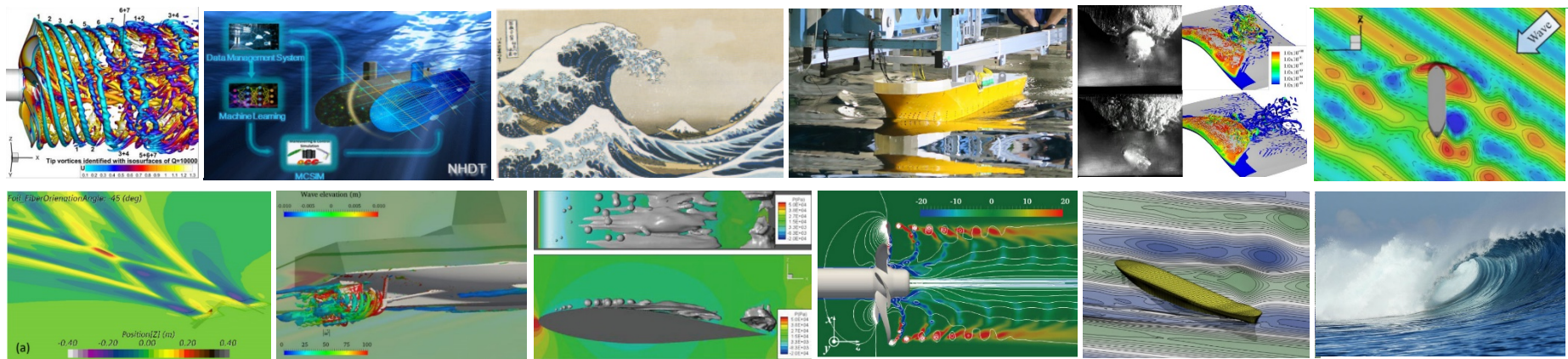


# The 33rd Symposium on Naval Hydrodynamics Osaka, Japan, October 18 – 23, 2020

## Program for Virtual Symposium



Co-organized by  
U.S. Office of Naval Research and  
Department of Naval Architecture & Ocean Engineering, Osaka University



## Schedule-at-a-Glance of the 33rd SNH

Time	Monday – October 19	
20:00	Opening Welcome	
20:20	Keynote Lecture by Dr. Thomas C. Fu	
21:10	Invited-Speaker lecture No. 1 by Prof. Charles Meneveau	
22:15	Session I-A Fundamentals of Fluid Dynamics in the Naval Context (Part-1)	Session I-B Cavitation and Multi-phase Flows (Part-1)
23:15	Close	

Time	Tuesday – October 20	
20:00	Weinblum Memorial Lecture by Prof. Spyros Kinnas	
20:50	Invited-Speaker Lecture No. 2 by Dr. Matteo Diez	
22:00	Session II-A Fundamentals of Fluid Dynamics in the Naval Context (Part-2)	Session II-B Cavitation and Multi-phase Flows (Part-2)
23:00	Close	

Time	Wednesday – October 21	
20:00	Invited-Speaker Lecture No. 3 by Prof. Karen A. Flack	
20:50	Invited-Speaker Lecture No. 4 by Prof. Hidetsugu Iwashita	
22:00	Session III-A Hydrodynamics in Ship Design	Session III-B Undersea Vehicle Hydrodynamics & Hydroacoustics
23:00	Announcement of the 34th SNH	
23:20	Close	

Time	Thursday – October 22	
20:00	Session IV-A Nonlinear Wave-Induced Motions and Loads (Part-1)	Session IV-B Cavitation and Multi-phase Flows (Part-3)
21:10	Session V-A Nonlinear Wave-Induced Motions and Loads (Part-2) & Hydrodynamics of High Speed or Multi-hull Ships	Session V-B Cavitation and Multi-phase Flows (Part-4) & Turbulent Drag Reduction
22:20	Session VI-A Propulsor Hydrodynamics	Session VI-B Data Science in Hydrodynamics (Part-1)
23:20	Close	

