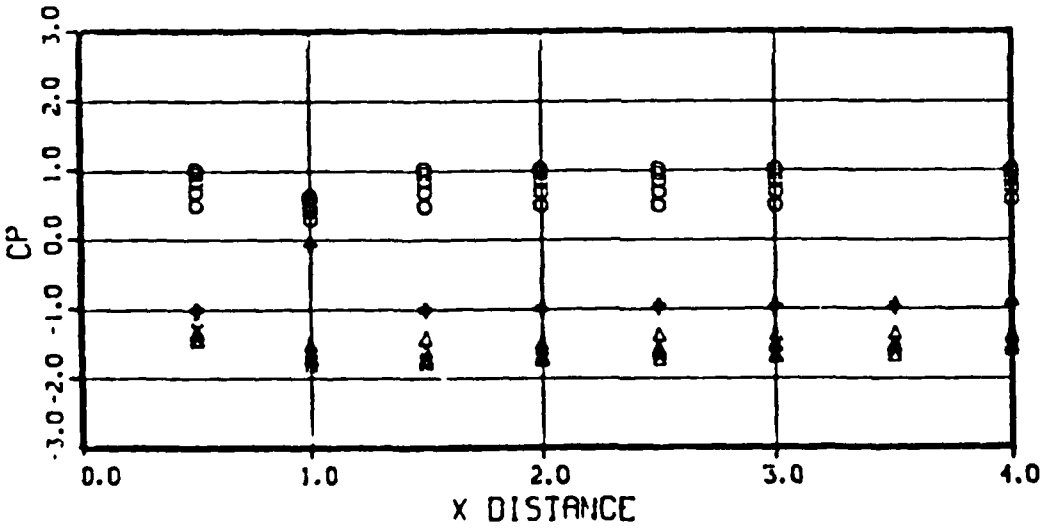


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 239 O1U-191.0 +/- 1.42 RND1U-3.595 +/-.016
P1U- 4484. +/- 8.80 V1U-282.92 +/- .936
M1U- .246 +/- .001 CL- 0.0352 CD- 0.9998

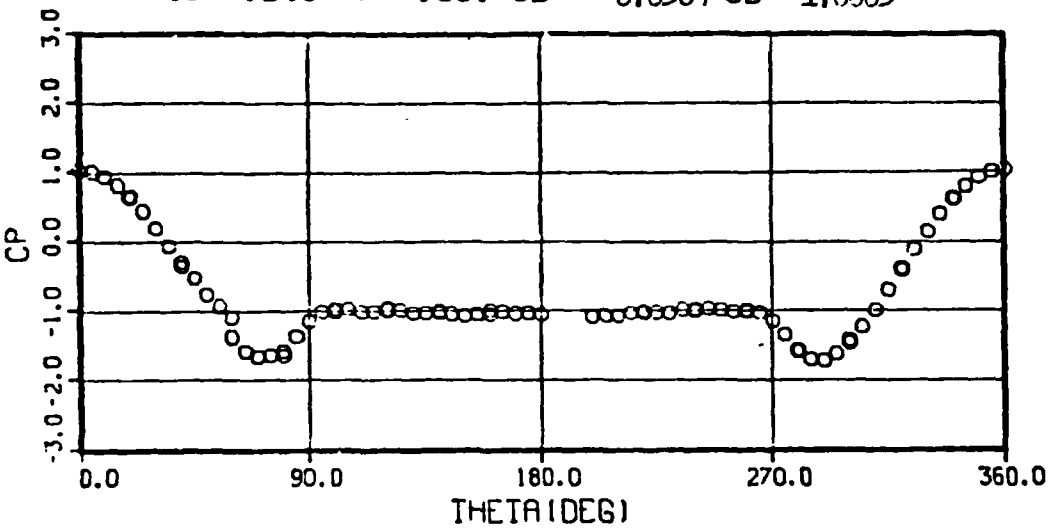


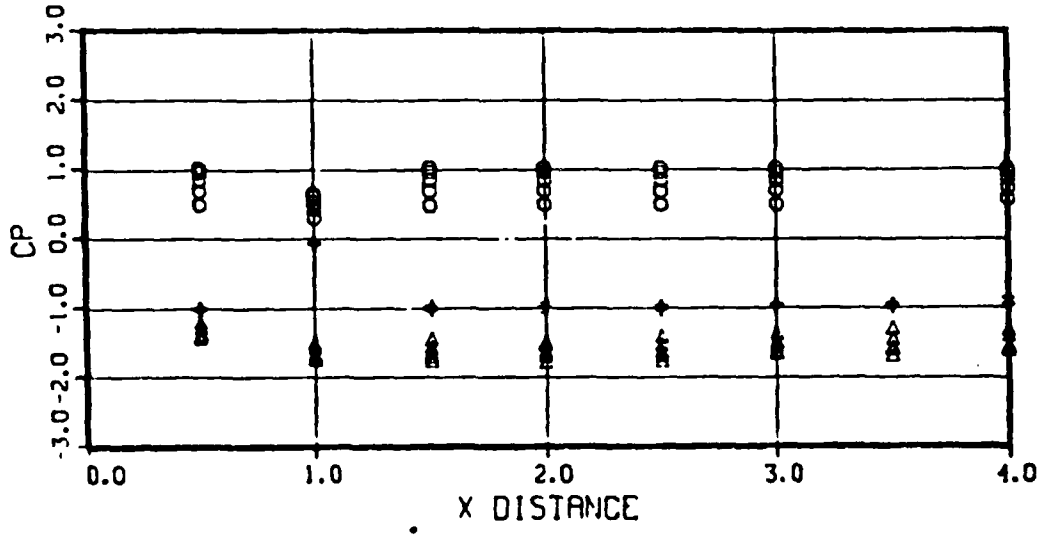


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 238 Q1U-164.2 +/- 1.36 RND1U-3.089 +/-.013
P1U- 3818. +/- 4.60 V1U-283.77 +/- 1.178
M1U- .248 +/- .001 CL- -0.0364 CD- 1.0003

