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TITLE

DPOSBOW - A PROGRAM FOR GENERATING A BALANCE-ON-A-WAVE PROFILE FROM A BODYPLAN FOR THE GENERATION OF SHIP HULL HYDROSTATIC PRESSURE LOAD \(USER

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DREA CR/95/502

DPOSBOW — A Program for Generating a Balance-on-a-Wave Profile from a Bodyplan for the Generation of Ship Hull Hydrostatic Pressure Load (User's Manual)

by
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CONTRACTOR REPORT

Prepared for

Defence Research Establishment Atlantic

Centre de Recherches pour la Défense Atlantique

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Abstract

DPOSBOW is an interactive version of the program POSBOW which has been developed for generating a static wave profile from a ship hull bodyplan. The wave profile is produced as a file which can be accessed by the ship hull finite element modelling program SHPHUL. The wave profile data is used by SHPHUL to generate a hull pressure load in the format of the finite element program VAST.

Résumé

DPOSBOW est une version interactive du program POSBOW qui a été mise au point pour générer un profil de vague stationnaire à partir du plan transversal de la carène d'un navire. Le profil de vague est fourni sous la forme d'un fichier qui peut être utilisé par SHPHUL, un programme de modélisation par éléments finis de la carène d'un navire. La donnée de ce profil de vague permet à SHPHUL de déduire les efforts de pression sur la carène, lequels peuvent alors être utilisés par le programme éléments finis VAST.

Contents

List of Figures

1 Introduction

This report describes the program DPOSBOW which is a modified version of the program POSBOW[1]. This version of POSBOW is used to obtain a waterline for a ship hull when it is balanced on a wave in either a sagging or hogging condition. The program performs the classical static wave balance with the ship poised on a standard trochoidal wave with a length equal to the ship length. The program is interactive and will read a bodyplan file in the format required by the finite element hull modelling program SHPHUL[3] or in the form required by POSBOW.

Once the waterline is generated, it can be used to obtained hydrostatic pressures on the ship hull in a form appropriate for a finite element structural analysis by the finite element program VAST[2]. The pressures are generated through the use of the program SHPHUL and the DPOSBOW-generated file PROFL.DAT.

2 Bodyplan Files

The bodyplan file can be in one of two data formats. One is the bodyplan format as shown in Appendix A which is the format used in SHPHUL. The other is in the format shown in Appendix B and Appendix C which is the format of the original POSBOW.

2.1 Bodyplan File in SHPHUL Format

The file must be the original unmodified data consisting of a title on one line and the overall length on the second line followed by 21 stations. Less than 21 stations can be used but not more than 21. It is important that the units be identified and located on the line giving the overall length. They must be in the abbreviated form (in.,ft., mm.,or MM.,M.) and consist of a space and three characters. The first station must start at 1 as shown in the example in Appendix A. The file is identified as PREFX.DAT where PREFX is a five character name given by the user. DPOSBOW will automatically produce a bodyplan file from the data in POSBOW format as PREFX.DIN in addition to the wave profile file PROFL.DAT. An example of PROFL.DAT is shown in Appendix D.

2.2 Bodyplan File in POSBOW Format

The data file must be created in accordance with the users guide illustrated in Appendix B. The file in POSBOW format consists of a title line followed by two integers for units identification and printing options. The data must be in either feet or meters. A 1 indicates meters and a 2 indicates feet. The third line gives the overall hull form particulars of length, centre of gravity location, displacement, and draft. The remaining lines of data are the hull lines of form offsets until the last line, which indicates whether sagging or hogging is the condition applied. The

last line also defines wave height control and and phase angle. The input file name must made up of a five character prefix with .DIN as its suffix.

3 Interactive Terminal Session

The loading command for running DPOSBOW on a VAX VMS system is given in Appendix E. The additional data required for generating the waterline coordinates are entered in response to terminal prompts. This procedure is demonstrated in the following terminal sessions.

3.1 Session Using SHPHUL Format

This terminal session used a bodyplan file CPFBA.DAT in SHPHUL data format with only 20 stations. The offsets were in millimeters. The program was designed for use with Tektronix terminals or those capable of Tektronix emulation. The prompts are shown as they would appear on the terminal screen.

```
 RUN DPOSBOW

WHAT IS THE LINE SPEED?
9600

IDENTIFY TERMINAL TYPE ACCORDING TO RESOLUTION,
CURSOR AND COLOUR CAPABILITY:
ENTER 0 FOR TEKTRONIX 4006 (LOW RES/NO CURS/NO COL)
      1 FOR TEKTRONIX 4010/12/13 (LOW RES/CURSORS/NO COL)
      2 FOR TEKTRONIX 4014/4015  (HI RES/CURSORS/NO COL)
      3 FOR TEKTRONIX 41XX/42XX OR 4014/4015-EGM (COLOUR)
1

IDENTIFY TERMINAL TYPE ACCORDING TO DIALOG CAPABILITY:
ENTER 0 NO DIALOG AREA
      1 DIALOG AREA

0
```

```
CHOOSE THE BODYPLAN FILE FORMAT AVAILABLE
 0 = BODYPLAN FORMAT
 1 = POSBOW DATA FORMAT

0
```

```
ENTER THE PREFIX OF THE BODYPLAN FILE NAME
CPFBA
```

The data file is CPFBA.DAT. Only the first five characters must be entered.