## Schedule-at-a-Glance of the 33rd SNH

Time	Friday – October 23	
20:00	Session VII-A Hydrodynamics of Maneuvering and Control (Part-1)	Session VII-B Data Science in Hydrodynamics (Part-2) & Ocean Environment
21:00	Session VIII-A Hydrodynamics of Maneuvering and Control (Part-2) & Hydroelasticity for Ships and Propellers	Session VIII-B Near- and Far-Field Ship Wave and Wake Hydrodynamics
22:00	Closing	
22:15	Close	

*The 33rd Symposium on Naval Hydrodynamics is financially supported by*


*The Office of Naval Research Global, and Nippon Kaiji Kyokai (ClassNK).*



# ClassNK

### Time zone in main cities in the world during the Symposium

Location	Local Time	
Osaka / Tokyo	20:00	23:00
Seoul	20:00	23:00
Sydney	21:00	24:00
Shanghai	19:00	22:00
Taipei	19:00	22:00
Athens	14:00	17:00
Rome / Paris	13:00	16:00
Amsterdam / Hamburg	13:00	16:00
Copenhagen / Oslo	13:00	16:00
London	12:00	15:00
Lisbon	12:00	15:00
St. John's	09:00	12:00
Boston	07:00	10:00
Ann Arbor	07:00	10:00
Washington D.C.	07:00	10:00
Iowa City	06:00	09:00
Texas	06:00	09:00
Pasadena	04:00	07:00
San Francisco	04:00	07:00

 *Time in the technical program is written with local time in Osaka / Tokyo. Please confirm your local time.*

**Day 1: Monday, October 19, 2020**

**33rd Symposium  
on Naval Hydrodynamics**

October 18-23, 2020 | Osaka, Japan



### *Opening Welcome*

Monday 20:00 – 20:20 Welcome Address and Announcement  
*Dr. Ki-Han Kim & Prof. Masashi Kashiwagi*

### *Plenary Session: Keynote Lecture*

Session Chair: *Dr. Ki-Han Kim, Office of Naval Research, USA*

Monday 20:20 – 21:10 Naval Hydrodynamics Waypoints: Where we have been and where we are going  
***Dr. Thomas C. Fu***

*Head, Mission Capable, Persistent & Survivable Naval Platforms Department;  
Director, Advanced Naval Platforms Division, Office of Naval Research (U.S.A.)*



### *Plenary Session: Invited-Speaker Lecture No. 1*

Session Chair: *Professor Beverley McKeon, California Institute of Technology, USA*

Monday 21:10 – 22:00 Democratizing Access to Big Data from DNS and Application to Machine Learning  
***Professor Charles Meneveau***

*Louis M. Sardella Professor, Department of Mechanical Engineering;  
Associate Director, Institute for Data Intensive Engineering and Science (IDIES);  
Professor, Department of Physics and Astronomy  
Johns Hopkins University (U.S.A.)*



**Q&A Session I-A: *Fundamentals of Fluid Dynamics in the Naval Context (Part-1)***

Session Chair: *Professor Moustafa Abdel-Maksoud, Hamburg University of Technology, Germany*

- Monday 22:15 – #108 Experimental and Numerical Study of Air-Water Interface Instabilities with Machine Learning for Experimental Data Analysis  
*T. K. Dogan, Z. Wang and F. Stern (Univ. of Iowa)*
- 22:25 – #96 Experimental Investigation on the Turbulent Air-Wake Produced by a Generic Ship due to an Incoming Atmospheric Boundary Layer  
*H. Setiawan, Kevin and J. P. Monty (Univ. of Melbourne)*
- 22:35 – #17 Towards Development of Air Entrainment Models for Ship Wakes  
*K. Hendrickson, X. Yu and D. K.-P. Yue (MIT)*
- 22:45 – #65 Local Flow around a Surface Combatant at Various Static Drift Conditions: The Role Played by Turbulence Closures  
*M. Visonneau, E. Guilmineau and G. Rubino (ECN)*
- 22:55 – #98 Large Eddy Simulation of Marine Flows over Complex Geometries Using a Massively Parallel Unstructured Overset Method  
*T. Kroll, N. Morse, W. Horne and K. Mahesh (Univ. of Minnesota)*
- 23:05 – #95 A Combined Method of HOS and CFD for Simulating a Container Ship in Steep Waves  
*Y. Zhuang, D. Wan, B. Bouscasse and P. Ferrant (Shanghai Jiao Tong Univ., ECN)*

