ittc - news

DECEMBER 1999 **No. 41**

Contents

Message from the Chairman

I am sure that we all had a pleasant and rewarding Conference in September and I send our thanks to our hosts, Professor Lee and Professor Shen. I also want to record our gratitude to Dr. Yang for his excellent organisation and work during the three-year period when he was the secretary to the Executive Committee. The considerable support provided by KRISO is also gratefully acknowledged.

Italy is very pleased to have the opportunity to host the 23rd ITTC in 2002 and I am proud to take over the chairmanship of the ITTC and the Executive Committee. I will do my best to sustain the co-operative spirit of the Conference and promote its aims.

During the next three years the tasks of the technical committees are focused on developing the ITTC recommended procedures and much of this work will be done under the guideline of the Quality Manual. I want to thank all of the members for agreeing to serve on the committees and the group and I wish them success in carrying out their tasks.

I send my best wishes and greetings to all of you for the New Year as we look forward to holding the first ITTC in the new millennium.

Ulderico Grazioli, Chairman
23rd ITTC Executive Committee

Report from the 22nd ITTC

The 22nd ITTC was held in Seoul from 5 to 7 September, and after transferring all of the delegates by plane on 8 September, the Conference continued in Shanghai until the 11 September. 184 delegates from 26 countries attended and there were 61 accompanying persons.

The Conference was very successful both technically and socially. This was the first occasion that the ITTC had been held in two countries and the delegates were especially fortunate in having the opportunity to visit Korea and China. It had been felt before the Conference that there may be some difficulty in transferring all of the delegates and accompanying persons during the middle of the Conference but this was carried out very efficiently.

The support provided by the Conference Secretariat in Korea and China was excellent. There were seventeen technical sessions on the following subjects:

- Resistance
- Propulsion
- Loads and Responses
- Manoeuvring
- Cavitation Induced Pressure Fluctuations
- Computational Methods for Propeller Cavitation
- Unconventional Propulsors
- Waterjets
- Trials and Monitoring
- Safety of High Speed Marine Vehicles
- Model Tests of High Speed Marine Vehicles
- Stability
- Ice
- Environmental Modelling
- Deep Water Mooring
- Symbols and Terminology
- Quality Systems.

The technical reports of all of the committees and groups were well received. The considerable amount of valuable work carried out by the chairmen and members of the outgoing committees is acknowledged and they are thanked for all of their efforts, which contributed so much to the success of the 22nd ITTC.

Newsletter editor:
Dr. Enrico De Bernardis
Istituto Nazionale per Studi ed Esperienze
di Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma, ITALY

Published by:
Executive Committee Secretariat
23rd International Towing Tank Conference
Tel.: +39 06 50299 328
Fax: +39 06 50 70 619
E-mail: e.debernardis@mail.insean.it

The accompanying persons programme was greatly enjoyed. One of the additional benefits of holding the Conference in two countries was the opportunity of attending two splendid banquets.

The discussions contributed during the Conference are being published as Volume III of the Proceedings and will be distributed to members in February.

News from the Executive Committee

The Executive Committee held three meetings during the Conference in Seoul and Shanghai. Some items from the agenda are reported in the following.

ITTC Member Organisations

The French company OCEANIDE, which operates the tank "Le Bassin de Génie Océanique First", presented an application for ITTC membership. The application was approved. Manager of the tank B.G.O. is Dr. Jean-Claude Dern, former director of Bassin d'Essais des Carènes (Paris) and former Area representative for Southern Europe.

The Versuchsanstalt für Wasserbau und Shiffbau resigned from the Advisory Council.

New Committee Structure and Tasks for the 23rd ITTC

The Executive Committee approved the new committees and the tasks proposed by the Advisory Council for the 23rd ITTC. Chairmen and members for the new committees were selected from lists of names submitted for each of the geographical areas.

Curriculum vitae are required by the Executive Committee when new members are nominated for the technical committees. It was agreed that the Advisory Council should draft a standard format for CVs.

2002 ITTC Arrangement

The 23rd ITTC Full Conference will take place in Venice, Italy, organised by INSEAN, in 2002.

Some alternative plans were proposed, each one offering some advantages. It was agreed on the opportunity to evaluate carefully all the available possibilities before presenting the final plan.

Host Organization for ITTC in 2005

Proposals to host the 24th ITTC will be considered.

Decisions of the Full Conference

At the plenary session, held in the morning of September 11th, the Full Conference approved the following items relating to the 23rd ITTC:

- structure of Technical Committees
- recommendations and tasks for ITTC Technical Committees
- appointment of Adm. Ulderico Grazioli as Chairman of the Executive Committee.

The Technical Committees and Groups established for the 23rd ITTC are listed in the following pages with their tasks.

Secretary of the 23rd ITTC Executive Committee

After the meeting, the Chairman proposed, and the Executive Committee Members accepted, Dr. Enrico De Bernardis, of INSEAN, as Secretary of the Executive Committee.

Newsletter Distribution Policy

A significant change is envisaged for the distribution of this newsletter. Starting with the present issue of ***ittc - news***, along with the printed paper, a PDF file will be sent to all addressees reachable by e-mail; besides, it will be available for download from the ITTC web site, where the newsletter will be provided also in HTML format for on-line consultation.

In the next future, after considering the reaction from the newsletter addressees, the Executive Committee might adopt the decision of replacing the printed version of ***ittc - news*** with the electronic format, and circulate the newsletter only by e-mail to those who can be reached in this way.

News from the Advisory Council

The Advisory Council had two meetings during the 22nd Conference, one in Seoul and one in Shanghai, and a brief summary is given here.

New Members

The Chairman welcomed Dr. Masayoshi Hirano, the new representative for Akishima Laboratories and Professor Atilla Incecik, who has joined the Council as the representative for Newcastle University.

The number of members of the Advisory Council is at present 32.

Application of Membership to the ITTC

For future applications to the ITTC the secretary will to draw up a form (1-2 pages), which should include the data necessary to evaluate whether applicants are eligible to the ITTC.