SHIP NAME
CPF - OFFSETS IN MILLIMETERS TO DECK LINE

The title of the data is displayed for reference.

```
DISTANCE BETWEEN PERPENDICULARS 124500.00 mm.
 ENTER
 0 TO CONTINUE
 1 TO STOP
0
```

The length and units used are displayed for confirmation.

```
ENTER CG DISTANCE FROM BOW IN METERS
62
```

The centre of gravity must always be entered in meters or feet, depending on whether SI of FPS units are used, regardless of the units given for the length.

```
ENTER DISPLACEMENT IN LONG TONS OR TONNES
2000
```

```
ENTER DRAFT IN METERS
4
```

```
ENTER THE LOADING CONDITION
1 = SAGGING
2 = HOGGING
2
```

```
WAVE HEIGHT SELECTED=      6.695 METERS
ENTER
0 TO CONTINUE
1 TO CHANGE WAVE HEIGHT
0
```

Here the units must be in feet or meters depending on whether FPS or SI units are used.

```
UNITS FOR THE WAVE PROFILE ARE - MILLIMETERS-
DO YOU WISH TO CHANGE THEM ?
 0 = YES
 1 = NO
1
```

```
BALANCE ON A WAVE LOADING

ENTER
0 = TO CONTINUE
1 = PLOT GENERATED WAVE PROFILE FROM PROFL.DAT
```

```
1
```

```
 WAVE HEIGHT DATA IN  MILLIMETERS
ENTER 0 TO CONTINUE S TO STOP
```

```
0
```

The plot of the wave profile generated is shown in Figure 1.

```
PLOT WAVE AS A GRAPH
0 = YES
1 = NO
```

```
0
```

The wave profile is plotted as a graph in Figure 2 from the data in the file PROFL.DAT.

```
  OUTPUT FILES

PROFL.DAT = WATER LINE OFFSETS IN SHPHUL FORMAT
POSBOW.OUT = BONJEAN, PRESSURE AND WAVE DATA
CPFBA.DIN = BODYPLAN FILE CREATED IN POSBOW FORMAT
ENTER 0 TO STOP
```

```
0
```

The output files produced are listed. If the bodyplan data is in SHPHUL format then a bodyplan file in POSBOW format is also created so that the unmodified version of POSBOW can be run to obtain hull pressure data in the original form set by the program. A file POSBOW.OUT is also created as a check of the computations.

3.2 Session Using POSBOW Format

This terminal session used a bodyplan file 265ft.DIN in POSBOW format. The offsets were in feet and the condition was sagging.

```
CHOOSE THE BODYPLAN FILE FORMAT AVAILABLE
 0 = BODYPLAN FORMAT
 1 = POSBOW DATA FORMAT
```

```
0
```

```
ENTER THE PREFIX OF THE BODYPLAN FILE NAME
```

```
265FT
```

```
Name of input file ==> 265FT.DIN

Is it ready? [Y/N]
```

```
Y
```

When the data is supplied in POSBOW format the file name is displayed for confirmation.

```
Computing...Enter 0 to continue .
```

```
0
```

```
UNITS FOR THE WAVE PROFILE ARE - FEET      -
DO YOU WISH TO CHANGE THEM ?
 0 = YES
 1 = NO
```

```
1
```

In this case the units must be entered in feet.

```
BALANCE ON A WAVE LOADING

ENTER
0 = TO CONTINUE
1 = PLOT GENERATED WAVE PROFILE FROM PROFL.DAT
```

```
1
```

It is not necessary to plot the wave profile data, except for confirmation, as the PROFL.DAT file will be created in any case.

```
 WAVE HEIGHT DATA IN  FEET
ENTER 0 TO CONTINUE S TO STOP
0
```

The plot of the wave profile generated is shown in Figure 3.

```
PLOT WAVE AS A GRAPH
0 = YES
1 = NO
0
```

The wave profile is plotted as a graph in Figure 4 from the data in the file PROFL.DAT from input data in the format PREFX.DIN.

4 Concluding Remarks

The program DPOSBOW has been described and demonstrated by interactive terminal sessions. The program was shown to be capable of generating a data file of a static wave profile for a ship hull in the sagging or hogging condition for a specified wave height. The file can be used by the program SHPHUL to generate a hull pressure load, in the format of the finite element program VAST, to carry-out a structural analysis.

