**Computational Acoustics**
COMPUTATIONAL ACOUSTICS

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LONG TERM GOALS

Development of new, efficient, 3-dimensional, mathematical and computer models useful for solving acoustic propagation and all-direction scattering problems covering long-range, rough-bottom, and fluid/elastic interfaces in complex shallow water, as well as intermediate water depth, environments.

OBJECTIVES

For FY97, we continued to collaborative efforts with university scholars in making valuable contributions for Navy applications in the following ongoing research areas: (1) 3-dimensional coupled fluid-elastic modeling, (2) scientific technical activities involving: (a) publications, (b) delivering invited and contributed papers to international scientific conferences as a means of reporting our progress, disseminating information, and attracting more interest in the field, (c) fulfilling the role of editor-in-chief of the J. Computational Acoustics, and (3) remain current on other state-of-the-art technical developments related to our research topics that may stimulate our research topics.

APPROACH

Develop practical propagation models for solving Navy problems as the first step. Incorporate additional useful capabilities to our existing models. Create new numerical mathematical schemes along with the application of theoretical and applied mathematics required for the development of propagation models. Models are developed to handle all complex ocean environmental conditions by means of scientific computing (moderate to large-scale computations).

WORK COMPLETED
Prior to FY97, besides new numerical schemes, we had developed 2 acoustic propagation models, the IFD (a 2-dimensional model) and the FOR3D (a 3-dimensional model). The accomplishments during the past Fiscal Year include: (1) the formulation of 3D fluid-elastic interface parabolic equations, (2) the development of a 3D coupled fluid-elastic wave propagation mathematical model, (3) a numerical solution for the above mathematical model, and (4) publications.

RESULTS
Results include: (1) a set of wave equations represent a 3D coupled fluid-elastic wave propagation, (2) a convergent numerical scheme to solve the above equations, (3) 4 presentations, 3 were invited, and (4) 3 publications.

IMPACT/APPLICATIONS
A large number of fellow scientists and scholars nationwide and worldwide have been using our models for research, application, reference, and Ph.D. thesis writings. Prior to calendar year 1997, our record showed over 100 users who requested our codes for various purposes. The number of users increased, especially for the 3D (FOR3D) model.

TRANSITIONS
The FOR3D model has been placed on the World-Wide-Web for public use. National Taiwan University used the FOR3D model for real shallow water applications.

RELATED PROJECTS
This research project is related to NUWC IR Project: Fluid-elastic Interface Modeling.

REFERENCES