Tasking and monitoring the work of the technical committees

For the 22nd ITTC procedures were developed to follow-up the progress of the work of the technical committees (see also ITTC News No. 35). These procedures worked very well and the Council decided that the same procedures will be used for the 23rd ITTC.

The Advisory Council should review the progress of the work of each committee. Each committee should prepare an interim report for consideration at the Council meetings; the reports should include a statement on the progress of the committee's work, attendance at meetings, and any other matters requiring the attention of the Council.

Quality Systems Manual

The two manuals produced by the 22nd ITTC Quality Systems Group will be referred to as:

- ITTC Sample Quality Manual (Vol. 1)
- ITTC Recommended Procedures, Guidelines and Bench Mark Data (Vol. 2).

Additional Specialist Committee

In order to continue some important issues raised by the 22nd ITTC Stability Committee the Advisory Council recommended that a Specialist Committee be established for "Prediction of Extreme Ship Motions and Capsizing". The committee's tasks will be to:

- co-ordinate a comparative study of mathematical models for the prediction of intact and damaged stability in waves
- present the guidelines for experimental testing of intact and damaged stability, in the format defined in the ITTC Recommended Procedures, Guidelines and Bench Mark Data.

ITTC web site

A permanent ITTC web site should be created.

Secretary's note: The domain name www.ittcdoc.org has been reserved, but www.ittcdoc.com is also reserved and will have a reference to www.ittcdoc.org. The domain names ittc.org as well as ittc.com were already occupied.

Chairman, Vice Chairman and Secretary of the 23rd ITTC Advisory Council

At the Advisory Council meeting in March 1999 Dr. Hans Broberg, SSPA was appointed Chairman of the 23rd ITTC Advisory Council.

Dr. Keh-Sik Min was re-elected Vice Chairman.

Mr. Willem van Berlekom, SSPA has been appointed Secretary to the Advisory Council. Mr. van Berlekom can be contacted at the following e-mail address: willem.van.berlekom@sspa.se.

Outgoing Chairman and Secretary

The ingoing chairman Dr. Broberg and the Advisory Council thanked Mr. Nielsen and Mr. Bowden for their excellent work within the Council as Chairman and Secretary, respectively.

Dates and venues for future meetings

2000: Val de Reuil in September 2000
2001: North America June-July 2001
2002: Gothenburg March 2002.

News from the Technical Committees

Resistance Committee

The 23rd ITTC Resistance Committee met briefly at the close of the 22nd ITTC in Shanghai, China. The committee has established e-mail communication and exchanged Professional Résumé to aid in getting acquainted and has initiated discussion of interpretation and plan of action for its tasks. The committee is planning collaboration with the Specialist Committee on Procedures for Resistance, Propulsion, and Propeller Open-Water Tests.

The committee will hold its first meeting the week of 13-17 March 2000.

Propulsion Committee

The Propulsion Committee met briefly after the Conference in Shanghai, with six members attending. The committee agreed to conduct its first meeting in

Rome, Italy on 9-11 February 2000. In Shanghai, Friedrich Mewis was nominated to be secretary, with confirmation awaiting the first official meeting.

Loads and Responses Committee

After the 22nd ITTC, the newly appointed 23rd ITTC Loads and Responses Committee had a short meeting in Shanghai. At this meeting 6 of the 9 members and the chairman of the 22nd ITTC L&R Committee were present. All members were requested to contribute to the tasks recommended by the 22nd ITTC and to provide proposals for their contribution to the Committee at the first official meeting.

A tentative schedule for Committee meetings was established and it was decided to have the first meeting, hosted by Canal de Experiencias Hidrodinámicas, on January 11 and 12, 2000 in Madrid, Spain.

Speed and Powering Trials Committee

The first meeting of the committee is scheduled in Val de Reuil (at Bassin d'Essais des Carènes) on 17, 18 and 19 November. All members of the committee will attend the meeting.

Ice Committee

The committee asked Dr. Ahmed Derradji, NRC, Canada, to be the secretary of the committee. They will soon decide the time and place of the first meeting.

Committee on Water Quality and Cavitation

The initial meeting of the Committee is scheduled to be held in conjunction with the International Conference on Propeller Cavitation. This conference will be held on 3, 4 and 5 April 2000 at the University of Newcastle, Newcastle upon Tyne, England. Dr. Mehmet Atlar will host this meeting and specific details will be forwarded to the Committee.

Committee assignments for each task have been established. The Committee will focus on the measurement and effect of water quality on cavitation inception/scaling.

Cavitation Induced Pressures Committee

Three members of the specialist committee held an informal meeting directly after the 22nd ITTC in Shanghai. The first formal meeting is scheduled for the end of January 2000 in Hamburg at the Hamburg Ship Model Basin. The meeting shall provide an initial review of the members' thoughts and plan how to deal with the assignments given by the full conference to our committee. Special emphasis should be given to the formulation of a questionnaire concerning experimental and theoretical procedures for the prediction of propeller induced pressure fluctuations. Likely dates and locations for future meetings are as follows:

2000: ONR 2000
2001: PRADS 2001
2002: CAV 2002.

Waves Committee

The committee was established at the 22nd ITTC in Shanghai, China, where an initial meeting was held on 11 September. The next meeting is planned in Seattle, USA, May 2000, in connection with the 10th ISOPE Conference.

Stationary Floating Systems Committee

The committee will evaluate techniques and to recommend procedures for the experimental and numerical simulation of stationary floating systems in wind, wave and currents emphasizing some of these topics as follows.

For very deep water

- New systems to deep water
- Example of design procedure of deep-water mooring – current profile measurement, physical modelling of it etc.

For very large floating structures

- New mooring systems
- Hydroelasticity.

For shallow water

- Modelling of shallow water waves and their effects on floating structures.

And in general

- Instability of stationary floating systems due to VIV, and others
- low frequency damping – experimental and numerical evaluations
- The modelling of dynamic positioning systems for floating platforms.