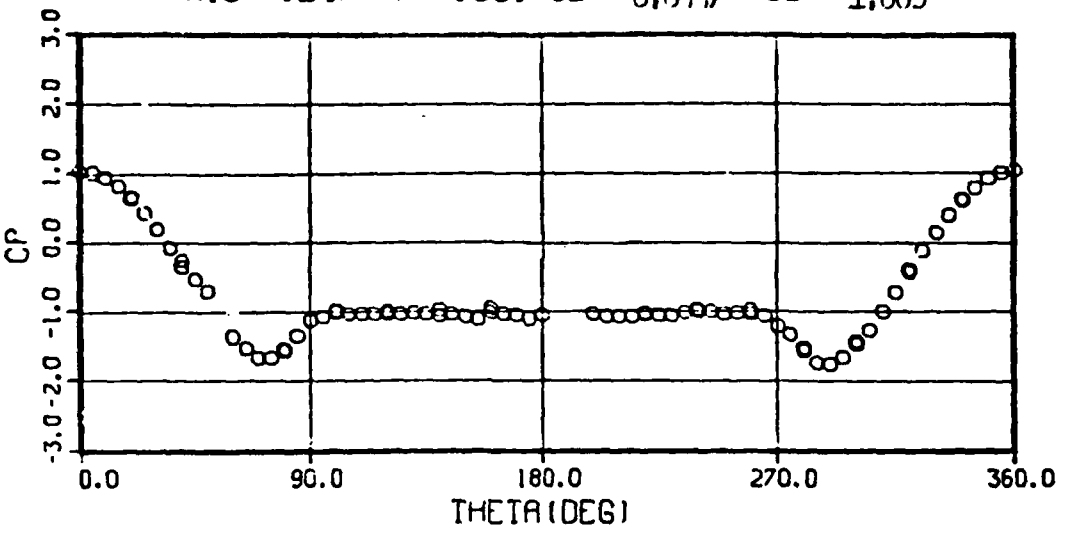


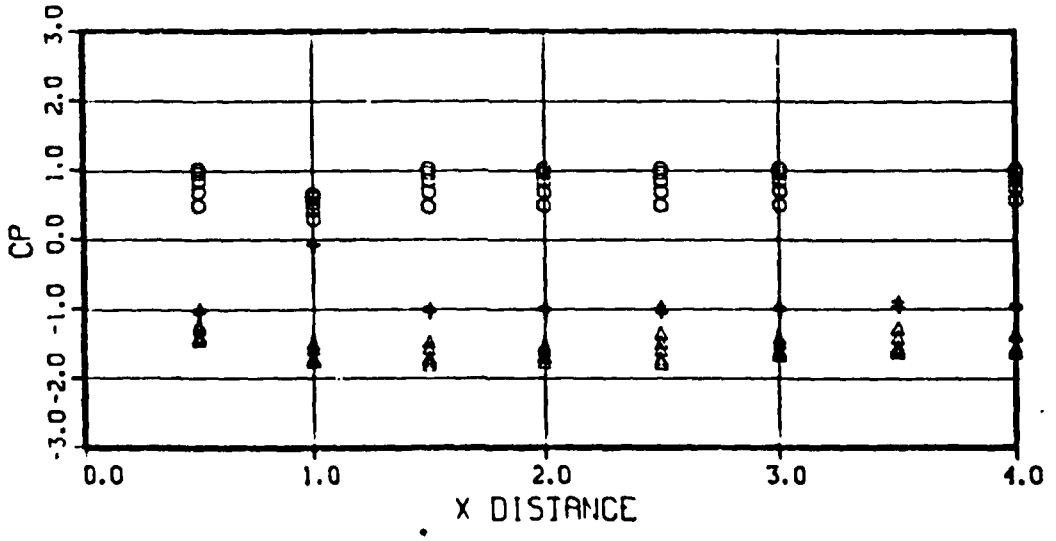


CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

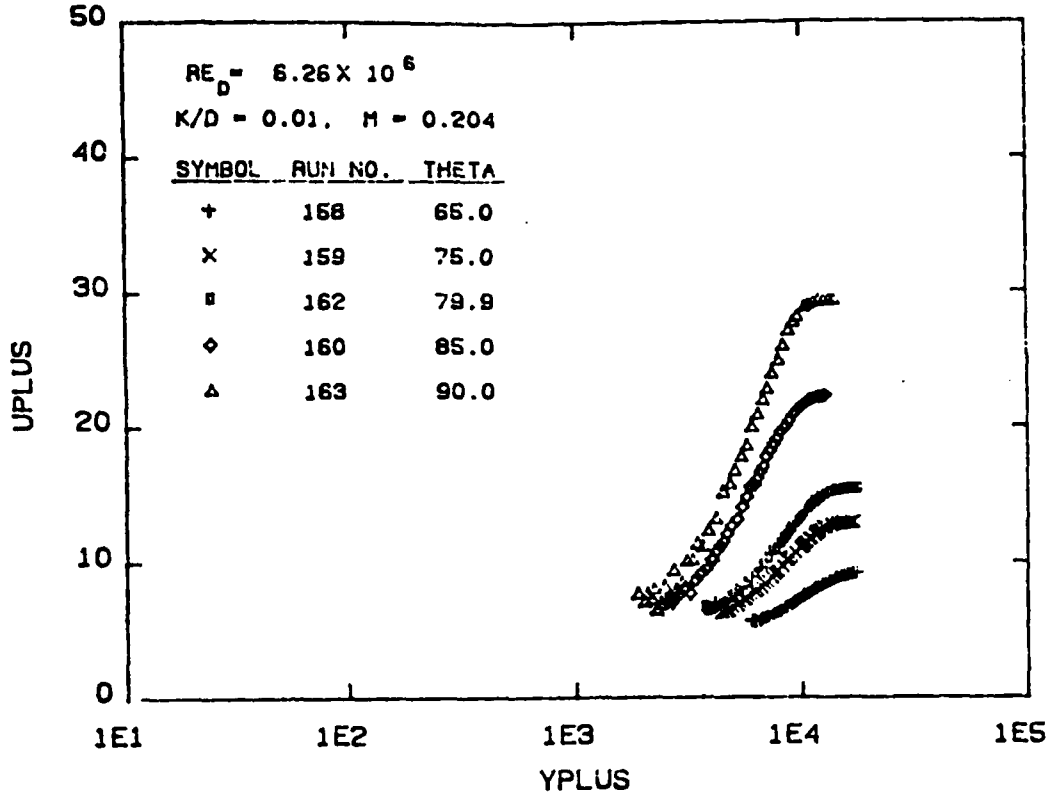
CYLINDER + NO. 60 MESH SCREEN

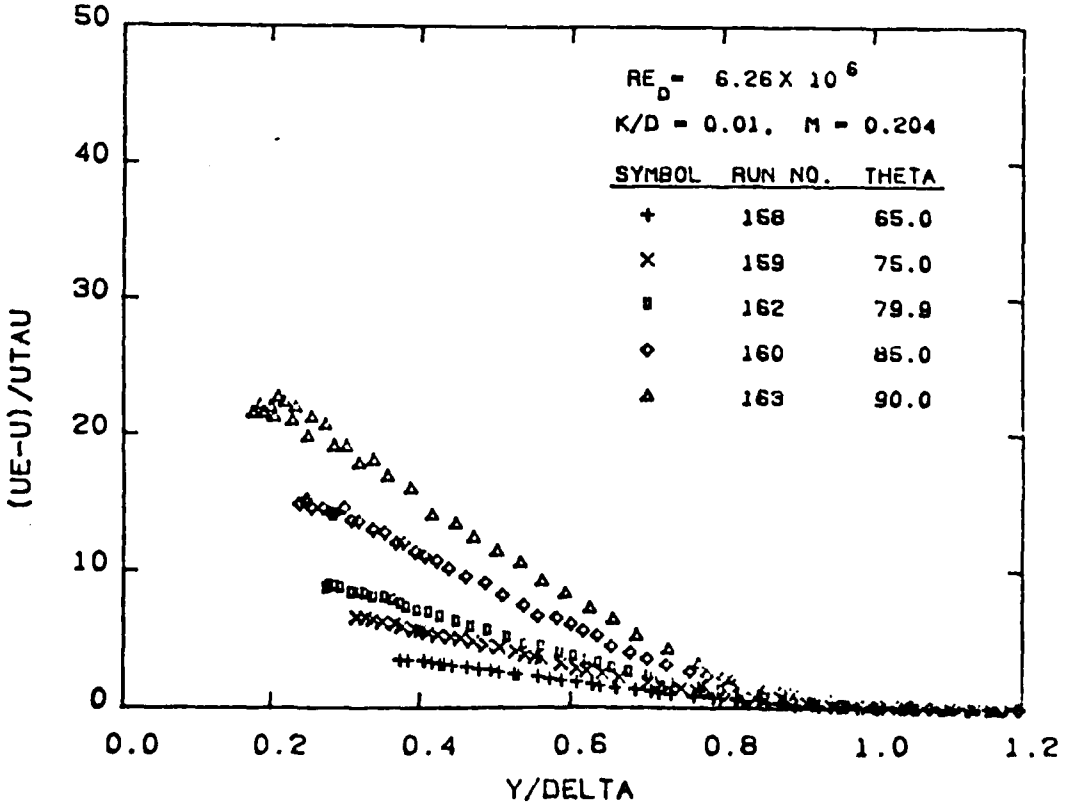
RUN 237 O1U-135.8 +/- .94 RND1U-2.580 +/-.015
P1U- 3185. +/- 18.60 V1U-281.94 +/- 1.812
M1U- .247 +/- .001 CL- 0.0447 CD- 1.009





CP VALUES ALONG LONGITUDINAL RAYS AT
POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.
THE 5 SETS OF POINTS AT EACH LOCATION
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.