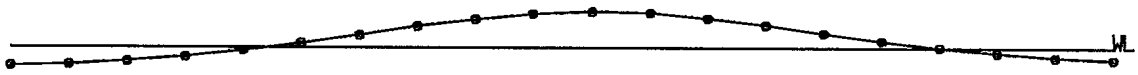

Figure 1: The Wave Profile Generated by POSBOW for the Hogging Condition

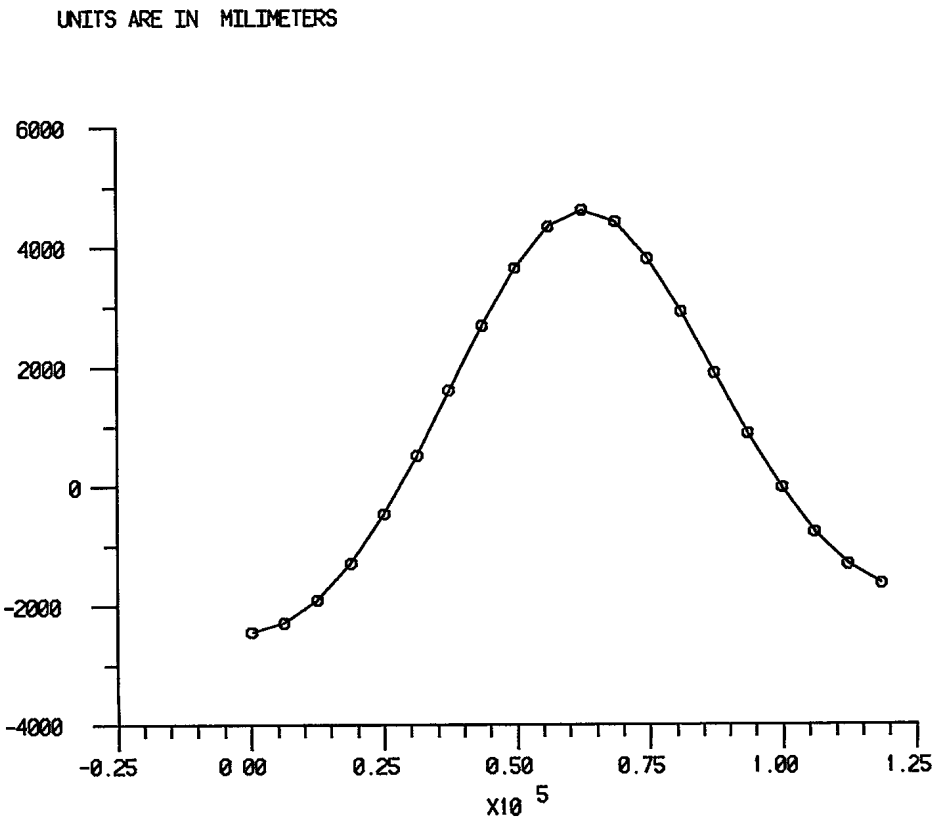

Figure 2: A Graph of the Wave Profile Plotted from PROFL.DAT

Figure 3: The Wave Profile Generated by POSBOW for the Sagging Condition

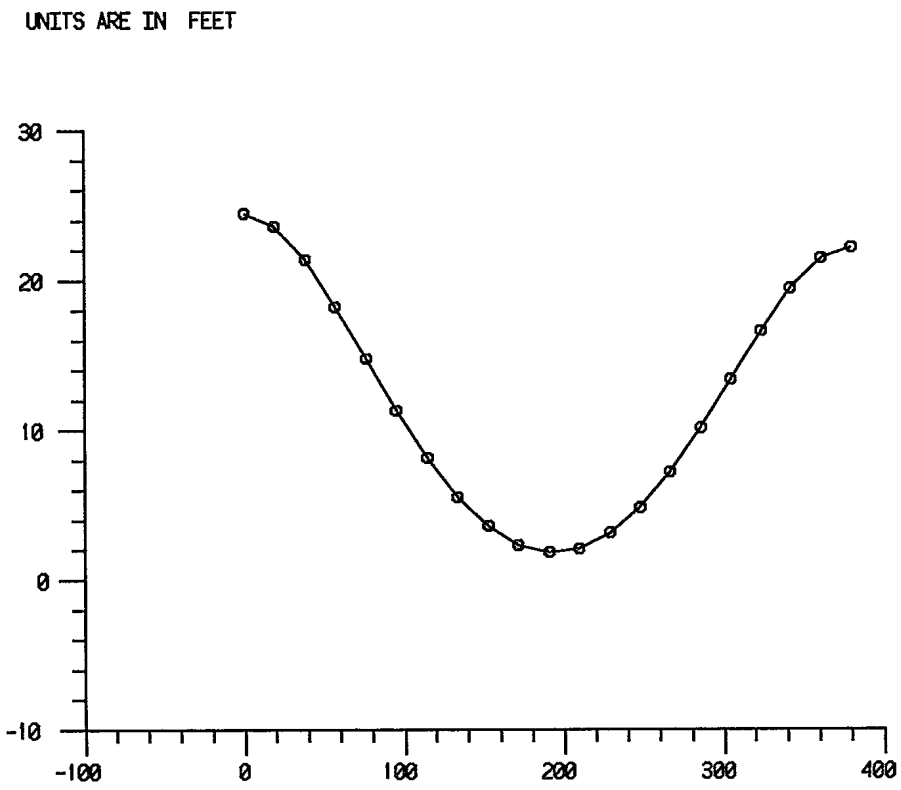

Figure 4: A Graph of the Wave Profile Plotted from PROFL.DAT with Input in the Form PREFX.DIN