Schedule for the next meetings:

2000: around February in Shanghai, China
2001: around January in Delft, The Netherlands
2002: around October in Canada or Brazil.

Committee for Validation of Waterjet Test Procedures

The first meeting of the Waterjet Committee is scheduled for either the week of January 17 2000 or the week of January 24 2000. The first meeting of the committee will deal with definition and subdivision of tasks to the committee members, time schedule for the standardisation tests and practical issues involved. This meeting is to be held in New Orleans, so that as a sequel to it, a meeting can be held with the Gulf Coast Region Maritime Technology Center, which is administered by the University of New Orleans.

The GCRMTC will make a model(s) of both the hull and the jet available for testing by the ITTC members. The meeting with the GCRMTC people will address appointments on the exchange of material between GCRMTC and ITTC, time schedules and appointments on exchange of information.

Committee for Prediction of Extreme Ship Motion and Capsizing

This new committee held its first meeting immediately following the 22nd ITTC in Shanghai.

To assist with presentations on extreme motions and capsizing, the committee has established a database of photos and videos. This is being held by the secretary (Martin Renilson at the Australian Maritime College) and will be available to any member organisations on request.

Member organisations are requested to let the secretary have any such material, which they would be prepared to share with other members.

Member organisations that have not yet completed the questionnaire are requested to do so as soon as possible.

A supplementary questionnaire is being added to cover issues missed, including experimental techniques, and member organisations are requested to complete this too. Both will be available on the Australian Maritime College web site at: www.amc.edu.au soon.

The main thrust of the committee's work will be the conduct of benchmarking for both Intact and Damaged ships. Committee members are currently implementing these themselves and the procedures will be finalised at the next meeting of the committee. These will then be circulated to all member organisations.

The next meeting of the committee will be held in Tasmania immediately following the 7th International Conference on the Stability of Ships and Ocean Vehicles in February 2000. Details of this conference can be found on the web at: www.amc.edu.au.

Publication Schedule

Contributions are requested from you for the ITTC Newsletter. The primary function of ***ittc - news*** is to provide communication among the member organisations, the Executive Committee, the Advisory Council, and the technical committees and groups. As the editor of ***ittc - news***, I shall be pleased to receive reports on the work of your committees and groups as well as any other material of interest to the members. Messages by fax, letter or e-mail will be fine. The following schedule is anticipated for the newsletter:

Newsletter No.	Deadline for receipt of material	Date of issue
41	15 November 1999	December 1999
42	15 May 2000	June 2000
43	15 November 2000	December 2000
44	15 May 2001	June 2001
45	15 November 2001	December 2001
46	15 May 2002	June 2002

Address Corrections

In case the address stated in the subsequent sections or used in sending this newsletter is incorrect (misspelling, wrong postal code, improper title, etc.), please inform the editor so that corrections will be implemented.

Technical Committees and Groups of the 23rd ITTC and their Tasks

The Conference confirmed/established four General Committees, ten Specialists Committees, and one Group, and assigned updated tasks to them.

Each Committee will submit a final report on the results of its work to the Full Conference. The conclusions and the recommendations of the Committee should be structured into three separate parts:

- General technical conclusions
- Recommendations to the Conference on carrying out or reporting work requiring Conference action (e.g. testing techniques, symbols, prediction techniques, etc.)
- Recommendations for future work and identification of tasks which may be appropriate for Committees.

1. General Committees

Resistance. Review the state-of-the-art, comment on the potential impact of new developments of the ITTC, and identify the need for research and development for resistance and flow. Monitor and follow the development of new experimental techniques and extrapolation methods.

Identify the requirements for new procedures, benchmark data, validation, uncertainty analyses and stimulate the necessary research for their preparation.

Develop procedures for model tests to measure sinkage and trim, wave profiles and elevations and nominal wake, for both deep and shallow water.

Develop guidelines for model tests and extrapolation methods to predict far field waves and wash.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Continue work on CFD uncertainty assessment methodology and examples, including further developments for error sources and solution techniques. Compare and evaluate the results of the application of codes of ITTC member institutes to selected examples, specifically those of the Gothenburg 2000 Workshop on CFD in Ship Hydrodynamics.

Review research and development and provide recommendations for extrapolation methods and turbulence treatment in EFD and in CFD.

Prepare an up-to-date bibliography of relevant technical papers and reports.

Propulsion. Review the state-of-the-art, comment on the potential impact of new developments on the ITTC, and identify the need for research and development in the areas of propulsors, cavitation and powering performance. Monitor and follow the development of new experimental techniques and extrapolation methods.

Review the ITTC recommended procedures, benchmark data and test cases for validation and uncertainty analyses and update as required. In particular, the following procedures should be reviewed:

- Model Scale Cavitation Pattern Tests
  ITTC Procedure 4.9-03-03-03.1
- Description of Cavitation Appearances
  ITTC Procedure 4.9-03-03-03.2

Develop a procedure for predicting the performance of ships with azimuthing thrusters as the main propulsor.

Identify the requirements for new procedures, benchmark data, validation, uncertainty analyses and stimulate the necessary research for their preparation.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Review methods for scale effects on the passive components of propulsors and for assessing screw propeller scale effects with emphasis on the occurrence of excessive laminar flow.

Review the development of numerical design and analysis methods for propulsors. Follow the developments in the modelling of unconventional and multicomponent propulsors.

Review developments in experimental techniques and analytic methods for modelling the propulsive effects of propeller-rudder interaction including cavitation and cavitation effects.

Review developments in analytic and experimental methods for hydroelastic phenomena on propulsors and recommend procedures to account for hydroelastic effects in predicting and evaluating propulsor performance.

Prepare an up-to-date bibliography of relevant technical papers and reports.

Manoeuvring. Review the state-of-the-art, comment on the potential impact of new developments on ITTC, and identify the need for research and development into manoeuvrability. Monitor and follow the development of new experimental techniques and extrapolation methods.