**Q&A Session I-B: *Cavitation and Multi-phase Flows (Part-1)***

Session Chair: *Dr. Mario Felli, National Research Council – Institute of Marine Engineering (CNR-INM), Italy*

- Monday 22:15 – #41 Dynamics of Cavitation Inception in High Reynolds Number Shear Flow  
*L. Barbaca, J. A. Venning, P. S. Russell, E. S. C. Russell, B. W. Pearce and P. A. Brandner (Univ. of Tasmania)*
- 22:25 – #75 Experimental Study of Cavitation Inception During the Interaction of Vortices  
*D. Knister, E. Callison, H. Ganesh and S. L. Ceccio (Univ. of Michigan)*
- 22:35 – #82 Experimental Study of the Mechanisms Sustaining Attached Cavitation Inception  
*O. Ram, K. Agrawal and J. Katz (Johns Hopkins Univ.)*
- 22:45 – #83 Measuring the 3D pressure field and relating it to cavitation inception in a turbulent shear layer  
*K. Agarwal, O. Ram, J. Wang, Y. Lu and J. Katz (Johns Hopkins Univ.)*
- 22:55 – #76 The effect of Reynolds number on a developed tip vortex cavity and its radiated noise  
*J. Bosschers (MARIN)*
- 23:05 – #78 Reducing water entry impact forces by altering cavity dynamics  
*R. Rabbi, N. Speirs, A. Kiyama, J. Belden and T. Truscott (Utah State Univ.)*

**Day 2: Tuesday, October 20, 2020**

**33rd Symposium  
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**Plenary Session: Weinblum Memorial Lecture**

Session Chair: *Dr. Arthur Reed, Naval Sea Systems Command, USA*

Tuesday 20:00 – 20:50 Prediction of Performance and Design of Marine Propulsors and Turbines

***Professor Spyros Kinnas***

*Hudson-Matlock Professor of Civil Engineering  
Associate Director, Offshore Technology Research Center  
Department of Civil, Architectural and Environmental Engineering  
University of Texas at Austin (U.S.A.)*



**Plenary Session: Invited-Speaker Lecture No. 2**

Session Chair: *Professor Frederick Stern, University of Iowa, USA*

Tuesday 20:50 – 21:40 Simulation-Based Design Optimization in Naval Hydrodynamics: A Research Journey  
(In memory of Prof. Yusuke Tahara)

***Dr. Matteo Diez***

*Senior Research Scientist  
National Research Council – Institute of Marine Engineering (CNR-INM)  
(Italy)*





**Q&A Session II-A: *Fundamentals of Fluid Dynamics in the Naval Context (Part-2)***

Session Chair: *Professor Pablo Carrica, University of Iowa, USA*

- Tuesday 22:00 – #133 The Impact of a Flexible Plate on a Quiescent Water Surface  
*A. Wang, H. Kim, Z. Wong, M. Yu, K. T. Kiger and J. H. Duncan (Univ. of Maryland)*
- 22:10 – #117 High-Fidelity FSI Simulations and V&V of Vertical and Oblique Flexible Plate Slamming  
*R. Pellegrini, M. Diez, Z. Wang, F. Stern, A. Wang, Z. Wong, M. Yu, K. T. Kiger and J. H. Duncan (Univ. of Iowa, CNR-INM, et al.)*
- 22:20 – #53 Flow Structure in the Wake of Turbulent Wing-Body Junction Flows  
*S. Zimmerman, J. H. Lee, J. Monty and J. Klewicki (Univ. of Melbourne)*
- 22:30 – #58 A Critical Survey of Turbulence Modeling Methods for Ship Aero- and Hydrodynamics  
*M. Liefendahl, J. Revstedt and C. Fureby (Swedish Defense Research Agency)*
- 22:40 – #61 Analytical estimate of the reflection coefficient for forcing zones in 3D-flow simulations with nonlinear free-surface waves  
*R. Peric and M. Abdel-Maksoud (Hamburg University of Technology)*
- 22:50 – #124 Modelling Forced & Naturally Transitioning Boundary Layers on an Unappended Submarine Hull  
*W. Sidebottom and K. Petterson (Univ. of New South Wales, Swedish Defense Research Agency)*