RE$_D$= 6.26 X 10^6
K/D = 0.01, M = 0.204
SYMBOL RUN NO. THETA
+ 158 65.0
X 159 75.0
▪ 162 79.9
◇ 160 85.0
△ 163 90.0
UPLUS
YPLUS
0
10
20
30
40
50
1E1
1E2
1E3
1E4
1E5


RE$_D$= 6.26 X 10^6
K/D = 0.01, M = 0.204
SYMBOL RUN NO. THETA
+ 158 65.0
X 159 75.0
▪ 162 79.9
◇ 160 85.0
△ 163 90.0
(UE-U)/UTAU
Y/DELTA
0
10
20
30
40
50
0.0
0.2
0.4
0.6
0.8
1.0
1.2

RUN 190

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.184	0.618	6047.46	5.718	0.375	3.515
0.189	0.618	6214.75	5.707	0.386	3.526
0.199	0.621	6549.33	5.736	0.406	3.497
0.199	0.629	6549.33	5.810	0.406	3.423
0.204	0.638	6716.62	5.893	0.417	3.341
0.209	0.648	6883.90	5.984	0.427	3.250
0.212	0.650	6967.55	6.001	0.432	3.232
0.217	0.662	7134.84	6.111	0.443	3.123
0.227	0.673	7469.41	6.215	0.463	3.019
0.234	0.690	7720.35	6.367	0.479	2.866
0.242	0.696	7973.28	6.426	0.495	2.807
0.247	0.713	8136.56	6.582	0.505	2.651
0.257	0.727	8473.14	6.715	0.526	2.518
0.260	0.733	8556.78	6.753	0.531	2.480
0.273	0.751	8975.01	6.938	0.557	2.295
0.280	0.766	9225.94	7.075	0.572	2.159
0.286	0.778	9476.87	7.187	0.588	2.046
0.298	0.795	9811.45	7.343	0.609	1.891
0.308	0.814	10146.02	7.514	0.630	1.719
0.313	0.827	10313.31	7.639	0.640	1.595
0.323	0.838	10647.89	7.742	0.661	1.492
0.336	0.854	11066.11	7.887	0.687	1.347
0.346	0.868	11400.68	8.014	0.707	1.219
0.351	0.876	11567.97	8.115	0.716	1.119
0.359	0.890	11818.90	8.214	0.733	1.020
0.374	0.906	12326.77	8.367	0.764	0.867
0.387	0.918	12738.99	8.479	0.790	0.754
0.402	0.931	13240.85	8.595	0.822	0.639
0.407	0.941	13408.14	8.692	0.832	0.541
0.422	0.952	13910.00	8.781	0.863	0.452
0.430	0.963	14160.94	8.889	0.879	0.344
0.440	0.969	14495.51	8.957	0.899	0.282
0.455	0.977	14997.38	9.021	0.931	0.218
0.468	0.982	15418.60	9.064	0.957	0.169
0.481	0.987	15833.82	9.114	0.982	0.119
0.494	0.992	16252.04	9.163	1.008	0.072
0.509	0.995	16753.90	9.188	1.040	0.045
0.516	0.997	17004.83	9.210	1.055	0.023
0.534	0.999	17590.34	9.228	1.091	0.005

RUN 189

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.186	0.490	4463.84	6.353	0.316	6.621
0.194	0.492	4644.54	6.379	0.329	6.595
0.199	0.501	4768.33	6.498	0.337	6.476
0.207	0.518	4951.03	6.721	0.350	6.253
0.217	0.527	5194.62	6.836	0.368	6.138
0.222	0.544	5316.42	7.057	0.376	5.937
0.232	0.557	5560.01	7.232	0.393	5.741
0.237	0.563	5681.81	7.301	0.402	5.672
0.242	0.577	5803.60	7.485	0.411	5.489
0.250	0.593	5986.30	7.690	0.424	5.284
0.260	0.602	6229.89	7.811	0.441	5.163
0.267	0.611	6412.59	7.922	0.454	5.051
0.278	0.627	6656.18	8.133	0.471	4.842
0.288	0.647	6895.77	8.397	0.488	4.576
0.298	0.660	7143.37	8.563	0.506	4.413
0.311	0.684	7447.86	8.880	0.527	4.094
0.318	0.706	7630.55	9.133	0.540	3.842
0.326	0.717	7813.25	9.306	0.553	3.668
0.331	0.723	7935.04	9.385	0.562	3.588
0.346	0.750	8300.43	9.735	0.587	3.238
0.359	0.781	8604.92	10.130	0.609	2.844
0.367	0.793	8787.62	10.292	0.622	2.682
0.379	0.804	9092.11	10.435	0.643	2.539
0.392	0.828	9396.60	10.745	0.665	2.229
0.415	0.857	9944.68	11.119	0.704	1.855
0.425	0.866	10188.28	11.237	0.721	1.737
0.430	0.877	10310.07	11.381	0.730	1.593
0.440	0.889	10553.67	11.538	0.747	1.436
0.453	0.904	10858.16	11.725	0.768	1.249
0.463	0.913	11101.75	11.823	0.786	1.151
0.478	0.925	11467.14	12.004	0.811	0.970
0.488	0.941	11710.73	12.204	0.829	0.770
0.499	0.947	11954.33	12.287	0.846	0.688
0.506	0.955	12137.02	12.367	0.859	0.587
0.524	0.967	12563.32	12.543	0.889	0.433
0.539	0.972	12926.70	12.615	0.915	0.358
0.562	0.982	13476.76	12.745	0.954	0.229
0.575	0.986	13781.28	12.795	0.975	0.179
0.586	0.990	14085.77	12.842	0.997	0.130
0.603	0.993	14451.16	12.876	1.023	0.095
0.621	0.995	14877.45	12.907	1.053	0.066
0.632	0.998	15321.04	12.918	1.070	0.040
0.651	0.999	15608.22	12.955	1.105	0.018
0.669	0.999	16034.51	12.963	1.135	0.011

RUN 162

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.185	0.435	3803.14	6.682	0.275	8.688
0.191	0.439	3854.32	6.643	0.278	8.927
0.196	0.425	3956.69	6.527	0.286	8.043
0.201	0.431	4059.07	6.630	0.293	8.740
0.212	0.456	4263.81	7.007	0.308	8.363
0.218	0.454	4417.37	6.982	0.319	8.388
0.224	0.462	4539.74	7.101	0.327	8.269
0.232	0.477	4673.30	7.339	0.338	8.031
0.242	0.478	4878.05	7.345	0.352	8.025
0.250	0.489	5031.61	7.511	0.364	7.859
0.257	0.508	5185.16	7.802	0.375	7.568
0.263	0.524	5287.54	8.059	0.382	7.311
0.273	0.541	5492.28	8.320	0.397	7.050
0.283	0.549	5697.03	8.439	0.412	6.931
0.293	0.573	5901.77	8.777	0.426	6.593
0.308	0.592	6208.89	9.106	0.449	6.264
0.321	0.618	6464.82	9.501	0.467	5.869
0.336	0.636	6771.94	9.781	0.489	5.589
0.354	0.668	7130.24	10.261	0.515	5.109
0.369	0.703	7437.36	10.801	0.537	4.569
0.384	0.731	7744.48	10.921	0.560	4.448
0.402	0.740	8102.78	11.372	0.585	3.998
0.415	0.760	8358.71	11.683	0.604	3.686
0.427	0.778	8614.64	11.954	0.622	3.416
0.438	0.794	8819.39	12.201	0.637	3.169
0.450	0.811	9075.32	12.460	0.656	2.909
0.466	0.833	9382.43	12.798	0.678	2.572
0.483	0.851	9740.74	13.078	0.704	2.292
0.494	0.865	9945.48	13.296	0.719	2.074
0.509	0.882	10252.60	13.554	0.741	1.816
0.532	0.905	10733.28	13.913	0.774	1.457
0.549	0.920	11071.58	14.144	0.800	1.226
0.567	0.935	11429.88	14.373	0.826	0.997
0.585	0.945	11788.19	14.520	0.852	0.850
0.602	0.958	12197.68	14.725	0.881	0.645
0.633	0.973	12760.72	14.929	0.922	0.441
0.664	0.982	13374.96	15.098	0.966	0.274
0.694	0.990	13989.19	15.209	1.011	0.161
0.722	0.994	14552.24	15.280	1.051	0.089
0.745	0.997	15012.92	15.316	1.085	0.054
0.765	0.998	15422.43	15.345	1.114	0.025