Review the ITTC recommended procedures, benchmark data and test cases for validation and uncertainty analyses and update as required. In particular, the following procedures should be reviewed:

- Manoeuvring Trials code including IMO criteria
  ITTC Procedure 4.9-03-04-01
- Captive Model Test Procedure
  ITTC Procedure 4.9-03-04-03

Prepare a procedure for free running model manoeuvring tests including conventional and unconventional propulsion/manoeuvring devices such as Z drives and waterjet propulsion.

Devise a validation procedure for manoeuvring simulation models obtained from model and/or full scale data.

Develop procedures for the evaluation and documentation of manoeuvring and control characteristics of HSMVs.

Identify the requirements for new procedures, benchmark data, validation, uncertainty analyses and stimulate the necessary research for their preparation.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Review methods for predicting manoeuvring in shallow and confined waters.

Prepare an up-to-date bibliography of relevant technical papers and reports.

Loads and Responses. Review the state-of-the-art, comment on the potential impact of new developments on ITTC, and identify the need for research and development in the areas of seakeeping and offshore engineering. Monitor and follow the development of new experimental techniques and extrapolation methods.

Review the ITTC recommended procedures, benchmark data and test cases for validation and uncertainty analyses and update as required. In particular, the following procedures should be reviewed:

- Seakeeping Experiments
  ITTC Procedure 4.9-03-05-02.1
- Predicting Power Increase in Irregular Waves from Model Experiments in Regular Waves
  ITTC Procedure 4.9-03-05-02.2
- Experiments on Rarely Occurring Events
  ITTC Procedure 4.9-03-05-02.3
- Analysis Procedure for Regular Wave Tests
  ITTC Procedure 4.9-03-05-03.2
- Model Testing on Tanker Turret Systems
  ITTC Procedure 4.9-03-05-03.3

Develop a procedure for the validation of seakeeping computer codes.

Identify which procedures could be developed for offshore testing.

Identify the requirements for new procedures, benchmark data, validation, uncertainty analyses and stimulate the necessary research for their preparation.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Review progress in experimental and numerical hydroelastic problems including risers, very large floating structures and HSMVs.

Prepare an up-to-date bibliography of relevant technical papers and reports.

2. *Specialist Committees*

The following Specialist Committees will be established for 3 years:

Speed and Powering Trials. Review and update the following ITTC procedure based on the recommendations of the 22nd ITTC Trials and Monitoring Committee and given in Section 4 and Appendix 1 of the report of the Committee:

- Guide for Speed/Powering Trials
  ITTC Procedure 4.9-03-03-01.3

Include instrumentation and environmental effects.

Take into account the recommendations of ISO TC8 SC9 WG2 committee's Committee Draft 15016. The procedure must be in the format defined in the Manual of ITTC Recommended Procedures and it should be included in the Committee report as a separate appendix. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Procedures for Resistance, Propulsion and Propeller Open-Water Tests. Update the following procedures (including validation and uncertainty analysis) for conventional ships and high speed ships such as planing and semi-planing monohull and multi-hull vessels:

- Ship Models
  ITTC Procedure 4.9-02-01-01
- Resistance Test
  ITTC Procedure 4.9-03-02-01
- Propulsion Test
  ITTC Procedure 4.9-03-03-01.1
- Open Water Test
  ITTC Procedure 4.9-03-03-02.1
- Resistance Test for HSMVs
  ITTC Procedure 4.9-03-03-05.1

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Validation of Waterjet Test Procedures. Perform a series of standardisation experiments as presented in the report of the 22nd Waterjets Committee. This study would be performed on a voluntary basis, by participating ITTC experimental facilities and other interested parties such as waterjet manufacturers. The major goals of the study are to obtain cross validation

of test techniques, correlation with numerical predictions, comparison of results between laboratories, and to perform a comprehensive measurement uncertainty analysis.

Carry out three different types of experiments to investigate and validate the methods currently used to estimate the powering characteristics of a waterjet-propelled ship. These three experiments, the waterjet pump loop, the waterjet/inlet water tunnel, and towing basin self-propulsion tests using both the momentum flux and direct measurement methods, will be performed by the participants, as appropriate.

Document procedures and nomenclature for the performance of both the waterjet loop test and waterjet/inlet test. The successful estimation of powering performance of the waterjet is dependent upon these quasi open-water characteristics of the pump and inlet.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Cavitation Induced Pressures. Develop and validate practical experimental and numerical prediction procedures for unsteady hull pressure, including the method using propeller cavitation volume time-variation.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Water Quality and Cavitation. Review the development and recommend guidelines for the water quality measurements and conditions to minimise scale effects in cavitation.

Review the techniques and procedures for controlling and adjusting water quality characteristics in cavitation test facilities.

Review the development of new extrapolation methods for cavitation inception data with regard to water quality parameters.

Carry out a study of flow mechanisms and related physical parameters that affect cavitation intermittence and cavitation instability. Include the effect of off-design conditions.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Ice. Update the following procedures for carrying out model tests in ice:

- General Guidelines for Ice Model Testing
  ITTC Procedure 4.9-03-03-04.1
- Ice Resistance Test in Level Ice
  ITTC Procedure 4.9-03-03-04.2.1

If there is sufficient time, also update the existing ITTC Procedure concerning ice testing.

The updated procedure should include uncertainty analysis and validation.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Review developments in ice model testing and prepare an up-to-date bibliography of relevant technical papers and reports.

Waves. Review and update recommended wave spectra including 2-parameter spectra, short crested seas, fetch limited, bi-modal spectra, and finite depth spectra.

Examine wave generating procedures with respect to wave quality in both deep and shallow water and develop guidelines for spectral quality during model tests.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

The compatibility of ITTC and coastal engineering practices for modelling shallow and finite water depth should be investigated.

The committee must consult with IAHR.

Stationary Floating Systems. Evaluate techniques and recommend procedures for the experimental and numerical simulation of stationary floating systems in wind, waves and currents including hybrid-testing techniques and deep-water current profiles.