**Q&A Session II-B: *Cavitation and Multi-phase Flows (Part-2)***

Session Chair: *Professor Steve Ceccio, University of Michigan, USA*

- Tuesday 22:00 – #27 Effect of Non-Condensable Gas on the Thermophysical Properties of Bubbly Water and on Bubble Collapse Dynamics Probed by Molecular Simulations, *J. I. Siepmann, J. L. Chen, B. Liang and K. Mahesh (Univ. of Minnesota)*
- 22:10 – #14 Physical and Numerical Investigation of the Transient Cavitating Flow around a Pitching Hydrofoil  
*M. J. Zhang, B. Huang, Q. Wu and G. Y. Wang (Beijing Institute of Technology)*
- 22:20 – #19 Averaging Methods for Cavitating Bubbly Flows  
*S. H. Bryngelson, A. Charalampopoulos, T. P. Sapsis and T. Colonius (California Institute of Technology, MIT)*
- 22:30 – #104 New Insights into Roughness Applications in Tip Vortex Cavitation Inception Mitigation  
*U. Svennberg, A. Asnaghi, R. Gustafsson and R. E. Bensow (Kongsberg Maritime Sweden AB, Chalmers University of Technology)*
- 22:40 – #106 Multi-Scale Euler-Lagrange Cavitation Modelling and Prediction of Cavitation Erosion  
*A. Peters, U. Lantermann and O. el Moctar (University of Duisburg-Essen)*
- 22:50 – #113 Inertial Collapse of Multiple Bubbles near a Rigid Surface  
*S. Alahyari Beig, M. Kim and E. Johnsen (Univ. of Michigan)*

**Day 3: Wednesday, October 21, 2020**

**33rd Symposium  
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***Plenary Session: Invited-Speaker Lecture No. 3***

Session Chair: *Professor Joseph Katz, Johns Hopkins University, USA*

Wednesday 20:00 – 20:50 Prediction of Drag for Rough Wall Boundary Layer Flows

***Professor Karen A. Flack***

*Professor, Mechanical Engineering Department  
United States Naval Academy  
(U.S.A.)*



***Plenary Session: Invited-Speaker Lecture No. 4***

Session Chair: *Professor Masashi Kashiwagi, Osaka University, Japan*

Wednesday 20:50 – 21:40 Innovative Measurement of Unsteady Pressure Distribution on Ship-Hull Surface and Its Use for Hydrodynamic Study on Seakeeping

***Professor Hidetsugu Iwashita***

*Professor, Department of Transportation and Environmental Systems  
Hiroshima University  
(Japan)*





**Q&A Session III-A: *Hydrodynamics in Ship Design***

Session Chair: *Dr. Emilio F. Campana, National Research Council, CNR-DIITET, Italy*

- Wednesday 22:00 – #40 Hydrodynamic Design of Energy Saving Device for Ship Scale Performance Improvement  
*H. Ikenoue, T. Hino and Y. Takagi (Yokohama National Univ.)*
- 22:10 – #128 A New Hull Form Modification Technique for Hydrodynamic Optimization of a TriSWACH  
*Chi Yang and Fuxin Huang (George Mason University)*
- 22:20 – #103 Propulsive Characteristics and Comparative Study on the Prediction Methods of Power Increase in Regular Head Waves of KVLCC2 Using Model Tests, *J. E. Choi, C. M. Lee, J. H. Seo, J. W. Yu and I. Lee (Pusan National Univ.)*
- 22:30 – #64 Hydrodynamic Design of Propulsion Devices taking into account Full Scale Roughness Effects  
*K. Kim, M. Leer-Andersen and S. Werner (SSPA Sweden AB)*
- 22:40 – #33 Assessment of Experimental and CFD Capability for KCS Added Power in Head and Oblique Waves  
*Y. Sanada, D-H. Kim, H. Sadat-Hosseini, F. Stern, M. A. Hossain, P-C. Wu, Y. Toda, J. Otzen, C. Simonsen, M. Abdel-Maksoud, M. Scharf and G. Grigoropoulos (Univ. of Iowa, Univ. of North Texas, Osaka Univ., et al.)*