A Bodyplan File In SHPHUL Format

```
This is a printout of the file CPFBA.DAT.

CPF - OFFSETS IN MILLIMETERS TO DECK LINE DEC.7 1993    Title
124500.00 mm.  Overall length F10.2 format
  1.00000 15  4   1 = station 15 = number of offsets  4 = unused number
    0.0   292.0   515.0   735.0   974.0  1151.0  1255.0  1586.0  1975.0
 2424.0  3000.0  3550.0  4250.0  4913.0  5400.0
  126.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0  6000.0  7000.0
 8000.0  9000.0 10000.0 11000.0 12015.0 12650.0
  2.00000 17  5
    0.0   200.0   721.0  1000.0  1166.0  1552.0  1930.0  2188.0  2334.0
 2774.0  3256.0  3785.0  4350.0  5100.0  5700.0  6360.0  6600.0
    0.0     0.0  1000.0  1608.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  9000.0 10000.0 11000.0 12000.0 12500.0
  3.00000 18  6
    0.0   200.0  1000.0  1160.0  1837.0  2390.0  2913.0  3239.0  3426.0
 3932.0  4437.0  4984.0  5650.0  6200.0  6300.0  6800.0  7300.0  7400.0
    0.0     0.0   800.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  9000.0  9750.0 10000.0 11000.0 12000.0 12200.0
  4.00000 18  7
    0.0   200.0  1665.0  2000.0  2588.0  3306.0  3916.0  4255.0  4446.0
 4930.0  5404.0  5926.0  6300.0  6500.0  6800.0  7029.4  7392.3  7726.0
    0.0     0.0  1000.0  1324.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  8700.0  9000.0  9400.0 10023.4 11002.3 11926.0
  5.00000 18  8
    0.0   200.0  1000.0  2268.0  3470.0  4273.0  4869.0  5167.0  5330.0
 5731.0  6137.0  6594.0  6929.0  7200.0  7300.0  7450.0  7750.0  7900.0
    0.0     0.0   303.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  8615.0  9000.0  9420.0 10000.0 11000.0 11650.0
  6.00000 18  9
    0.0   200.0  2000.0  2971.0  4373.0  5204.0  5702.0  5930.0  6057.0
 6365.0  6688.0  7047.0  7308.0  7473.0  7535.0  7724.0  7908.0  7999.0
    0.0     0.0   534.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  8503.0  8803.0  9104.0 10005.0 10982.0 11450.0
  7.00000 18 10
    0.0   200.0  2000.0  3731.0  5190.0  5979.0  6360.0  6528.0  6622.0
 6856.0  7101.0  7364.0  7554.0  7718.0  7781.0  7926.0  8125.0  8153.0
    0.0     0.0   364.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  8521.0  8822.0  9160.0 10005.0 11000.0 11264.0
  8.00000 18 11
    0.0   200.0  2000.0  4340.0  5754.0  6493.0  6812.0  6946.0  7020.0
 7208.0  7396.0  7584.0  7800.0  7820.0  7813.0  8021.0  8192.0  8200.0
    0.0     0.0   338.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
 6000.0  7000.0  8000.0  8700.0  8800.0  8972.0  9986.0 11019.0 11132.0
  9.00000 15 12
    0.0   200.0  2000.0  4724.0  6122.0  6814.0  7104.0  7210.0  7267.0
```

```
7417.0  7567.0  7717.0  7800.0  7850.0  8200.0
   0.0     0.0   338.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0  9000.0 11132.0
10.00000 15 13
   0.0   200.0  2000.0  4895.0  6348.0  6989.0  7258.0  7345.0  7389.0
7528.0  7658.0  7788.0  7850.0  7889.0  8200.0
   0.0     0.0   338.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0  9010.0 11151.0
11.00000 15 14
   0.0   200.0  2000.0  4940.0  6416.0  7043.0  7312.0  7400.0  7446.0
7569.0  7693.0  7816.0  7830.0  7850.0  8200.0
   0.0     0.0   338.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0  9000.0 11150.0
12.00000 15 15
   0.0   200.0  2000.0  4824.0  6348.0  7006.0  7300.0  7400.0  7446.0
7569.0  7693.0  7816.0  7830.0  7850.0  8191.0
   0.0     0.0   338.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0  9000.0 11151.0
13.00000 14 16
   0.0   200.0  2000.0  4433.0  6181.0  6895.0  7225.0  7335.0  7390.0
7519.0  7647.0  7776.0  7810.0  8135.0
   0.0     0.0   358.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0 11192.3
14.00000 14 17
   0.0   200.0  2000.0  3437.0  5777.0  6673.0  7060.0  7190.0  7260.0
7397.0  7533.0  7669.0  7775.0  8078.0
   0.0     0.0   647.0  1000.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8690.0 11192.3
15.00000 14 18
   0.0   200.0  1183.0  2000.0  4787.0  6183.0  6780.0  6971.0  7063.0
7221.0  7364.0  7508.0  7642.0  8000.0
   0.0     0.0  1000.0  1281.0  2000.0  3000.0  4000.0  4630.0  5000.0
6000.0  7000.0  8000.0  8690.0 11200.0
16.00000 15 19
   0.0   341.0  1000.0  2000.0  3000.0  4000.0  5000.0  6000.0  6677.0
6811.0  7012.0  7161.0  7309.0  7396.0  7800.0
 517.0  1000.0  1682.0  2075.0  2260.0  2500.0  2803.0  3494.0  4630.0
5000.0  6000.0  7000.0  8000.0  8690.0 11250.0
17.00000 15 20
   0.0  1000.0  2000.0  3000.0  4000.0  5214.7  5600.0  5892.0  6338.0
6512.0  6757.0  6911.0  7065.0  7150.0  7550.0
1880.0  2453.0  2750.0  2944.0  3152.0  3549.3  3700.0  4000.0  4630.0
5000.0  6000.0  7000.0  8000.0  8700.0 11270.0
18.00000 14 21
   0.0  1000.0  2000.0  3000.0  4246.9  4558.0  5353.0  5955.0  6177.0
6460.0  6618.0  6776.0  6900.0  7330.0
2970.0  3153.0  3318.0  3488.0  3738.2  3806.9  4116.0  4630.0  5000.0
6000.0  7000.0  8000.0  8700.0 11280.0
19.00000 13 22
```

```
   0.0  1000.0  2000.0  3000.0  4000.0  5000.0  5516.0  5807.0  6125.0
6286.0  6469.0  6507.0  6900.0
3670.0  3739.0  3811.0  3894.0  4020.0  4286.0  4630.0  5000.0  6000.0
7000.0  7995.0  8127.0 10701.9
20.00000  8 23
   0.0  3000.0  4000.0  5000.0  5550.0  5800.0  6100.0  6500.0
4080.0  4200.0  4300.0  4550.0  5200.0  6000.0  8125.0 10700.0
```

