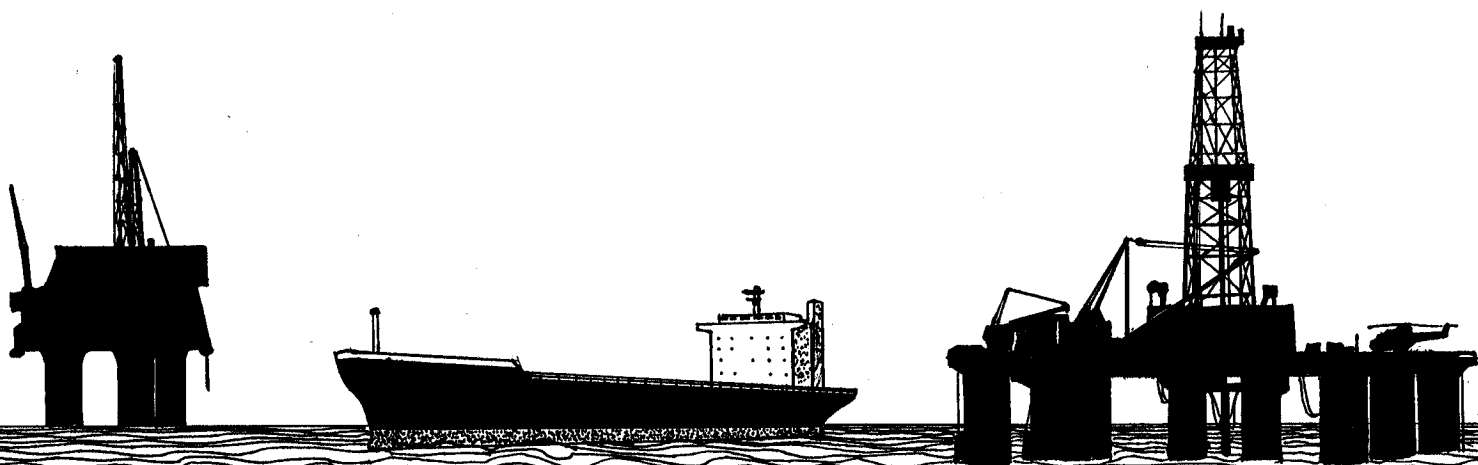# THE FIRST
INTERNATIONAL WORKSHOP
ON WATER WAVES
AND FLOATING BODIES

Massachusetts Institute of Technology

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The First International Workshop on Water Waves and Floating Bodies

S. R. Breit, Editor

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ABSTRACT

A workshop was held at MIT on 16-19 February 1986 for specialists
performing theoretical research on the interactions of water waves with
floating or submerged bodies. This report contains extended abstracts
of the papers presented, and a summary of the discussion.

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1. Introduction

The interaction of water waves with floating or submerged bodies has been an active area of fluid mechanics since the time of Lord Kelvin and J. H. Michell. Naval architects, seeking analytical methods to predict phenomena such as the wave resistance of ships, and their motions in a seaway, have worked together with applied mathematicians who are attracted to this field. During the past 20-30 years the number of workers has grown significantly, with the emergence of parallel applications in the field of offshore engineering including the analysis of wave interactions with large structures intended for oil exploration, recovery and production. Activity in the latter field has been most intense in the countries bordering the North Sea, and in the United States.

The common technical theme of ship hydrodynamics and offshore engineering is the development of analytical and computational methods for predicting the hydrodynamic interactions of surface waves with floating or submerged bodies. Potential theory is applicable in most cases, and the boundary conditions are well known, but the free-surface boundary condition is a severe complication in solving this class of problems. The use of numerical techniques and solutions has been an obvious feature in the past two decades. However, as with other branches of fluid mechanics, ever-larger computing facilities are not a panacea and continued developments must rest on a combination of numerical and analytical efforts, with appropriate guidance from experiments.

In order to provide a forum for informal discussions of fundamental theoretical research in this area, of mutual interest to engineers and scientists, an annual series of workshops has been initiated. The first of these was held at MIT on 16-19 February 1986. A total of 37 papers were selected on the basis of submitted extended abstracts, with contributions from younger workers and students as well as from established experts. To preserve an atmosphere conducive to informal discussion, attendance was limited to the authors of the accepted papers and the session chairmen.

This report contains the abstracts and a summary of the discussion, arranged in alphebetical order according to the (first) authors' name. A list of all authors names, and the titles of their talks, is given on the following two pages. A list of all participants' names and addresses is given in the final section of the report.