**Q&A Session III-B: *Undersea Vehicle Hydrodynamics & Hydroacoustics***

Session Chair: *Professor Richard Sandberg, University of Melbourne, Australia*

- Wednesday 22:00 – #22 Simulation-based Investigation of Foil-Turbulence Interaction Noise  
*M. Liefvendahl and R. E. Bensow (Swedish Defense Research Agency, Chalmers Univ. of Technology)*
- 22:10 – #62 Hydroacoustic Analysis of a Marine Propeller in Open Water Conditions through LES and Acoustic Analogy  
*R. Broglia, M. Cianferra, A. Posa, M. Felli and V. Armenio (CNR-INM, Univ. of Trieste)*
- 22:20 – #114 Ingestion of Non-Uniform Turbulent Inflow by a Rotor: Sound Production and Propagation  
*W. N. Alexander, C. Hickling, N. A. Balantrapu and W. J. Devenport (Virginia Tech)*
- 22:30 – #52 Vertical Zigzag and Controlled Turn Maneuvers of a Generic Submarine in Deep Water and Near the Surface Including Irregular Waves, *Y. Kim, J. E. Martin and P. M. Carrica (Univ. of Iowa)*
- 22:40 – #138 A Prolate Spheroid in Stratified Flow  
*J. L. Ortiz-Tarin, K. Chongsiripinyo and S. Sarkar (Univ. of California at San Diego, Chulalongkorn Univ.)*

23:00 – 23:20 ***Announcement of the 34th Symposium on Naval Hydrodynamics***

**Q&A Session IV-A: *Nonlinear Wave-Induced Motions and Loads (Part-1)***

Session Chair: *Dr. Woei-Min Lin, Office of Naval Research, USA*

- Thursday 20:00 – #73 Numerical Prediction of Self-Propulsion in Extreme Head Seas  
*B. Knight, W. Xu and K. Maki (Univ. of Michigan)*
- 20:10 – #70 CFD Simulations of Two-body Interactions in Waves  
*W. Meng, H. Peng and W. Qiu (Memorial Univ.)*
- 20:20 – #60 Seakeeping in Regular and Irregular Waves with Forward Speed Using a Two-Phase Functional Coupling based SWENSE Solver  
*T. Descamps, Y. J. Kim, Z. Li, Y. M. Choi, B. Bouscasse, L. Gentaz, G. Ducrozet, D. Le Touzé and P. Ferrant (ECN, BV)*
- 20:30 – #12 Prediction of Heavy Weather Seakeeping of a Destroyer Hull Form by means of Time Domain Panel and CFD Codes  
*F. van Walree, A. Serani, M. Diez and F. Stern (MARIN, CNR-INM, Univ. of Iowa)*
- 20:40 – #59 Experimental and Computational Characterization of the Unconstrained Dynamics of a Self-Propelled Amphibious Vehicle  
*A. Arnold, S. Behara, J. E. Martin, P. M. Carrica and C. M. Harwood (Univ. of Iowa)*
- 20:50 – #84 Full Resolution of Extreme Ship Response Statistics  
*X. Gong, Z. Zhang, K. Maki and Y. Pan (Univ. of Michigan)*