B Input for Bodyplan File in POSBOW Format

The input file in POSBOW is identified as PREFX.DIN
An example of the file PREFX.DIN is given in Appendix C

Data set 1

TITLE - Up to 64 characters identifying ship and date

Data set 2 FREE FORMAT(2 integers)

IUNIT - specifies the system of units to be used for input and output:
IUNIT = 1 SI units
IUNIT = 2 FPS units

IPR - control integer for Bonjean data printout
IPR = 0 Bonjean output supressed
IPR = 1 Bonjean output printed

Data set 3 FREE FORMAT(4 reals)

EL - Length between perpendiculars
ELCG - Longitudinal position centre of gravity from FP
TONS - Displacement of the ship
DRFT - Mean draft of the ship

Data set 4 FREE FORMAT(2 integers)

Part a: (one card)

IST - Station no. (from sta 0 to sta 20)
NPTS(IST)- Number of offsets for the ith section (less than 25)

Part b: (a total of NPTS(IST) cards for ith section)
FREE FORMAT(2 reals)

X(J) - Global X-coordinate of the jth offset point of the ith section
Y(J) - Global Y- coordinate of the jth offset point of the ith section

Data set 5 FREE FORMAT(2 integers 1 real)

LDTYP - Types of loading to be calculated
LDTYP=1 Sagging condition
LDTYP=2 Hogging condition
IWH - control integer for wave height

```
            WH=1      wave height = LBP/20
            WH=2      wave height = LBP/13.724
            WH=3      wave height = 0.6(LBP)**0.6
            WH=4      wave height = 1.1(LBP)**0.5
            WH=5      wave height = 5.0(LBP)**0.3
            WH=9      wave height = 0.6(LBP)**0.5
PHASE    -  Phase angle
```

