

PROCEEDINGS
SYMPOSIUM ON NAVAL HYDRODYNAMICS, 1st.
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FOREWORD

There are few disciplines having the far-reaching and intimate consequences in the whole spectrum of Navy operations, vehicles, and implements as does Hydrodynamics. Moreover, it is a contemporary characteristic of the field that the basic physical and mathematical problems now recognized as the central ones are also among the very ones faced by the designer of the modern Fleet and its myriad accouterments. In recent years, we have seen a rapid exploitation of scientific and technological breakthroughs in the development of Fleet components and Naval strategic and tactical concepts. It may be fairly stated that advances in Hydrodynamics have played a significant part in the evolution of the new Navy; on the other hand, the need for intensification of research in this discipline has been emphasized by the hydrodynamical problems which must be solved if the most effective Naval system compatible with the unprecedented developments in other fields is to be provided.

A result of the increasing importance of those aspects that have been characterized here as "Naval Hydrodynamics"—to highlight their significance in Naval applications—has been a continually growing need for meetings devoted exclusively to these aspects. To meet this need, and as one of the ways of fulfilling its mission of insuring maximum contribution of basic science to Naval effectiveness, the Office of Naval Research has developed a series of symposia of which these Proceedings are the initial outcome. This first "Symposium on Naval Hydrodynamics" differed in an important way from the usual scientific meetings in that the papers were specifically intended to contain critical surveys of various aspects of Hydrodynamics rather than the results of isolated pieces of research. In recognition of the widespread scientific interest and basic nature of the meeting, the National Academy of Sciences—National Research Council joined with the Office of Naval Research in co-sponsoring the Symposium.

In addition to the motivations mentioned above, there were several other objectives for the Symposium. In order to derive the greatest possible benefits for those both in research and in design, we sought the following goals in the several contributions: firstly, critical reviews and analyses of the status of each area including the results of important recent researches; secondly, an interpretation, where appropriate, of the significance of these results for future design applications; and, finally, guidance for future research based on the authors' conclusions and opinions regarding the most fruitful directions toward which future research might be oriented. The intimate role of the foundational scientific aspects of the field in Naval and marine applications is naturally revealed in the choice of topics finally selected for presentation. Thus, invitations were issued for papers on the basic physical and mathematical aspects (turbulence, cavitation, geophysical hydrodynamics) as well as more obviously applicatory topics (ship motions, water-based aircraft research, underwater ballistics problems, etc.).

A further, most important, motivation and purpose of this meeting was to develop an awareness—among those in related disciplines—of the many scientifically rewarding and technologically important problems still extant and the new ones that seem to arise faster than the classical ones are solved. In this way, it is hoped that additional activity in classical Hydrodynamics will be stimulated in this country and, as a consequence, increase the scientific potential ultimately needed in support of Naval problems.

During the early planning stages, as the scope and objectives began emerging clearly, there sprung up a spontaneous desire on the part of his colleagues, past and present, to choose the occasion of this first Symposium on Naval Hydrodynamics to honor Captain Harold E. Saunders, USN (Ret.) for his contributions in creating a stimulating atmosphere for research in Hydrodynamics in the U. S. Navy. Capt. Saunders, through his foresight and inexhaustible energy, can be credited—perhaps more than any other man—with the existence in the U. S. Navy at the start of World War II of the facilities and environment so urgently needed for dealing with the hydrodynamic problems suddenly faced by the Fleet and which had been neglected in prior years. In spite of, or perhaps because of, his uncompromising demand for the ultimate detailed solution of the most difficult problem, he holds the respect and affection of all those who know and worked with him, whether or not they agreed with him in all matters. While Capt. Saunders has received well-deserved honors from the U. S. Navy and various institutions, it was a privilege to make the Symposium banquet the occasion of a more personal appreciation by his friends and scientific colleagues. The testimonial, delivered by RAdm. A. G. Mumma, USN, Chief of the Bureau of Ships, is reproduced as an important part of this volume.

It is our privilege to express the appreciation of the Office of Naval Research and the National Academy of Sciences to the authors, each an authority in his field, for their graciousness in accepting our invitations. Special thanks are due Prof. L. M. Milne-Thomson for his willingness to accept the difficult assignment of presenting a critique of the theoretical foundations of the field.

Finally, it is a pleasure to acknowledge the contributions of the members of the team directly responsible for the Symposium. The technical program and physical arrangements for the formal sessions were the responsibility of the ONR Mechanics Branch. The many administrative details, the banquet, and arrangements for personal comfort were kindly undertaken by the National Research Council. Special recognition is deserved by Mr. Marshall P. Tulin for his contributions toward developing and formulating the technical program, Dr. Frederick S. Sherman for undertaking the task of editing the proceedings, Cdr. Waldo S. Simons, USN, and Mr. John M. Crowley and Dr. Howard M. Berger for the physical environment and aids and the Mrs. Lucille Rittue, Yetta Hassin and Audrey Steinman for their good humored secretarial assistance throughout the trying year leading up to the meeting. All are members of the ONR Mechanics Branch. Special thanks are also extended to Mrs. Alice McIntyre and Mrs. Catherine M. Parrish of the NAS-NRC for their assistance to the Executive Secretary, NRC Physical Sciences Division.

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