**Q&A Session IV-B: *Cavitation and Multi-phase Flows (Part-3)***

Session Chair: *Professor Paul A. Brandner, University of Tasmania, Australia*

- Thursday 20:00 – #26 Bubble Breakup and Coalescence in Hybrid RANS/LES Models  
*B. Yuan, J. Li and P. M. Carrica (Univ. of Iowa)*
- 20:10 – #97 Large Eddy Simulation for the Investigation of Different Regimes of Cavitation  
*F. L. Brandao, A. Madabhushi, M. Bhatt and K. Mahesh (Univ. of Minnesota)*
- 20:20 – #143 Simulation of Bubble / Lifting Surface Interaction and Cavitation  
*G. L. Chahine, C.-T. Hsiao and J. Ma (DYNAFLOW INC.)*
- 20:30 – #118 Sheet Cavitation Inception Mechanisms on a NACA 0015 Hydrofoil  
*M. X. van Rijsbergen, A. K. Lidtke, G. Lajoinie and M. Versluis (MARIN, Univ. of Twente)*
- 20:40 – #39 Cavitation in Tip-Leakage Flows  
*P. S. Russell, L. Barbaca, E. S. C. Russell, B. W. Pearce and P. A. Brandner (Univ. of Tasmania)*
- 20:50 – #11 A Polydisperse Model of Cavitation  
*J. Li and P. M. Carrica (Univ. of Iowa)*

**Q&A Session V-A: *Nonlinear Wave-Induced Motions and Loads (Part-2) & Hydrodynamics of High Speed or Multi-hull Ships***

Session Chair: *Professor Bettar Ould el Moctar, University of Duisburg-Essen, Germany*

- Thursday 21:10 – #31 Statistical Analysis of Extreme Ship Loads: Physical Distribution Tails, Limitations of Data-Driven Approaches and Model Uncertainty, *B. Brown and V. Pipiras (Univ. of North Carolina)*
- 21:20 – #71 On Extreme Value Properties of Vertical Bending Moment  
*T. Sapsis, V. Pipiras, K. Weems and V. Belenky (MIT, Univ. of North Carolina, David Taylor Model Basin)*
- 21:30 – #68 Towards Numerical Estimation of Probability of Capsizing Caused by Broaching-to  
*K. Weems, V. Belenky, K. Spyrou, S. Aram and K. Silva (David Taylor Model Basin, NTUA, Univ. of Michigan)*
- 21:40 – #56 Numerical Analysis of Semi-displacement Vessels in Head Waves  
*H. Simonis, P. Marleaux and M. Abdel-Maksoud (Hamburg University of Technology)*
- 21:50 – #101 A Hybrid Quasi-Nonlinear Model for Planing Hull Seakeeping  
*C. M. O'Reilly, N. Garfield, D. J. Piro, D. C. Kring (Navatek LLC)*
- 22:00 – #88 Hydrodynamics of High Deadrise, Swept Back, Cambered Planing Surfaces  
*S. Brizzolara, R. Bay, B. Beaver, M. Morabito, Z. Wang and F. Stern (Virginia Tech, United States Naval Academy, et al.)*

**Q&A Session V-B: *Cavitation and Multi-phase Flows (Part-4) & Turbulent Drag Reduction***

Session Chair: *Professor Krishnan Mahesh, University of Minnesota, USA*

- Thursday 21:10 – #81 Cavitation in the Wake of a Backward Facing Step  
*A. Bhatt, H. Ganesh and S. L. Ceccio (Univ. of Michigan)*
- 21:20 – #112 Scale Resolving Simulations of the Non-cavitating and Cavitating Flows in an Axial Water Jet Pump  
*M. H. Arabnejad, A. Eslamdoost, U. Svennberg and R. E. Bensow (Chalmers Univ. of Technology, et al.)*
- 21:30 – #139 Towards Experimental Measurement of Interfacial Shear Stress in a Turbulent Liquid-Air Layer  
*C. Fort, E. Florou, M. Habukawa, M. A. André and P. M. Bardet (George Washington Univ.)*
- 21:40 – #111 Superhydrophobic Surface Air Layer Drag Reduction  
*C. Callahan-Dudley, C. Tecson, R. De La Cruz and S. A. Makharju (UC Berkeley, TU Delft)*
- 21:50 – #1 Active Separation Control by Sweeping Jets for Naval Applications  
*S. Aram, R. Thomas, J. Hartenberger and S. Gowing (NSWCCD, CACI International Inc.)*
- 22:00 – #99 Direct Numerical Simulation of Realistic Rough Surfaces and Energy Minimization for the Prediction of Interfacial Equilibrium Position, *R. Ma, K. Alamé, S. Anantharamu and K. Mahesh (Univ. of Minnesota)*