RUN 160

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.191	0.332	2565.99	7.396	0.239	14.892
0.199	0.328	2668.22	7.301	0.248	14.989
0.199	0.315	2668.22	7.018	0.248	15.272
0.204	0.345	2736.37	7.685	0.255	14.605
0.217	0.344	2906.75	7.671	0.271	14.619
0.224	0.360	3008.98	8.028	0.280	14.263
0.229	0.364	3077.14	8.103	0.287	14.187
0.240	0.345	3213.45	7.697	0.299	14.593
0.247	0.387	3315.68	8.619	0.309	13.671
0.255	0.389	3417.91	8.680	0.318	13.610
0.270	0.416	3622.37	9.277	0.337	13.013
0.283	0.425	3792.75	9.474	0.353	12.817
0.295	0.459	3963.14	10.225	0.369	12.065
0.303	0.457	4065.37	10.177	0.378	12.113
0.316	0.487	4235.75	10.863	0.394	11.427
0.326	0.501	4372.06	11.172	0.407	11.118
0.339	0.517	4542.44	11.525	0.423	10.765
0.351	0.543	4712.83	12.099	0.439	10.191
0.369	0.569	4951.36	12.678	0.461	9.612
0.385	0.590	5223.98	13.150	0.486	9.140
0.407	0.633	5462.52	14.071	0.509	8.219
0.430	0.665	5769.21	14.813	0.537	7.478
0.445	0.701	5973.67	15.616	0.556	6.674
0.466	0.705	6246.28	15.715	0.582	6.575
0.481	0.727	6450.74	16.203	0.602	6.088
0.494	0.749	6621.13	16.691	0.617	5.599
0.509	0.766	6825.59	17.073	0.636	5.217
0.524	0.799	7030.05	17.799	0.655	4.491
0.544	0.819	7302.67	18.253	0.680	4.037
0.562	0.841	7541.20	18.735	0.702	3.555
0.582	0.858	7813.82	19.133	0.728	3.157
0.608	0.882	8154.98	19.628	0.759	2.662
0.626	0.894	8393.12	19.930	0.782	2.360
0.643	0.900	8631.66	20.052	0.804	2.238
0.659	0.918	8836.12	20.453	0.823	1.837
0.689	0.937	9245.05	20.884	0.861	1.406
0.706	0.946	9449.51	21.091	0.881	1.199
0.722	0.957	9681.04	21.331	0.902	0.959
0.740	0.966	9926.58	21.525	0.924	0.765
0.758	0.972	10165.12	21.654	0.947	0.634
0.778	0.977	10437.73	21.779	0.972	0.511
0.793	0.982	10642.20	21.893	0.991	0.397
0.813	0.985	10880.73	21.954	1.013	0.337
0.829	0.990	11119.27	22.057	1.035	0.233
0.844	0.992	11323.73	22.123	1.054	0.167
0.864	0.995	11596.35	22.178	1.080	0.112
0.890	0.997	11937.11	22.228	1.112	0.062
0.905	0.998	12141.56	22.255	1.131	0.035
0.928	0.999	12448.67	22.278	1.159	0.020