Report on the progress of full dynamic positioning (DP) systems and DP assisted deep sea mooring and develop procedures for model testing DP systems.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as sepa-

rate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

Esso Osaka. Continue the analysis of the Esso Osaka benchmark data in the following areas and organise a workshop to present the Esso Osaka benchmark data and the results of the analysis:

a) Reduce the scatter in existing data either by eliminating suspect data sets, or by stimulating new, benchmark quality experiments.
b) Compare propeller and rudder forces and propeller-hull-rudder interactions.
c) Carry out a systematic series of simulations using one reference mathematical model (e.g. MMG with fixed propeller and rudder forces and interactions) using available sets of hull damping coefficients (linear and non-linear).
d) Compare the results of these systematic simulations with available track data, and particularly the full scale trials data.

Prediction of Extreme Ship Motions and Capsizing. Co-ordinate a comparative study of mathematical models for the prediction of intact and damaged stability in waves. The mathematical models will be compared to the results of benchmark tests for the two test ships, Ships A and B, as specified in Section 7.2 of the report of the Stability Committee of the 22nd ITTC.

Present the guidelines for experimental testing of intact and damaged stability, as given in Appendix A of the report of the Stability Committee of the 22nd ITTC, in the format defined in the ITTC Quality Manual.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they should be included in the Committee report as separate appendices. Symbols and terminology should agree with those used in the 1999 version of the ITTC SaT List; if necessary, new symbols should be proposed.

3. Groups

Quality Systems. Develop guidelines for carrying out benchmark tests.

Collect procedures for calibration of instrumentation and measuring equipment.

Adapt the ITTC Sample Quality Manual to the new standard when ISO 9000 is updated.

Support the technical committees in the development of procedures.

Evaluate the implementation of procedures.

Incorporate changes to existing procedures as provided for in:

- Procedure for Adoption or Modification of Recommended Procedures
  ITTC Procedure 4.5-01

Develop a procedure for updating the Symbols and Terminology List.

Members of the Executive Committee

Adm. Ulderico Grazioli (chairman)
Istituto Nazionale per Studi ed Esperienze
di Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY
Tel.: +39 06 5071 580
Fax: +39 06 5070 619
E-mail: secretary@mail.insean.it

Prof. Robert F. Beck (rep. Americas)
University of Michigan
Dept. of Naval Architecture & Marine Engineering
2600 Draper Road
Ann Arbor, MI 48109-2145
USA
Tel.: +1 313 764 0282
Fax: +1 313 936 8820
E-mail: rbeck@engin.umich.edu

Dr. Arne Hasle Nielsen (rep. Northern Europe)
Danish Maritime Institute
Hjortekaersvej 99
DK-2800 Lyngby
DENMARK
Tel.: +45 45 87 9325
Fax: +45 45 87 9333
E-mail: dmi@danishmaritime.dk

Prof. José A. Aláez (rep. Southern Europe)
Canal de Experiencias Hidrodinámicas de El Pardo
Carretera de la Sierra s/n.
28048 El Pardo-Madrid
SPAIN
Tel.: +34 91 376 2100
Fax: +34 91 376 0176
E-mail: cehmail@cehipar.es

Dr. Gerhard Jensen (rep. Central Europe)
Hamburg Ship Model Basin (HSVA)
Bramfelder Strasse 164
D-22305 Hamburg
GERMANY
Tel.: +49 40 69 20 3215
Fax.: +49 40 69 20 3345
E-mail: gj@hsva.isys.net.de

Prof. Hiroharu Kato (rep. Pacific Islands)
University of Tokyo
Dept. of Environmental & Ocean Engineering
7-3-1, Hongo, Bunkyo-Ku
Tokyo 113
JAPAN
Tel.: +81 3 3812 2111 (E 6535)
Fax: +81 3 3815 8360
E-mail: kato@fluidlab.naoe.t.u-tokyo.ac.jp

Dr. Seung-Il Yang (rep. East Asia)
Korea Research Institute of Ships and Ocean Engineering (KRISO)
Yusong P.O. Box 23
Taejon 305-600
KOREA
Tel.: +82 42 868 7240
Fax: +82 42 868 7274
E-mail: siyang@mailgw.kimm.re.kr

Dr. Hans Broberg (chairman of AC)
SSPA Maritime Consulting AB
Chalmers Tvärgata 10
P.O. Box 24001
SE-400 22 Göteborg
SWEDEN
Tel.: +46 31 63 9500
Fax.: +46 31 63 9624
E-mail.: hans.broberg@sspa.se

Mr. Willem van Berlekom (secretary of AC)
SSPA Maritime Consulting AB
Chalmers Tvärgata 10
P.O. Box 24001
SE-400 22 Göteborg
SWEDEN
Tel.: +46 31 772 9063
Fax.: +46 31 772 9124
E-mail: willem.van.berlekom@sspa.se

Prof. Choung Mook Lee (past chairman)
AFERC
Pohang University of Science & Technology
San 31, Hyoja-Dong
Pohang 790-784
KOREA
Tel.: +82 562 279 5900
Fax: +82 562 279 3199
E-mail: cmlee@vision.postech.ac.kr

Dr. Enrico De Bernardis (secretary)
Istituto Nazionale per Studi ed Esperienze
di Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY
Tel.: +39 06 50299 328
Fax: +39 06 50 70 619
E-mail: e.debernardis@mail.insean.it

Members of the Technical Committees

Resistance Committee

Prof. Frederick Stern (chairman)
Iowa Institute of Hydraulic Research
University of Iowa
Iowa City, IA 52242-1585
USA

Dr. Hoyte C. Raven
Maritime Research Institute Netherlands
P.O. Box 28
NL-6700 AA Wageningen
THE NETHERLANDS

Prof. Luis Pérez-Rojas
Escuela Técnica Superior de Ingenieros Navales (ETSIN) – Universidad Politécnica de Madrid
Av.da Arco de la Victoria s/n.
28040 Madrid
SPAIN