C Bodyplan File in POSBOW Format

The file is identified by a five character prefix as 265FT.DIN.

```
 265 HULL OFFSETS
2 0  FEET
  380.00   190.00  2000.00     4.00  Length, C.G., Displacement, Draft
  0  29
     0.40      0.00
     0.90      1.20
     1.10      2.30
     1.30      3.50
     1.50      4.70
     1.70      5.90
     1.90      7.00
     2.00      8.20
     2.20      9.40
     2.40     10.60
     2.70     11.70
     2.90     12.90
     3.10     14.10
     3.40     15.20
     3.70     16.40
     4.10     17.60
     4.50     18.80
     4.90     19.90
     5.40     21.10
     5.90     22.30
     6.40     23.40
     7.00     24.60
     7.60     25.80
     8.20     27.00
     8.90     28.10
     9.60     29.30
    10.40     30.50
    11.10     31.70
    12.00     34.00
  1  28
     0.00      0.00
     1.40      1.20
     2.10      2.30
     2.70      3.50
     3.10      4.70
     3.50      5.90
     3.80      7.00
     4.20      8.20
     4.60      9.40
     4.90     10.60
```

```
    5.20     11.70
    5.60     12.90
    6.10     14.10
    6.50     15.20
    6.90     16.40
    7.40     17.60
    7.90     18.80
    8.40     19.90
    8.90     21.10
    9.50     22.30
   10.00     23.40
   10.60     24.60
   11.20     25.80
   11.80     27.00
   12.50     28.10
   13.10     29.30
   13.90     30.50
   14.70     32.80
2  27
    0.00      0.00
    2.00      1.20
    3.30      2.30
    4.30      3.50
    4.90      4.70
    5.50      5.90
    6.00      7.00
    6.50      8.20
    7.00      9.40
    7.40     10.60
    7.90     11.70
    8.40     12.90
    8.90     14.10
    9.40     15.20
    9.90     16.40
   10.40     17.60
   10.80     18.80
   11.40     19.90
   11.90     21.10
   12.40     22.30
   13.00     23.40
   13.60     24.60
   14.20     25.80
   14.80     27.00
   15.40     28.10
   15.90     29.30
   16.50     31.50
3  26
    0.00      0.00
    3.00      1.20
```