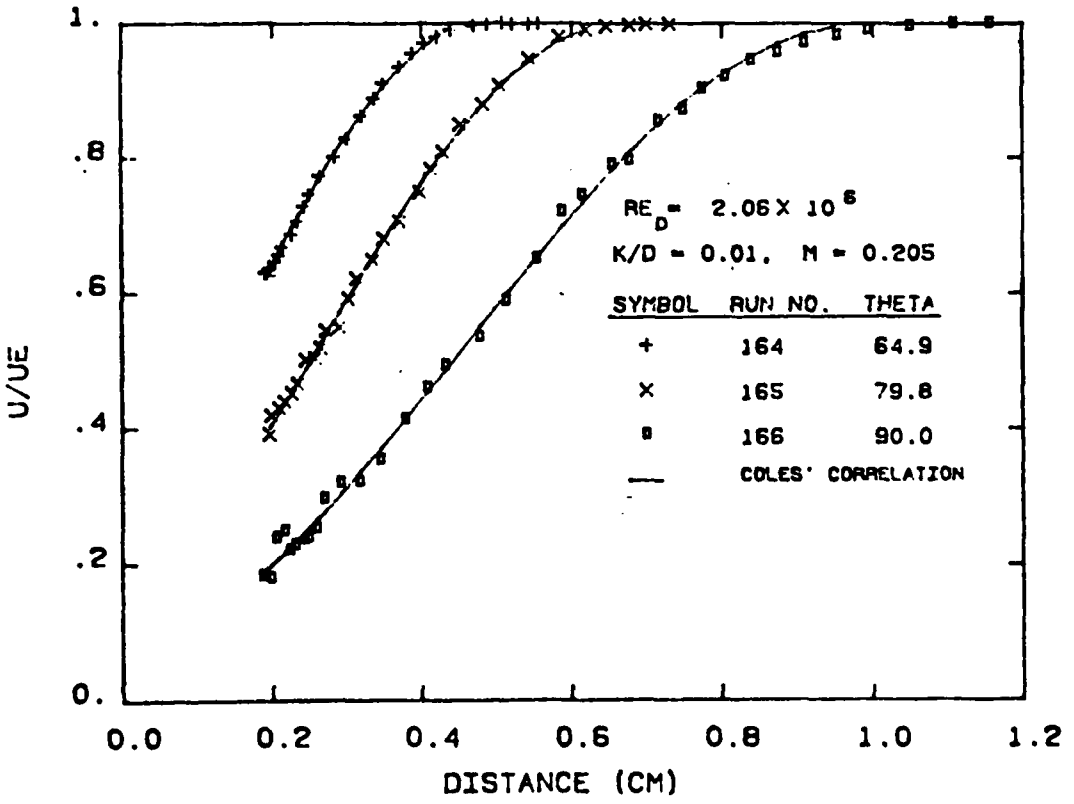
RUN 163

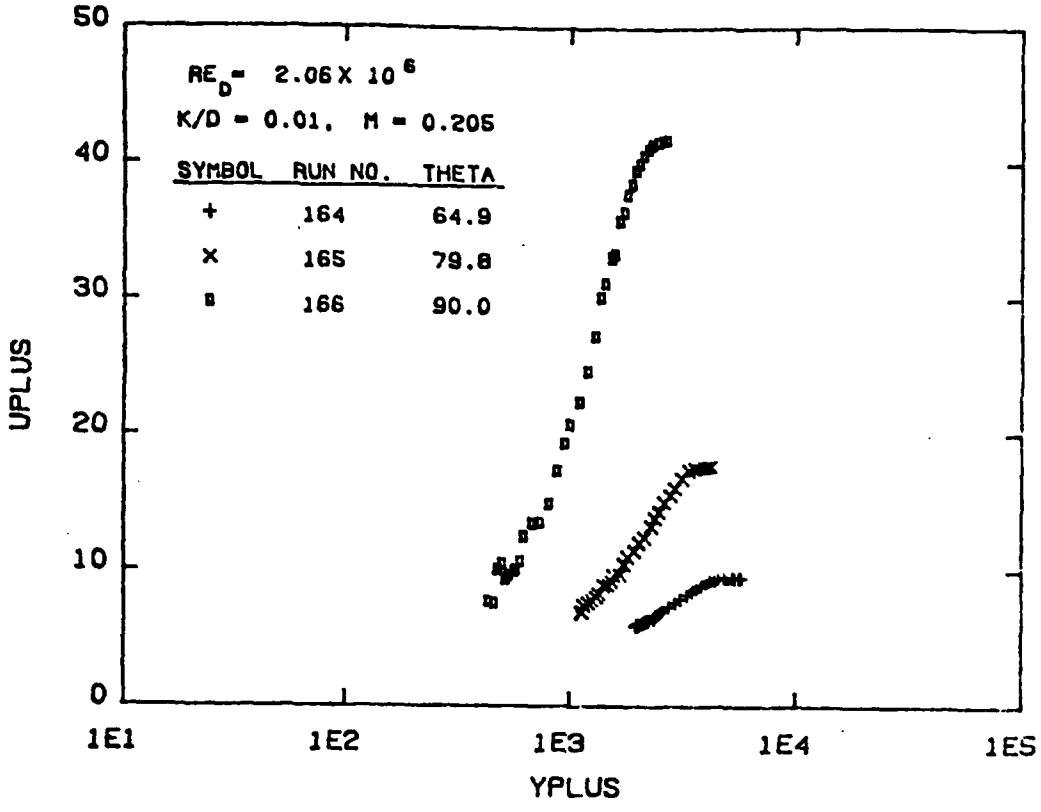
Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.189	0.263	1912.64	7.723	0.177	21.878
0.195	0.242	2035.61	7.117	0.186	22.283
0.204	0.263	2067.10	7.735	0.191	21.666
0.214	0.245	2170.07	7.316	0.200	22.064
0.219	0.273	2221.55	8.031	0.205	21.370
0.224	0.223	2273.04	6.556	0.210	22.846
0.234	0.236	2376.00	6.949	0.219	22.452
0.245	0.283	2478.97	8.311	0.229	21.089
0.250	0.246	2530.46	7.291	0.234	22.109
0.267	0.323	2710.65	9.464	0.250	19.937
0.273	0.274	2762.14	8.057	0.255	21.344
0.283	0.292	2966.08	8.593	0.274	20.808
0.306	0.346	3096.79	10.167	0.286	19.233
0.323	0.347	3276.98	10.223	0.302	19.185
0.341	0.369	3457.16	11.437	0.319	17.963
0.361	0.382	3663.33	11.217	0.338	18.163
0.382	0.423	3869.05	12.375	0.357	17.026
0.415	0.452	4203.70	13.275	0.388	16.125
0.445	0.518	4512.63	15.223	0.416	14.268
0.478	0.539	4847.26	15.853	0.447	13.550
0.504	0.573	5104.66	16.841	0.473	12.960
0.537	0.608	5439.33	17.870	0.502	11.931
0.570	0.630	5773.97	18.495	0.533	10.711
0.600	0.682	6082.88	20.064	0.563	9.327
0.633	0.733	6417.53	20.548	0.592	8.413
0.665	0.750	6777.92	22.058	0.625	7.343
0.702	0.778	7112.57	22.873	0.656	6.526
0.735	0.838	7447.22	24.644	0.687	5.357
0.780	0.853	7907.58	25.024	0.730	4.277
0.824	0.887	8348.19	26.093	0.770	3.310
0.872	0.926	8837.30	27.232	0.816	2.369
0.918	0.946	9300.66	27.827	0.858	1.874
0.953	0.960	9663.05	28.232	0.892	1.569
1.024	0.985	10383.85	28.928	0.958	0.472
1.073	0.992	10870.52	29.142	1.003	0.259
1.123	0.998	11385.77	29.280	1.051	0.120
1.176	0.999	11902.10	29.376	1.100	0.025

RUN 161

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.417	0.160	651.99	25.587	0.212	155.875
0.478	0.185	747.23	30.565	0.242	154.096
0.516	0.225	806.76	41.810	0.262	143.653
0.552	0.215	862.31	40.658	0.280	144.804
0.586	0.213	917.87	39.567	0.298	145.895
0.626	0.240	977.39	44.516	0.317	140.946
0.674	0.307	1052.78	56.917	0.342	128.545
0.740	0.314	1155.97	58.151	0.375	127.310
0.788	0.356	1231.37	65.655	0.400	119.806
0.845	0.413	1320.61	76.572	0.430	108.890
0.897	0.439	1402.00	81.325	0.455	104.137
0.976	0.502	1525.02	93.032	0.495	92.449
1.040	0.557	1624.23	103.232	0.527	82.230
1.106	0.620	1727.41	115.073	0.561	70.385
1.207	0.696	1885.14	129.103	0.612	56.359
1.294	0.759	2021.06	140.737	0.656	44.724
1.432	0.834	2235.35	154.740	0.725	30.723
1.560	0.899	2437.73	166.782	0.791	18.679
1.695	0.945	2652.02	175.310	0.861	10.152
1.794	0.966	2802.82	178.162	0.909	6.300
1.858	0.985	2901.52	182.270	0.962	3.192
1.972	0.985	3080.60	183.455	1.000	2.000
2.068	0.994	3231.35	184.436	1.049	1.026
2.167	0.997	3386.16	184.875	1.099	0.583
2.305	0.998	3600.45	185.136	1.168	0.326
2.386	0.999	3727.43	185.320	1.209	0.141
2.478	1.000	3858.39	185.438	1.252	0.024

PHI	6.498E+01	7.986E+01	8.390E+01
RUN	164	165	166
RE	2.071E+06	2.092E+06	2.084E+06
M	2.036E-01	2.042E-01	2.053E-01
K/D	1.000E-02	1.000E-02	1.000E-02
UI	7.047E+01	7.086E+01	7.115E+01
UE	1.074E+02	1.105E+02	1.055E+02
NU	1.080E-05	1.070E-05	1.080E-05
RESID	4.600E-03	8.300E-03	1.460E-02
YMIN	1.913E-01	1.963E-01	1.887E-01
YMAX	3.513E-01	5.062E-01	7.755E-01
PI	5.070E-01	2.006E+00	6.720E+00
DU*	1.853E+01	1.710E+01	1.488E+01
K+	3.300E+03	1.840E+03	7.400E+02
DELTA	4.505E-01	6.447E-01	9.796E-01
CF	5.080E-02	1.540E-02	2.500E-03
U*	1.123E+01	6.227E+00	2.527E+00
DEL*	7.490E-02	1.660E-01	3.484E-01
THETA	5.250E-02	8.910E-02	1.399E-01
H	1.427E+00	1.863E+00	2.491E+00
RTHETA	5.240E+03	9.190E+03	1.370E+04
BETA	-1.018E-01	5.954E-01	9.906E+00