Dr. Emilio F. Campana
Istituto Nazionale per Studi ed Esperienze di Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY

Dr. Yoshiaki Kodama
Ship Research Institute
Ministry of Transport
6-38-1 Shinkawa, Mitaka
Tokyo 181-0004
JAPAN

Dr. Yuzo Kusaka
Akishima Laboratories (Mitusi Zosen) Inc.
1-1-50, Tsutsujiga-oka, Akishima
Tokyo 196-0012
JAPAN

Dr. Tomasz J. Bugalski
Ship Design and Research Centre
Waly Piastowskie Str. 1
PL-80-958 Gdansk
POLAND

Prof. Seung-Hee Lee
Inha University
Dept. of Naval Architecture and Ocean Engineering
253 Yonghyun-Dong, Nam-Ku
Inchon 402-751
KOREA

Prof. De-Bo Huang
Harbin Engineering University
Dept. of Naval Architecture & Ocean Engineering
Harbin, Heilongjiang 150001
CHINA

Propulsion Committee

Dr. Stuart D. Jessup (chairman)
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Dipl. Ing. Friedrich Mewis
Hamburg Ship Model Basin (HSVA)
Bramfelder Strasse 164
D-22305 Hamburg
GERMANY

Dr. Alexander Poustoshny
Krylov Shipbuilding Research Institute
44 Moskovskoye Shosse
196158 St. Petersburg
RUSSIA

Ir. Jan Holtrop
Maritime Research Institute Netherlands
P.O. Box 28
NL-6700 AA Wageningen
THE NETHERLANDS

Dr. Jin-Tae Lee
Korea Research Institute of Ships and Ocean Engineering (KRISO)
Yusong P.O. Box 23
Taejon 305-600
KOREA

Dr. Pier Giorgio Esposito
Istituto Nazionale per Studi ed Esperienze di Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY

Dr. Christian Dugue
Bassin d'Essais des Carènes
Chaussée du Vexin
F-27100 Val de Reuil
FRANCE

Dr. Yasushi Shirose
Ishikawajima-Harima Heavy Industries Co., Ltd.
Ship and Hydraulic Machine Development Dept.
1 Shin-Nakahara-cho, Isogo-ku
Yokohama 235
JAPAN

Prof. Neil Bose
Memorial University of Newfoundland
Ocean Engineering Research Center
St. John's, Newfoundland - A1B 3X5
CANADA

Manoeuvring Committee

Dr. Stephane Cordier (chairman)
Bassin d'Essais des Carènes
Chaussée du Vexin
F-27100 Val de Reuil
FRANCE

Prof. Marc Vantorre
University of Gent
Dept. of Mechanical Construction and Production
Division Maritime Technology
Technologiepark - Zwijnaarde 9
B-9052 Gent - Zwijnaarde
BELGIUM

Prof. Key Pyo Rhee
Seoul National University
Dept. of Naval Architecture and Ocean Engineering
San 56-1 Shinrim-Dong, Kwanak-ku
Seoul 151-742
KOREA

Prof. Zao-Jian Zou
Wuhan Transportation University
Dept. of Naval Architecture and Ocean Engineering
Wuhan, Hubei 430063
CHINA

Dr. Jakob Buus Petersen
Danish Maritime Institute
Hjortekaersvej 99
DK-2800 Lyngby
DENMARK

Mr. Peter Trägårdh
SSPA Maritime Consulting AB
P.O. Box 24001
SE-400 22 Göteborg
SWEDEN

Prof. Kazuhiko Hasegawa
Osaka University
Dept. of Naval Architecture & Ocean Engineering
2-1 Yamadaoka, Suita
Osaka 565
JAPAN

Prof. Michael S. Triantafyllou
Massachusetts Institute of Technology
Department of Ocean Engineering
Room 5-323
77 Massachusetts Ave.
Cambridge 02139
USA

Loads and Responses Committee

Prof. Wataru Koterayama (chairman)
Research Institute for Applied Mechanics
Kyushu University
6-1 Kasuga-Koen, Kasuga-Shi
Fukuoka 816
JAPAN

Mr. Timothy Smith
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Prof. Johan M.J. Journée
Delft University of Technology
Department of Marine Technology
Mekelweg 2
NL-2628 CD Delft
THE NETHERLANDS

Mr. Xie Nan
China Ship Scientific Research Center
P.O. Box 116
Wuxi, Jiangsu 214082
CHINA

Mr. Dariusz E. Fathi
MARINTEK
P.O. Box 4125 Valentinlyst
N-7002 Trondheim
NORWAY

Prof. Jerzy Matusiak
Helsinki University of Technology
Ship Laboratory
P.O. Box 5300
FIN-02015 HUT
FINLAND

Prof. Hiroshi Kagemoto
University of Tokyo
Department of Environmental Studies
7-3-1 Hongo, Bunkyo-ku
Tokyo 113-0033
JAPAN

Prof. Grant E. Hearn
University of Newcastle Upon Tyne
Department of Marine Technology
Armstrong Bldg.
Newcastle Upon Tyne - NE1 7RU
UNITED KINGDOM

Dr. Adolfo Marón
Canal de Experiencias Hidrodinámicas de El Pardo
Carretera de la Sierra, s/n
28048 El Pardo-Madrid
SPAIN

Speed and Powering Trials Committee

Dr. Pierre Perdon (chairman)
Bassin d'Essais des Carènes
Chaussée du Vexin
F-27100 Val de Reuil
FRANCE

Dr. Yukio Koshiba
Ishikawajima-Harima Heavy Industries Co., Ltd.
Ship and Hydraulic Machine Development Dept.
1 Shin-Nakahara-cho, Isogo-ku
Yokohama 235
JAPAN

Dr. Roberto Fazzeri
Centro per gli Studi di Tecnica Navale
(CETENA)
Via Ippolito d'Aste 5
I-16121 Genova
ITALY

Dr. Everett L. Woo
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Dr. Deuk-Joon Yum
Hyundai Maritime Research Institute
1 Cheonha-Dong, Dong-Ku
Ulsan 682-792
KOREA