4.70	2.30
5.80	3.50
6.80	4.70
7.70	5.90
8.40	7.00
9.00	8.20
9.50	9.40
10.00	10.60
10.60	11.70
11.10	12.90
11.60	14.10
12.10	15.20
12.60	16.40
13.10	17.60
13.50	18.80
14.00	19.90
14.50	21.10
15.00	22.30
15.50	23.40
15.90	24.60
16.30	25.80
16.70	27.00
17.10	28.10
17.60	30.50
4 26	
0.00	0.00
4.10	1.20
6.20	2.30
7.60	3.50
8.70	4.70
9.80	5.90
10.60	7.00
11.40	8.20
12.00	9.40
12.60	10.60
13.20	11.70
13.70	12.90
14.20	14.10
14.70	15.20
15.20	16.40
15.60	17.60
15.90	18.80
16.30	19.90
16.60	21.10
17.00	22.30
17.30	23.40
17.50	24.60
17.80	25.80
18.10	27.00

```
   18.40     28.10
   18.70     29.50
5  25
    0.00      0.00
    4.80      1.20
    7.90      2.30
    9.70      3.50
   10.90      4.70
   11.90      5.90
   12.80      7.00
   13.70      8.20
   14.50      9.40
   15.10     10.60
   15.70     11.70
   16.10     12.90
   16.50     14.10
   17.00     15.20
   17.40     16.40
   17.70     17.60
   17.90     18.80
   18.10     19.90
   18.30     21.10
   18.50     22.30
   18.70     23.40
   18.80     24.60
   19.00     25.80
   19.20     27.00
   19.40     28.40
6  24
    0.00      0.00
    5.40      1.20
    9.20      2.30
   11.40      3.50
   12.90      4.70
   14.10      5.90
   15.10      7.00
   15.90      8.20
   16.70      9.40
   17.30     10.60
   17.80     11.70
   18.20     12.90
   18.50     14.10
   18.70     15.20
   19.00     16.40
   19.10     17.60
   19.30     18.80
   19.40     19.90
   19.60     21.10
   19.70     22.30
```

```
  19.80     23.40
  19.90     24.60
  19.90     25.80
  20.00     27.60
7  24
   0.00      0.00
   5.80      1.20
  10.20      2.30
  12.90      3.50
  14.80      4.70
  16.10      5.90
  17.10      7.00
  17.90      8.20
  18.40      9.40
  18.90     10.60
  19.30     11.70
  19.60     12.90
  19.90     14.10
  20.10     15.20
  20.10     16.40
  20.20     17.60
  20.20     18.80
  20.30     19.90
  20.40     21.10
  20.40     22.30
  20.50     23.40
  20.50     24.60
  20.60     25.80
  20.60     27.30
8  23
   0.00      0.00
   5.90      1.20
  10.70      2.30
  14.30      3.50
  16.40      4.70
  17.70      5.90
  18.70      7.00
  19.40      8.20
  19.80      9.40
  20.10     10.60
  20.30     11.70
  20.50     12.90
  20.70     14.10
  20.80     15.20
  20.80     16.40
  20.90     17.60
  20.90     18.80
  20.90     19.90
  20.80     21.10
```

```
   20.80     22.30
   20.80     23.40
   20.90     24.60
   20.90     27.00
 9  23
    0.00      0.00
    6.10      1.20
   11.00      2.30
   15.10      3.50
   17.10      4.70
   18.50      5.90
   19.40      7.00
   19.90      8.20
   20.30      9.40
   20.60     10.60
   20.80     11.70
   20.90     12.90
   20.90     14.10
   21.00     15.20
   21.00     16.40
   21.00     17.60
   21.00     18.80
   21.00     19.90
   21.00     21.10
   20.90     22.30
   20.90     23.40
   20.90     24.60
   20.90     26.60
10  23
    0.00      0.00
    6.30      1.20
   11.30      2.30
   15.30      3.50
   17.10      4.70
   18.50      5.90
   19.30      7.00
   19.80      8.20
   20.30      9.40
   20.60     10.60
   20.70     11.70
   20.90     12.90
   20.90     14.10
   21.00     15.20
   21.00     16.40
   21.00     17.60
   21.00     18.80
   21.00     19.90
   20.90     21.10
   20.90     22.30
```

```
   20.90     23.40
   20.90     24.60
   20.90     26.50
11  23
    0.00      0.00
    6.20      1.20
   11.10      2.30
   14.60      3.50
   16.50      4.70
   17.90      5.90
   19.00      7.00
   19.60      8.20
   20.10      9.40
   20.40     10.60
   20.60     11.70
   20.70     12.90
   20.80     14.10
   20.90     15.20
   21.00     16.40
   20.90     17.60
   20.90     18.80
   20.90     19.90
   20.90     21.10
   20.90     22.30
   20.90     23.40
   20.90     24.60
   20.90     26.50
12  23
    0.00      0.00
    5.60      1.20
   10.30      2.30
   13.60      3.50
   15.70      4.70
   17.30      5.90
   18.50      7.00
   19.20      8.20
   19.80      9.40
   20.10     10.60
   20.40     11.70
   20.50     12.90
   20.70     14.10
   20.80     15.20
   20.90     16.40
   20.90     17.60
   20.90     18.80
   20.90     19.90
   20.90     21.10
   20.90     22.30
   20.90     23.40
```

```
    20.90     24.60
    20.90     26.50
13  23
     0.00      0.00
     4.70      1.20
     8.80      2.30
    12.60      3.50
    14.90      4.70
    16.60      5.90
    17.80      7.00
    18.70      8.20
    19.30      9.40
    19.80     10.60
    20.10     11.70
    20.40     12.90
    20.60     14.10
    20.70     15.20
    20.80     16.40
    20.80     17.60
    20.80     18.80
    20.90     19.90
    20.90     21.10
    20.90     22.30
    20.90     23.40
    20.90     24.60
    20.90     26.50
14  23
     0.00      0.30
     3.60      1.20
     7.50      2.30
    11.00      3.50
    13.30      4.70
    15.30      5.90
    16.90      7.00
    18.00      8.20
    18.70      9.40
    19.30     10.60
    19.70     11.70
    20.00     12.90
    20.30     14.10
    20.40     15.20
    20.60     16.40
    20.70     17.60
    20.70     18.80
    20.70     19.90
    20.70     21.10
    20.70     22.30
    20.70     23.40
    20.70     24.60
```

```
   20.70     26.50
15  22
    0.00      1.30
    5.20      2.30
    7.70      3.50
   11.00      4.70
   13.50      5.90
   15.50      7.00
   16.80      8.20
   17.80      9.40
   18.50     10.60
   18.90     11.70
   19.30     12.90
   19.60     14.10
   19.90     15.20
   20.20     16.40
   20.40     17.60
   20.40     18.80
   20.40     19.90
   20.40     21.10
   20.40     22.30
   20.40     23.40
   20.40     24.60
   20.40     26.50
16  21
    0.00      3.20
    3.70      3.50
    7.70      4.70
    9.80      5.90
   12.60      7.00
   14.80      8.20
   16.20      9.40
   17.20     10.60
   17.80     11.70
   18.20     12.90
   18.60     14.10
   19.00     15.20
   19.20     16.40
   19.30     17.60
   19.40     18.80
   19.50     19.90
   19.50     21.10
   19.60     22.30
   19.60     23.40
   19.60     24.60
   19.60     26.50
17  19
    0.00      5.80
    2.70      5.90
```

```
     7.40      7.00
    11.60      8.20
    13.50      9.40
    15.10     10.60
    16.10     11.70
    16.80     12.90
    17.20     14.10
    17.60     15.20
    18.00     16.40
    18.20     17.60
    18.30     18.80
    18.40     19.90
    18.40     21.10
    18.50     22.30
    18.60     23.40
    18.60     24.60
    18.70     26.50
18  16
     0.00      8.80
     6.10      9.40
    12.00     10.60
    13.60     11.70
    14.70     12.90
    15.30     14.10
    15.80     15.20
    16.20     16.40
    16.40     17.60
    16.60     18.80
    16.70     19.90
    16.90     21.10
    17.00     22.30
    17.20     23.40
    17.30     24.60
    17.40     26.50
19  14
     0.00     10.80
    10.70     11.70
    12.00     12.90
    12.70     14.10
    13.40     15.20
    13.80     16.40
    14.10     17.60
    14.40     18.80
    14.60     19.90
    14.90     21.10
    15.10     22.30
    15.40     23.40
    15.60     24.60
    15.90     26.50
```

```
20  14
     0.00      10.70
     7.80      11.70
     9.20      12.90
     9.80      14.10
    10.40      15.20
    10.90      16.40
    11.30      17.60
    11.70      18.80
    12.00      19.90
    12.40      21.10
    12.70      22.30
    13.10      23.40
    13.50      24.60
    13.90      26.50
2   4    0.0
```