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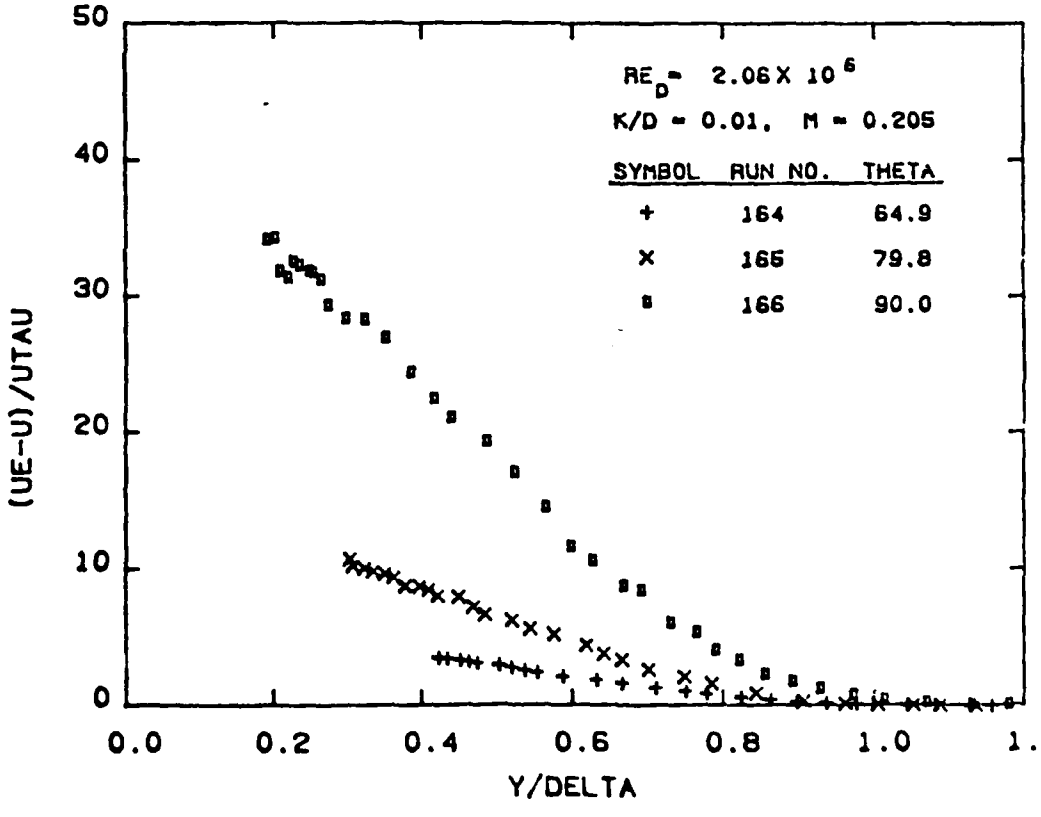
K/D = 0.01, M = 0.205
SYMBOL RUN NO. THETA
+ 164 64.9
× 165 79.8
▫ 166 90.0
UPLUS
YPLUS
0
10
20
30
40
50
1E1
1E2
1E3
1E4
1ES


RE$_D$= 2.06 X 10^6
K/D = 0.01, M = 0.205
SYMBOL RUN NO. THETA
+ 164 64.9
× 165 79.8
▫ 166 90.0
(UE-U)/UTAU
Y/DELTA
0
10
20
30
40
50
0.0
0.2
0.4
0.6
0.8
1.0
1.2

RUN 164

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.191	0.631	1989.21	6.035	0.425	3.529
0.196	0.636	2042.05	6.085	0.436	3.479
0.204	0.647	2121.30	6.190	0.453	3.374
0.209	0.658	2174.13	6.292	0.464	3.272
0.214	0.669	2226.97	6.403	0.475	3.162
0.227	0.688	2359.05	6.579	0.503	2.985
0.234	0.707	2438.31	6.760	0.520	2.804
0.242	0.730	2517.56	6.981	0.537	2.584
0.250	0.747	2596.81	7.146	0.554	2.418
0.265	0.775	2755.31	7.412	0.588	2.153
0.285	0.803	2966.65	7.682	0.633	1.882
0.300	0.830	3125.15	7.934	0.667	1.630
0.321	0.864	3336.49	8.261	0.712	1.303
0.339	0.890	3521.41	8.508	0.752	1.057
0.351	0.912	3653.50	8.720	0.780	0.844
0.372	0.937	3864.83	8.958	0.825	0.606
0.389	0.956	4049.75	9.146	0.864	0.418
0.405	0.972	4208.26	9.292	0.898	0.272
0.422	0.980	4393.18	9.375	0.938	0.189
0.440	0.991	4578.10	9.478	0.977	0.086
0.471	0.998	4895.10	9.547	1.045	0.017
0.488	1.000	5080.02	9.561	1.084	0.004