Dr. Lech Murawski
Ship Design and Research Centre
Waly Piastowskie Str. 1
PL-80-958 Gdansk
POLAND

Committee on Procedures for Resistance, Propulsion and POW Tests

Mr. William G. Day, Jr. (chairman)
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Dipl. Ing. Richard Anzböck
Schiffbautechnische Versuchsanstalt in Wien
Brigittenauer Lände 256
A-1200 Wien XX
AUSTRIA

Mr. Mo-Qin He
China Ship Scientific Research Center
P.O. Box 116
Wuxi, Jiangsu 214082
CHINA

Mr. Lars T. Gustafsson
SSPA Maritime Consulting AB
P.O. Box 24001
SE-400 22 Göteborg
SWEDEN

Dr. Anthony F. Molland
University of Southampton
Department of Ship Science
Highfield
Southampton S017 1BJ
UNITED KINGDOM

Dr. Sverre Steen
MARINTEK
P.O. Box 4125 Valentinlyst
N-7002 Trondheim
NORWAY

Dr. Yukihiko Okamoto
NKK Corporation, Ltd.
Ship and Marine Structure Laboratory
1, Kumozukokan-cho, Tsu
Mie 514-03
JAPAN

Prof. Mustafa Insel
Istanbul Technical University
Faculty of Naval Architecture and Ocean Eng.
Ayazaga Kampusu 80626, Istanbul
TURKEY

Committee for Validation of Waterjet Test Procedures

Dr. Thomas J.C. van Terwisga (chairman)
Maritime Research Institute Netherlands
P.O. Box 28
NL-6700 AA Wageningen
THE NETHERLANDS

Dr. Daniele Ranocchia
Istituto Nazionale per Studi ed Esperienze di
Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY

Dr. Dmitry Sadovnikov
Krylov Shipbuilding Research Institute
44 Moskovskoye Shosse
196158 St. Petersburg
RUSSIA

Dr. Gun-Il Choi
Hyundai Maritime Research Institute
1 Cheonha-Dong, Dong-Ku
Ulsan 682-792
KOREA

Prof. Mehrdad Zangeneh
University College London
Department of Mechanical Engineering
Torrington Place
London WC1E 7JE
UNITED KINGDOM

Dr. John G. Hoyt III
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Mr. Niclas Olofsson
KaMeWa Hydrodynamic Research Centre
Marine Laboratory
P.O. Box 1010
SE-68120 Kristinehamn
SWEDEN

Cavitation Induced Pressures Committee

Dr. Jürgen Friesch (chairman)
Hamburg Ship Model Basin (HSVA)
Bramfelder Strasse 164
D-22305 Hamburg
GERMANY

Dr. Noriyuki Sasaki
Sumitomo Heavy Industries, Ltd.
Hiratsuka Research Laboratory
63-30 Yuhigaoka, Hiratsuka
Kanagawa 254-8010
JAPAN

Dr. Fabio Di Felice
Istituto Nazionale per Studi ed Esperienze di
Architettura Navale (INSEAN)
Via di Vallerano 139
I-00128 Roma
ITALY

Prof. Paul Andersen
Danmarks Tekniske Universitet
Dept. of Naval Architecture & Offshore Engineering
Building 101E
DK-2800 Lyngby
DENMARK

Dr. Bong-Jun Chang
Hyundai Maritime Research Institute
1 Cheonha-Dong, Dong-Ku
Ulsan 682-792
KOREA

Dr. Ki-Han Kim
Naval Surface Warfare Center
David Taylor Model Basin
9500 MacArthur Blvd.
W. Bethesda, MD 20817-5700
USA

Dr. Göran Bark
Chalmers University of Tecnology
Dept. of Naval Architecture and Ocean Engineering
SE-41296 Göteborg
SWEDEN

Water Quality and Cavitation Committee

Dr. Michael L. Billet (chairman)
Applied Research Laboratory
Pennsylvania State University
P.O. Box 30
State College, PA 16804
USA

Dr. Y. Semionicheva
Krylov Shipbuilding Research Institute
44 Moskovskoye Shosse
196158 St. Petersburg
RUSSIA

Mr. Akira Ohshima
Mitsubishi Heavy Industries, Ltd.
Nagasaki Research & Development Center
5-717-1, Fukahori-Machi
Nagasaki 851-03
JAPAN

Prof. Steven L. Ceccio
University of Michigan
Dept. of Naval Architecture & Marine Engineering
2600 Draper Road
Ann Arbor, MI 48109-2145
USA

Dr. Mehmet Atlar
University of Newcastle Upon Tyne
Department of Marine Technology
Armstrong Bldg.
Newcastle Upon Tyne - NE1 7RU
UNITED KINGDOM

Dr. Laurence Briançon-Marjollet
Bassin d'Essais des Carènes
Chaussée du Vexin
F-27100 Val de Reuil
FRANCE

Dr. Young-Gi Kim
Samsung Heavy Industries Co., Ltd.
Samsung Ship Model Basin
Yusong P.O. Box 43
Taejon, 305-600
KOREA

Ice Committee

Prof. Hajime Yamaguchi (chairman)
University of Tokyo
Dept. of Naval Architecture & Ocean Engineering
7-3-1, Hongo, Bunkyo-ku
Tokyo 113
JAPAN

Dr. Ahmed Derradji
National Research Council
Institute for Marine Dynamics
P.O. Box 12093, Station A
St. John's, Newfoundland A1B 3T5
CANADA

Dr. Goran Wilkman
Kvaerner Masa Yards Technology
Arctic Research Center
Kaarantie 3
SF-00560, Helsinki 56
FINLAND

Dr. Koh Izumiyama
Ship Research Institute
Ministry of Transport
6-38-1 Shinkawa, Mitaka
Tokyo 181
JAPAN

Waves Committee

Dr. Carl Trygve Stansberg (chairman)
MARINTEK
P.O. Box 4125 Valentinlyst
N-7002 Trondheim
NORWAY