On behalf of all participants, we thank the U. S. National Science Foundation for financial support of the First International Workshop on Water Waves and Floating Bodies. The Second Workshop will be held from 17-20 March 1987 at the University of Bristol.

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2. List of Talks

Agnon, Y. & Mei, C. C., (MIT, USA), "Nonlinear resonance of long shelf waves by incident short waves"

Akylas, T. R. & Katsis, C. (MIT, USA), "Excitation of three-dimensional nonlinear waves by ships moving in shallow water"

Aranha, J. A. P. (Sao Paulo, Brazil), "Trapped wave and non-linear resonance in a semi-submersible"

Brandsma, F. J. (Delft, Netherlands), "The ray method for nonlinear ship waves"

Breit, S. R. (MIT, USA), "Surface-wave interaction between adjacent slender bodies"

Chan, J. L. K. & Calisal, S. M. (Vancouver, Canada), "Numerical towing tank for ship motion"

Doi, Y. (Hiroshima, Japan) & Kajitani, H. (Tokyo, Japan), "Study on characteristics of stern waves including viscous effects"

Dommermuth D. G. & Yue, D. K. (MIT, USA), "Numerical methods for nonlinear two-dimensional waves: regriding versus smoothing"

Faltinsen, O. M. (Trondheim, Norway), "Slow-drift phenomena in irregular waves"

Hearn, G. E. (Newcastle, UK), "Higher order methods of hydrodynamic analysis"

van Hooff, R. (Conoco, Houston, USA), "Dissemination of research results"

Jensen, P. S. (Lyngby, Denmark), "On the use of Rankine source potential in the ship wave problem"

Korsmeyer, F. T. (MIT, USA), "On the solution of the radiation problem in the time domain"

Lee, S. C. (Stevens Institute, USA), "A preliminary study on the hydrodynamic interaction between the wave, current and body"

Liu, Y. W. (Delaware, USA), "A simplified boundary integral method for two-dimensional floating body problem"

Marshall, K. & Evans, D. V. (Bristol, UK), "Wave problems with space-dependent boundary conditions"

Martin, J. (Edinburgh, UK), "Evolution of semi-submersible motion in waves"

Martin, P. A. (Manchester, UK), "Null-field methods for floating cylinders"

McIver, M. (University College London, UK), "Diffraction of water waves by a moored horizontal flat plate"

McIver, P. (Brunel, UK) & Evans, D. V. (Bristol, UK), "Sloshing frequencies in a rectangular tank with a baffle"

Mei, C. C., Hara, T. & Naciri, M. (MIT, USA), "Resonant scattering by periodic structures"

Molin, B. (IFP, France), "Second-order double frequency loads and motions for 3D bodies"

Nestegard, A. (A.S. Veritec, Norway) & Vinje, T. (Defense Research Establishment, Norway), "Changes in the wave elevation caused by under-water ridges"

Newman, J. N. (MIT, USA), "On the wave resistance Green function"

Papanikolaou, A. (Athens, Greece), "On the nonlinear wave forces acting on partially or fully submerged cylinders in waves"

Pousin, J., Verriere, M, & Lenoir, M. (ENSTA, France), "Study of the application of the localized finite element method for the resolution of the 2D Neumann-Kelvin problem"

Schwartz, L (Exxon, Annandale, New Jersey, USA) "The nonlinear evolution of viscous fingers -- a water-wave problem in disguise"

Sclavounos, P. D. (MIT, USA), "Recent advances in unified theory"

Stiassnie, M. (Technion, Israel), "Energy calculations based on the modified Zakharov equation"

Troesch, A. (Ann Arbor, USA) "A theoretical investigation of wall reflections"

Tuck, E. O., & Grundy, I. H. (Adelaide, Australia), "Waves generated by airflow from a stationary hovercraft"

Ursell, F. (Manchester, UK), "On the decay of wave motion in water of finite depth"

Wang, P. F. (MIT, USA), "Transient second-order diffraction by a vertical cylinder using the Weber transform"

Wehausen, J. V. (Berkeley, USA), "The radiation condition and causality"

Wu, T. Y. (Caltech, USA) "Periodic generation of solitons by steady moving bodies"

Wu, X. J. & Price, W. G. (Brunel, UK), "Appearance and dissappearance of irregular frequencies in wave-structure interaction problems"

Yue, D. K. (MIT, USA) & Kagemoto, H. (Ship Research Institute, Japan), "Wave Forces on a Platform Supported on a Large Number of Floating Legs"