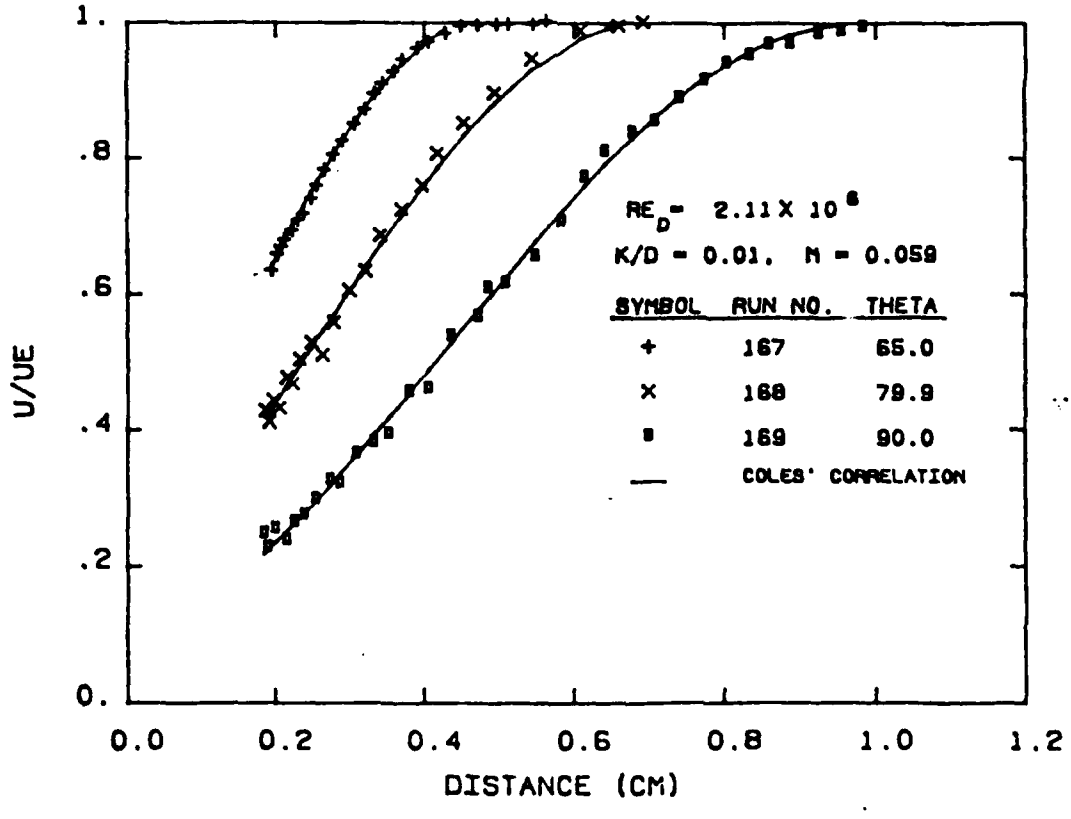
RUN 165

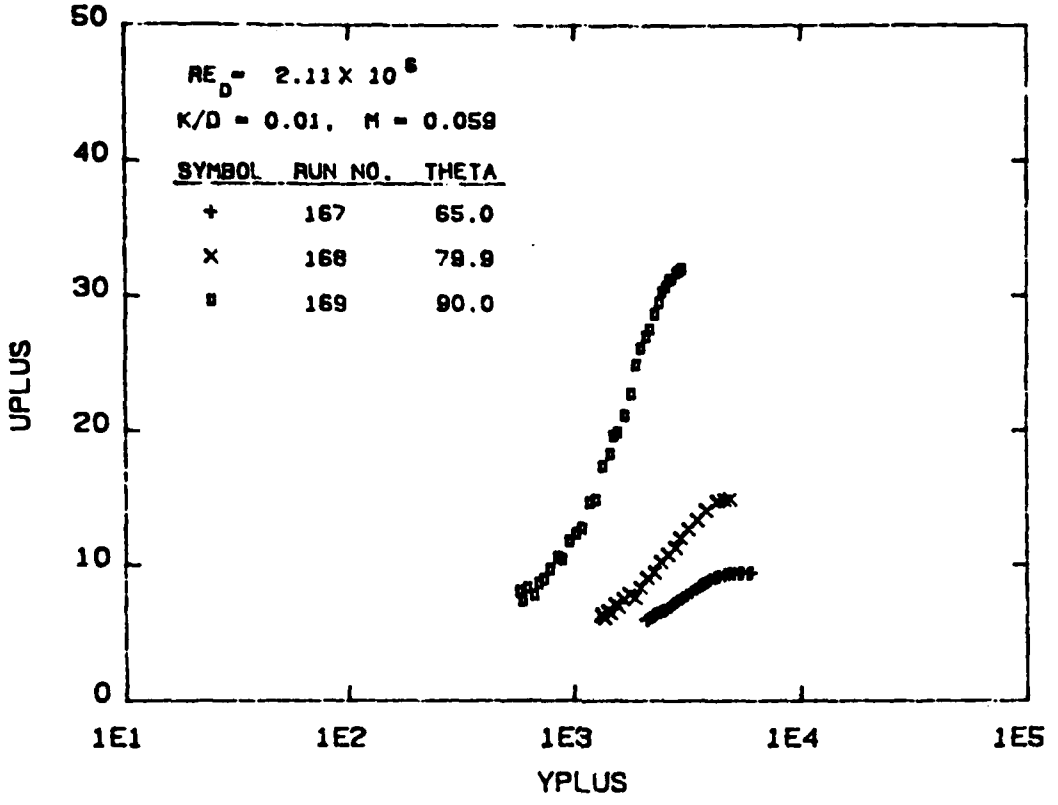
Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.196	0.393	1142.55	6.976	0.305	10.773
0.199	0.421	1157.33	7.465	0.308	10.284
0.209	0.432	1216.45	7.663	0.324	10.086
0.217	0.441	1260.79	7.835	0.336	9.914
0.227	0.454	1319.91	8.060	0.352	9.688
0.234	0.468	1364.26	8.305	0.364	9.443
0.245	0.503	1423.38	8.922	0.379	8.826
0.257	0.506	1497.28	8.976	0.399	8.772
0.265	0.521	1541.62	9.244	0.411	8.505
0.273	0.546	1585.97	9.690	0.423	8.059
0.290	0.551	1689.43	9.778	0.450	7.971
0.303	0.593	1763.33	10.527	0.470	7.222
0.313	0.623	1822.46	11.059	0.486	6.690
0.336	0.650	1955.48	11.533	0.521	6.216
0.351	0.681	2044.17	12.096	0.545	5.653
0.372	0.707	2162.41	12.540	0.576	5.208
0.400	0.750	2325.00	13.306	0.620	4.443
0.415	0.785	2413.68	13.930	0.643	3.818
0.430	0.811	2502.37	14.389	0.667	3.360
0.453	0.851	2635.39	15.108	0.702	2.641
0.483	0.880	2812.76	15.626	0.750	2.123
0.506	0.909	2945.79	16.136	0.785	1.612
0.544	0.949	3167.50	16.840	0.844	0.909
0.585	0.982	3403.99	17.421	0.907	0.328
0.621	0.992	3610.92	17.606	0.962	0.143
0.648	0.997	3773.50	17.695	1.006	0.054
0.679	0.999	3950.87	17.729	1.053	0.020

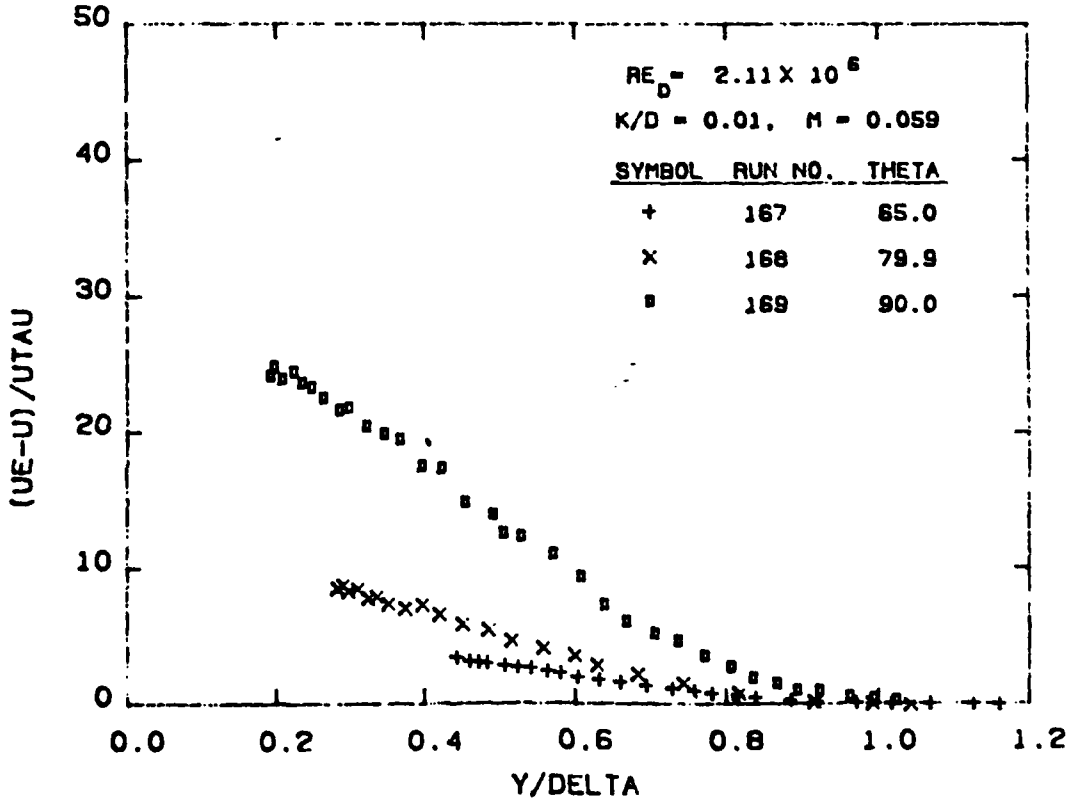
RUN 166

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.189	0.183	441.54	7.640	0.193	34.124
0.199	0.180	465.31	7.538	0.203	34.226
0.207	0.240	483.14	10.008	0.211	31.756
0.217	0.250	506.91	10.423	0.221	31.341
0.224	0.222	524.74	9.254	0.229	32.510
0.232	0.229	542.56	9.553	0.237	32.211
0.245	0.237	572.28	9.906	0.250	31.858
0.250	0.240	584.16	10.021	0.255	31.743
0.260	0.254	607.93	10.592	0.265	31.172
0.270	0.298	631.70	12.445	0.276	29.318
0.293	0.321	685.19	13.416	0.299	28.348
0.318	0.323	744.62	13.491	0.325	28.273
0.346	0.355	809.98	14.842	0.353	26.922
0.379	0.415	887.24	17.316	0.387	24.448
0.410	0.462	958.55	19.303	0.418	22.461
0.433	0.495	1012.03	20.670	0.442	21.094
0.478	0.536	1119.00	22.396	0.488	19.368
0.514	0.590	1202.20	24.646	0.525	17.118
0.554	0.652	1297.28	27.234	0.566	14.530
0.588	0.721	1374.54	30.123	0.600	11.641
0.615	0.746	1439.91	31.158	0.628	10.606
0.656	0.791	1534.99	33.038	0.670	8.726
0.679	0.798	1588.47	33.325	0.693	8.439
0.717	0.856	1677.61	35.755	0.732	6.009
0.750	0.873	1754.87	36.440	0.766	5.324
0.775	0.904	1814.29	37.737	0.792	4.027
0.806	0.922	1885.61	38.509	0.823	3.255
0.839	0.946	1962.86	39.516	0.856	2.248
0.875	0.958	2046.06	40.016	0.893	1.748
0.910	0.972	2129.25	40.598	0.929	1.165
0.953	0.983	2230.28	41.061	0.973	0.703
0.994	0.991	2325.36	41.388	1.015	0.376
1.050	0.996	2456.10	41.609	1.072	0.155
1.108	0.999	2592.78	41.736	1.131	0.028