Mr. Shigesuke Ishida
Ship Research Institute
Ministry of Transport
6-38-1 Shinkawa, Mitaka
Tokyo 181
JAPAN

Dr. Seok-Won Hong
Korea Research Institute of Ships and Ocean
Engineering (KRISO)
Yusong P.O. Box 23
Taejon 305-600
KOREA

Dr. Giorgio Contento
University of Trieste
Department of Naval Engineering
Via A. Valerio 10
I-34127 Trieste
ITALY

Dr. Mehernosh Irani
Offshore Technology Research Center
1200 Mariner Drive
Texas A&M Research Park
College Station, TX 77845-3400
USA

Dr. Julian Wolfram
Heriot-Watt University
Department of Civil and Offshore Engineering
Edinburgh EH14 4AS
UNITED KINGDOM

Prof. Yan-Ying Wang
Dalian University of Technology
Department of Naval Architecture
2 Linggong Road,
Dalian 116024
CHINA

Stationary Floating Systems Committee

Prof. Takeshi Kinoshita (chairman)
University of Tokyo
Institute for Industrial Science
7-22-1 Roppongi Minato-ku
Tokyo 106
JAPAN

Prof. J.A. Pinkster
Delft University of Technology
Department of Marine Technology
Mekelweg 2
NL-2628 CD Delft
THE NETHERLANDS

Dr. Liviu Crudu
Research and Design Institute for Shipbuilding
ICEPRONAV
SA 19A, Portului Str.
6200 Galati
ROMANIA

Dr. Bruce Colbourne
National Research Council
Institute for Marine Dynamics
P.O. Box 12093, Station A
St. John's, Newfoundland A1B 3T5
CANADA

Prof. Kazuo Hirata
Instituto de Pesquisas Tecnologicas (IPT)
Divisao de Engenharia Naval e Oceanica
Cidade Universitaria
CP 7141, A.S.O. Butanta
Sao Paolo SP CEP 05508
BRAZIL

Prof. Jian-Min Yang
Shanghai Jiao Tong University
Ship Hydrodynamics Laboratory
1954 Hua Shan Road
Shanghai 200030
CHINA

Dr. Mun-Keun Ha
Samsung Heavy Industries Co., Ltd.
Samsung Ship Model Basin
Yusong P.O. Box 43
Taejon, 305-600
KOREA

Dr. Krish P. Thiagarajan
Centre for Oil & Gas Engineering
University of Western Australia
Nedlands, WA 6907
AUSTRALIA

Esso Osaka Committee

Prof. Hiroaki Kobayashi (chairman)
Tokyo University of Mercantile Marine
Institute of Marine Science & Technology
Faculty of Mercantile Marine Science
2-1-6 Etchujima, Koto-ku
Tokyo 135
JAPAN

Dr. Jacek Nowicki
Gdansk Technical University
Ship Research Institute
Majarouskiego 11/12
PL-80-952 Gdansk
POLAND

Dr. Sun-Young Kim
Korea Research Institute of Ships and Ocean
Engineering (KRISO)
Yusong P.O. Box 23
Taejon 305-600
KOREA

Dr. Jan J. Blok
Maritime Research Institute Netherlands
P.O. Box 28
NL-6700 AA Wageningen
THE NETHERLANDS

Dr. Roderick Barr
Hydronautics Research, Inc.
7210 Pindell School Road
Fulton, MD 20759
USA

Committee for Prediction of Extreme Ship Motions and Capsizing

Prof. Dracos Vassalos (chairman)
University of Strathclyde
Marine Technology Centre
100 Montrose Street
Glasgow G4 0LZ Scotland
UNITED KINGDOM

Prof. Apostolos D. Papanikolaou
National Technical University of Athens
Dept. of Naval Architecture & Marine Engineering
9 Heroon Polytechniou Ave., Zografou
GR-15773 Athens
GREECE

Dr. Martin R. Renilson
Australian Maritime College
P.O. Box 986
Launceston, Tasmania 7250
AUSTRALIA

Dr. Aage Damsgaard
Danish Maritime Institute
Hjortekaersvej 99
DK-2800 Lyngby
DENMARK

Dr. Huan-Qiu Gao
China Ship Scientific Research Center
P.O. Box 116
Wuxi, Jiangsu 214082
CHINA

Dr. David Molyneux
National Research Council
Institute for Marine Dynamics
P.O. Box 12093, Station A
St. John's, Newfoundland A1B 3T5
CANADA

Prof. Naoya Umeda
Osaka University
Dept. of Naval Architecture & Ocean Engineering
2-1 Yamadaoka, Suita
Osaka 565
JAPAN

Quality Systems Group

Prof. Gerhard Strasser (chairman)
Schiffbautechnische Versuchsanstalt in Wien
Brigittenauer Lände 256
A-1200 Wien XX
AUSTRIA

Prof. Marco Ferrando
Università di Genova
Istituto di Ingegneria Navale
Via Montallegro 1
I-16145 Genova
ITALY

Mr. Naoji Toki
Mitsubishi Heavy Industries, Ltd.
Nagasaki Research & Development Center
5-717-1, Fukahori-Machi
Nagasaki 851-03
JAPAN

Mr. Jan Kanar
Ship Design and Research Centre
Waly Piastowskie Str. 1
PL-80-958 Gdansk
POLAND

Prof. Wen-Hao Qian
Marine Design & Research Institute of China
1688 Xi Zang Nan Road
Shanghai 200011
CHINA

Dr. David Clarke
University of Newcastle Upon Tyne
Department of Marine Technology
Armstrong Bldg.
Newcastle Upon Tyne - NE1 7RU
UNITED KINGDOM

Dipl. Ing. Barbara Günther
Schiffbau Versuchanstalt Potsdam GmbH
Marquardter Chaussee 100
D-14469 Postdam
GERMANY

Deadline of Next Newsletter

The deadline for submitting material to the June 2000 issue (No. 42) is 15 May 2000.