

COMMENTS ON THE 6TH INTERNATIONAL SHIP STABILITY WORKSHOP

by

**Dr. Willard J. Pierson,
Guest of Honor**

The City College of the City University of New York

The opportunity to attend and participate in this workshop is very much appreciated. It was most interesting to meet some of the workers in this field whom I had known only from publications of the Society of Naval Architects and Marine Engineers such as the Transactions, Marine Technology and the Journal of Ship Research. The literature on the subject of ocean waves and on the theories of ship motions in waves is a very difficult to keep up with because it is so extensive. I was impressed by the scope of the papers that were presented, which extended from the problems associated with small fishing vessels to those of very large containerships. The ability of naval architects to use the hydrodynamic equations, other than for relatively simple motions of linear waves, for the study of water on deck and the forces exerted on ship structures when the wave equations do not apply is very impressive.

The papers for the workshop ranged from extensive theoretical investigations to practical methods for providing ship operators with information on the fundamental aspects of how changing loading conditions on their ships affected stability. The concern for the extensive losses of fishing vessels in the North Pacific and the papers that were presented on this subject covered the full range from theory, forensic analysis and how to provide the ship operators with the information that they needed for safer operation. As an aside, a one of my students is stationed at the NOAA Pacific Marine Environmental Laboratory responsible for forecasting icing conditions, fog and extreme waves for the North Pacific Ocean where these vessels operate.

The presentation of the study of a large containership and its extreme rolling motion, which was described by a new form of resonance, was a highlight of the meeting. The authors' paper, recently published in Marine Technology, and the power point presentation with a CD showing the tests of a model of the ship in a modern wave tank capable of simulating short crested waves is an indication of the tremendous progress made by naval architects in the study of ship behavior in waves and of the ability to test new ship designs using Froude scaling under realistic conditions. The present theories for ship motions in waves are linear insofar as the waves are concerned, but many nonlinear aspects of the ship motions have been treated. It is noteworthy that model tests in wave tanks include all of the effects of nonlinear waves because it is not possible to generate waves that are linear. A

fruitful area of future research, in my opinion, will be to study more carefully the data obtained under these conditions so as to determine how the measurements differ from that predicted by a linear wave theory.

Finally, I note that there are many important papers in the oceanographic literature that can help in naval architecture. A closer collaboration with oceanographers is needed.