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FINAL TECHNICAL REPORT

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Mechanics Branch
Office of Naval Research
Room 404
800 N. Quincy St.
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Dear Pat:

As part of the joint investigation titled "Transverse Vorticity Measurements in the University of Houston Two Stream Shear Layer Facility," between J. F. Foss at Michigan State University and myself at the University of Houston, the following was accomplished at UH. As detailed in the April, 1993, progress report, all technical aspects of the project were complete at that time.

The descriptions of specific goals and results for the UH part of the study, as detailed in that report are:

1) In preparation for the acquisition of vorticity measurements, a yaw calibration facility was designed, built and installed in the UH Two Stream Shear Layer Facility. The hardware was integrated with the laboratory computer system so that probe positioning and tunnel speed control were automated to reduce time and uncertainties for the critical calibration process.

2) The tunnel wall positions were adjusted to obtain a nominal zero streamwise pressure gradient condition for the mixing layer in the first 8m of test section at the intermediate velocity conditions for the fixed velocity ratio of (2:1).

3) Detailed velocity traverses were conducted at the exit plane to document the initial conditions for the mixing layer at each of the flow

conditions.

4) Hot-wire surveys of the time mean flow field were obtained for the fixed velocity ratio to determine the evolution of momentum thickness of the mixing layer for each of the operating conditions.

4) *Software modifications* were performed to obtain the voltage time series records from the vorticity probe and other related signals.

5) With the help and guidance of John Foss and two students from Michigan State University, measurements using the vorticity probe were obtained for the mixing layer. These data were taken over the entire range of tunnel locations and flow conditions described in the original proposal.

6) The nearly 4Gbytes of data obtained in the mixing layer were transferred to digital audio tapes and copies of the tapes were delivered to Michigan State University.

Since then, I have had the opportunity to spend one month at Michigan State University working with the research group there. We were able to validate the data acquisition done at UH by comparing calibration runs obtained during data acquisition and showing that changes to the calibrations were within acceptable limits. In addition, the integral measures of the mixing layer were computed and shown to compare favorably with previous time average results. These steps are particularly important for the present experiments due to the very large amounts of data (nearly 4 Gbytes) involved. With the present validations, processing of the vorticity and velocity time series and subsequent computed measures can proceed at MSU.

I am aware of the rather unusual nature of the project and I greatly appreciate ONR's financial support.

Sincerely yours,

Stanley J. Kleis (Ph.D.)