PHI	6.500E+01	7.999E+01	9.005E+01
RUN	167	168	169
RE	2.081E+06	2.125E+06	2.102E+06
M	5.990E-02	6.040E-02	5.940E-02
K/D	1.000E-02	1.000E-02	1.000E-02
UI	2.078E+01	2.077E+01	2.042E+01
UE	3.207E+01	3.257E+01	3.038E+01
NU	3.160E-06	3.090E-06	3.070E-06
RESID	6.200E-03	1.450E-02	1.400E-02
YMIN	1.836E-01	1.887E-01	1.862E-01
YMAX	3.716E-01	4.961E-01	7.424E-01
PI	4.888E-01	1.407E+00	4.744E+00
DU*	1.861E+01	1.758E+01	1.556E+01
K+	3.400E+03	2.240E+03	9.750E+02
DELTA	4.428E-01	6.658E-01	9.610E-01
CF	5.350E-02	2.210E-02	4.300E-03
U*	3.399E+00	2.185E+00	9.470E-01
DEL*	7.460E-02	1.611E-01	3.241E-01
THETA	5.230E-02	9.000E-02	1.401E-01
H	1.428E+00	1.790E+00	2.313E+00
RTHETA	5.300E+03	9.470E+03	1.390E+04
BETA	-9.601E-02	4.078E-01	6.198E+00




RE$_D$= 2.11 X 10^6
K/D = 0.01, M = 0.059
SYMBOL RUN NO. THETA
+ 167 65.0
X 168 79.9
▪ 169 90.0
UPLUS
YPLUS
50
40
30
20
10
0
1E1
1E2
1E3
1E4
1E5


RE$_D$= 2.11 X 10^6
K/D = 0.01, M = 0.059
SYMBOL RUN NO. THETA
+ 167 65.0
X 168 79.9
▪ 169 90.0
(UE-U)/UTAU
Y/DELTA
50
40
30
20
10
0
0.0
0.2
0.4
0.6
0.8
1.0
1.2

RUN 167

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.184	0.631	1975.55	5.950	0.415	3.484
0.196	0.637	2112.17	6.008	0.443	3.426
0.204	0.660	2194.14	6.228	0.461	3.205
0.209	0.672	2248.79	6.340	0.472	3.093
0.214	0.682	2303.44	6.433	0.484	3.001
0.224	0.695	2412.73	6.560	0.507	2.873
0.232	0.711	2494.71	6.705	0.524	2.729
0.240	0.720	2576.68	6.790	0.541	2.644
0.250	0.742	2685.98	7.003	0.564	2.431
0.257	0.761	2767.95	7.182	0.581	2.251
0.267	0.784	2877.25	7.399	0.604	2.035
0.280	0.807	3013.87	7.617	0.633	1.817
0.293	0.827	3150.49	7.803	0.661	1.630
0.308	0.852	3314.44	8.037	0.696	1.396
0.323	0.873	3478.38	8.240	0.730	1.194
0.336	0.897	3615.00	8.464	0.759	0.970
0.346	0.912	3724.30	8.602	0.782	0.831
0.361	0.929	3888.25	8.766	0.816	0.668
0.372	0.947	3997.54	8.931	0.839	0.502
0.392	0.965	4216.14	9.101	0.885	0.332
0.407	0.974	4380.08	9.188	0.920	0.245
0.430	0.986	4626.00	9.306	0.971	0.128
0.450	0.997	4844.60	9.405	1.017	0.028
0.473	0.998	5090.52	9.413	1.069	0.021
0.499	1.000	5363.76	9.429	1.126	0.005
0.547	1.000	5882.92	9.431	1.235	0.003

RUN 168

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.189	0.429	1334.55	6.398	0.283	8.506
0.194	0.413	1370.47	6.159	0.291	8.746
0.199	0.445	1406.40	6.626	0.299	8.279
0.207	0.433	1460.28	6.461	0.310	8.444
0.217	0.479	1532.13	7.141	0.325	7.764
0.224	0.470	1586.01	7.000	0.337	7.905
0.234	0.506	1657.86	7.535	0.352	7.370
0.250	0.530	1765.63	7.904	0.375	7.001
0.265	0.512	1873.40	7.633	0.398	7.272
0.280	0.561	1981.17	8.358	0.421	6.547
0.300	0.607	2124.86	9.042	0.451	5.862
0.323	0.635	2286.52	9.465	0.486	5.440
0.344	0.688	2430.21	10.255	0.516	4.650
0.372	0.725	2627.79	10.810	0.558	4.095
0.400	0.761	2825.37	11.343	0.600	3.562
0.420	0.808	2969.06	12.044	0.631	2.861
0.455	0.853	3220.53	12.710	0.684	2.195
0.496	0.898	3507.91	13.378	0.745	1.527
0.544	0.948	3849.18	14.124	0.818	0.781
0.610	0.990	4316.19	14.752	0.917	0.152
0.661	0.998	4675.42	14.874	0.993	0.030

RUN 169

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.186	0.249	574.31	7.978	0.194	24.102
0.191	0.228	589.98	7.327	0.199	24.754
0.201	0.256	621.32	8.226	0.210	23.854
0.217	0.240	668.34	7.698	0.225	24.382
0.227	0.266	699.68	8.525	0.236	23.556
0.240	0.276	738.85	8.859	0.249	23.221
0.255	0.300	785.86	9.622	0.265	22.458
0.275	0.328	848.54	10.514	0.286	21.566
0.288	0.323	887.72	10.359	0.299	21.721
0.311	0.365	958.23	11.722	0.323	20.358
0.334	0.382	1028.75	12.257	0.347	19.823
0.354	0.395	1091.43	12.672	0.368	19.409
0.382	0.457	1177.62	14.651	0.397	17.430
0.407	0.462	1255.97	14.823	0.424	17.258
0.438	0.540	1349.99	17.318	0.455	14.762
0.473	0.568	1459.68	18.209	0.492	13.871
0.486	0.610	1498.86	19.573	0.506	12.507
0.509	0.618	1569.37	19.825	0.529	12.256
0.549	0.657	1694.74	21.090	0.572	10.990
0.585	0.709	1804.43	22.734	0.609	9.347
0.615	0.774	1898.45	24.834	0.640	7.247
0.643	0.812	1984.63	26.061	0.669	6.019
0.679	0.840	2094.33	26.932	0.706	5.149
0.709	0.857	2188.35	27.489	0.738	4.592
0.742	0.891	2290.20	28.584	0.773	3.497
0.775	0.917	2392.06	29.420	0.807	2.660
0.803	0.943	2478.25	30.243	0.836	1.838
0.834	0.955	2572.27	30.623	0.868	1.457
0.859	0.970	2650.62	31.123	0.894	0.958
0.887	0.971	2736.81	31.165	0.923	0.915
0.925	0.986	2854.33	31.645	0.963	0.435
0.956	0.991	2948.35	31.777	0.995	0.304
0.984	0.995	3034.54	31.928	1.024	0.153

END

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