D Wave Profile Data File PROFL.DAT

```
              ***** SHIPS BALANCING *****


          WAVE HEIGHT DATA IN  MILLIMETERS
        Y                Y               Z
      SAGGING          HOGGING     DIST FROM FP  STA

      0.000         -2451.077            0.000   1
      0.000         -2293.680         6225.000   2
      0.000         -1898.940        12450.000   3
      0.000         -1279.184        18675.000   4
      0.000          -457.909        24900.000   5
      0.000           525.298        31125.000   6
      0.000          1607.657        37350.000   7
      0.000          2694.858        43575.000   8
      0.000          3657.025        49800.000   9
      0.000          4340.907        56025.000  10
      0.000          4611.848        62250.000  11
      0.000          4414.537        68475.000  12
      0.000          3804.285        74700.000  13
      0.000          2915.749        80925.000  14
      0.000          1902.177        87150.000  15
      0.000           893.448        93375.000  16
      0.000           -16.129        99600.000  17
      0.000          -763.774       105825.000  18
      0.000         -1309.900       112050.000  19
      0.000         -1631.009       118275.000  20
%- - - - - - - - - INPUT DATA - - - - - - - - - -

   INPUT FILE: CPFBA.DAT

   TITLE:  CPF - OFFSETS IN MILIMETERS TO DECK LINE DEC.7 1993 (D.R. SMITH)

 1) HULL PARAMETERS
      LENGTH                              124.50 (M)
      DRAFT                                 4.00 (M)
      DISPLACEMENT                       2000.00 (TONNES)
      LONGITUDINAL POSITON OF CG (LCG)     62.00 (M)
      NO. OF STATIONS                      20

 2) TROCHOIDAL WAVE
       WAVE LENGTH = LBP
```

E Running DPOSBOW

The loading command for DPOSBOW on a VAX VMS system is:

```
$FOR/NOOPT DPOSBOW.DRS/CHECK
$LINK POSBOW,PS_9:[SOURCE.LIB.V60]PLOTVX,PLOTV,MARLIB,PL4113,-
DREAGUI,MGRAPH,PS_9:[SOURCE.LIB.OLD]PLOT10/LIB
```

Where PS_9:[SOURCE.LIB.V60] is the directory containing the following object files.

PLOTVX,PLOTV,MARLIB,PL4113,DREAGUI,MGRAPH - are generic plotting codes compatible with Tektronix PLOT10 and GKS grapgics. The were developed by Martec Ltd. Halifax N.S.

Similarly PS_9:[SOURCE.LIB.OLD] is the directory containing the Tektronix PLOT10 plotting program.

References

[1] Ando, S.,"POSBOW-FORTRAN Program for Calculating Pressures on Ship Hulls Balanced on Standard Waves," Informal Communication, Defence Research Establishment Atlantic, November, 1983.

[2] "Vibration And Strength Analysis Program (VAST): User's Manual," Martec Ltd., Halifax, Nova Scotia, September, 1990.

[3] Smith, D.R.,"SHPHUL User's Manual (Version II)," DREA Contractor Report CR/94/443, July, 1994.

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P.O. Box 1012,
Dartmouth, N.S. B2Y 3Z7

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4. AUTHORS (Last name, first name, middle initial. If military, show rank, e.g. Doe, Maj. John E.)

D.R. Smith

5. DATE OF PUBLICATION (month and year of publication of document)

September 1995

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DPOSBOW is an interactive version of the program POSBOW which has been developed for generating a static wave profile from a ship hull bodyplan. The wave profile is produced as a file which can be accessed by the ship hull finite element modelling program SHIPHUL. The wave profile data is used by SHIPHUL to generate a hull pressure load in the format of the finite element program VAST.

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wave profile
ship
hull
bodyplan
finite elements
hull pressure

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