

## PREFACE

It is my privilege to welcome you whole-heartedly at the 15th International Towing Tank Conference in The Netherlands. We highly appreciate that, after Professor Troost's successful initiative to organize the first Conference in The Hague in 1933 and after Conferences were held in Great Britain, U.S.A., Scandinavia, Italy, Spain, France, Germany and Japan, The Netherlands have been selected for the second time.

Through the years the Conference has maintained its character: an exchange of knowledge and experience between ship hydrodynamic laboratories in order to strengthen the significance of predictions for the behaviour of maritime constructions in reality.

During the 14 conferences the number of delegates increased from 23 in 1933, representing 9 countries, to about 200 delegates, representing 35 countries. This relatively small number of delegates could be obtained by maintaining the closed character of the Conference and selective criteria for acceptance as a delegate.

If we look backwards to the continuously changing and extending scope of hydrodynamic research in marine technology, a further growth of the Conference, despite the strong selective criteria for becoming a delegate, is expected. Especially in the last years an identity of marine technology and its hydrodynamic aspects became apparent. It is more than just the hull and its propulsion. The behaviour of ships in rough seas, the handling of ships in approaching harbours or travelling through ice have required our greatest attention from a viewpoint of safety and prevention of disasters. The transport, the installation and the operation of maritime constructions for offshore operations have demanded a thorough investigation of the extreme conditions at sea and their consequences for the feasibility of our maritime creations. This knowledge has contributed to a large extent to the development of terminals with mooring facilities and cargo handling in open

sea and has widened the possibilities for an exploration of the bottom of the seas and the oceans in greater and greater depths. The offshore industry is becoming the ocean engineering industry and we become aware that the time between Jules Verne's ideas and realisation is sometimes surprisingly small.

- So far this description of the present-day identity of marine technology -.

An analysis of applied hydrodynamic research clearly shows its various aspects and the interrelationship of these aspects. Usually a research project will start with observations on full scale or on a scale model. The investigator will try to formulate the observations - observe once again - then formulate sharper etc., until a description of the phenomenon can be drawn up with a high degree of accuracy, almost with a "mathematical exactness". If such a high degree of perfection is reached in describing a phenomenon, one could talk of "phenomenology". The almost "mathematical exactness" of the description in the appropriate environment of researchers almost naturally leads to a theory. A theory which in first instance indicates simple relationships between the main aspects (parameters). Next, as a rule, this simple parameter relationship will be subjected to a test. This test can be carried out with systematically varied experiments as well as with systematically varied computer calculations and will finally lead to a firm mathematical description of the parameter relationship, usually with more parameters than were known at the start.

The thus developed theories are quite suitable to reduce the number of alternatives for the design of an advanced maritime construction to one or two selected designs to be further investigated with an experiment on model scale. The phenomenology, the theory and the final experimental evaluation enable a prediction of the behaviour of the construction in reality.

In the last years, two important factors started influencing this symbiosis of phenomenology, theory and experiment.

These two factors are:

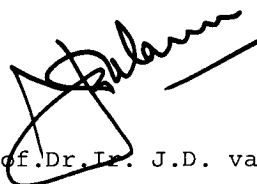
- Measuring techniques reached a quality permitting full scale measurements to be performed successfully, though still under incidental circumstances, which were difficult to reproduce at relatively high costs.
- Very powerful computer programs became available for the study of fundamental problems, into which up to now we did not dare to penetrate. In this respect could be

mentioned: The boundary layer of a ship, various viscous effects and fundamental components of the phenomenon "cavitation" and forces on maritime constructions in waves.

This analysis of maritime scientific research may be important in setting priorities and accentuating future maritime events.

In this complex of marine technology and its research, hydrodynamic institutes, universities, industries and governments are forced to co-operate in a more intensive way than ever before. It is my strong desire that all concerned with the various aspects of marine technology will understand this "Challenge of the Sea" and approach this challenge in optimizing the symbiosis of phenomenology, theory and experiment. It is the responsibility of the International Towing Tank Conference to understand this demand of community.

Wageningen, May 1978.



Prof. Dr. Ir. J.D. van Manen

Chairman of the 15th  
International Towing Tank  
Conference, The Hague,  
The Netherlands

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The 15th International Towing Tank Conference was held in The Hague, The Netherlands, from 3rd to 10th September 1978, in the Conference rooms of the Bel Air Hotel. The Conference consisted of the Opening Ceremony, two General Sessions and nine Technical Sessions. In addition, a Social Programme was arranged for the participants and the ladies accompanying them. The Conference was attended by a total of 199 delegates and observers representing 27 different nations.

The Conference Proceedings of the 15th ITTC consist of two parts:

- VOLUME I : including the Reports of the Executive Committee and the Technical Committees;
- VOLUME II : including the written contributions to the Reports of the Technical Committees, the Replies of the Committees and the final Recommendations.

To complete the technical material, appropriate space is devoted to the Opening Ceremony, the General Sessions and the Meetings of the Advisory Council.

The organization of the 15th ITTC would not have been possible without the assistance of various Institutions and Governmental Bodies in The Netherlands. First and foremost mention should be made of:

- Ministry of Science Policy
- Ministry of Defence
- Municipality of Rotterdam
- Municipality of The Hague.



Miss Cis Doorman



Mrs. Laura Richards

Finally, we should like to take this opportunity to express our deepest appreciation to Mrs. Laura Richards and Miss Cis Doorman, whose valuable assistance has contributed a great deal to the organization of the 15th ITTC and without whose patient efforts these Proceedings could not have been brought to completion. Especially also their readily available help and charming presence throughout the Conference is thankfully acknowledged.

Wageningen, december 1978.

*M.W.C. Oosterveld*

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