**Q&A Session VI-A: Propulsor Hydrodynamics**

Session Chair: *Professor Spyros Kinnas, University of Texas at Austin, USA*

- Thursday 22:20 – #90 Enhanced Estimation of Effective Wake for Propeller Design and Maneuvering Simulations  
*A. Sánchez-Caja, J. Martio and V. M. Viitanen (VTT)*
- 22:30 – #86 Development of an Efficient Method to Compute the Propeller-Hull Interactions in the Real Sea  
*C-Y. Hsin, C-S. Zhou, Y-J. Nian and Y-S. Wu (National Taiwan Ocean Univ.)*
- 22:40 – #16 Investigation of the interaction of a propeller wake with a downstream rudder via Large-Eddy Simulation  
*A. Posa, R. Broglia and E. Balaras (CNR-INM, George Washington Univ.)*
- 22:50 – #136 Experimental and CFD Study of the Streamwise Evolution of Propeller Tip Vortices  
*L. Wang, P. M. Carrica and M. Felli (Univ. of Iowa, CNR-INM)*
- 23:00 – #134 Propeller Tip and Hub Vortex Dynamics from the Near to the Very Far Field by Time-resolved PIV Measurements  
*M. Felli and M. Falchi (CNR-INM)*
- 23:10 – #123 A Viscous Vorticity Method for Predicting Propeller Performance  
*S. A. Kinnas and C. Wu (Univ. of Texas at Austin)*

**Q&A Session VI-B: Data Science in Hydrodynamics (Part-1)**

Session Chair: *Professor Michel Visonneau, Ecole Centrale de Nantes (ECN), France*

- Thursday 22:20 – #80 DNS Data Driven Modeling of Turbulent Flows over Rough Walls  
*M. Aghaei Jouybari, J. Yuan and G. J. Brereton (Michigan State Univ.)*
- 22:30 – #85 Turbulent Wake Prediction Using Deep Convolutional Neural Networks  
*B. Font, G. D. Weymouth, V.-T. Nguyen and O. R. Tutty (Univ. of Southampton, Alan Turing Institute, et al.)*
- 22:40 – #37 Data-driven Turbulence Modelling for Improved Prediction of Ship Airwakes  
*A. Haghiri, C. Lav and R. D. Sandberg (Univ. of Melbourne)*
- 22:50 – #69 Improved Vessel Motion Predictions using Full-Scale Measurements and Data-Driven Models  
*M. L. Schirrmann, M. D. Collette and J. W. Gose (Univ. of Michigan)*
- 23:00 – #115 Multi-Fidelity Machine Learning from Adaptive- and Multi-Grid RANS Simulations  
*J. Wackers, M. Visonneau, A. Serani, R. Pellegrini, R. Broglia and M. Diez (ECN, CNR-INM)*

**Q&A Session VII-A: *Hydrodynamics of Maneuvering and Control (Part-1)***

Session Chair: *Professor Andr s Cura-Hochbaum, Technical University Berlin, Germany*

- Friday 20:00 – #28 Numerical Investigation and Experimental Validation on Maneuverability of KVLCC2 Tanker in Regular Waves  
*J-H. Lee, Y. Kim, D-J. Kim and Y-G. Kim (Seoul National Univ.)*
- 20:10 – #92 A Comparative Study of RANS and DDES Performance in Predicting Ship Maneuverability for Free Running Model  
*J. Wang and D. Wan (Shanghai Jiao Tong Univ.)*
- 20:20 – #100 Prediction of Ship Maneuvering in Waves Using a Combined RANS and Potential Flow Approach  
*D. Piro, P. White, B. Knight, K. Maki and D. Kring (Navatek LLC, Univ. of Michigan)*
- 20:30 – #20 Course-Keeping Maneuver of KRISO Container Ship in Calm Water and Head Waves  
*S. RoyChoudhury, K. Kawamoto, P-C. Wu, Y. Sanada and Y. Toda (Osaka Univ., National Cheng Kung Univ, Univ. of Iowa)*
- 20:40 – #35 6-DOF Motion Simulation of a Ship Turning in Irregular Waves  
*M. A. A. Hasnan and H. Yasukawa (Hiroshima Univ.)*

**Q&A Session VII-B: *Data Science in Hydrodynamics (Part-2) & Ocean Environment***

Session Chair: *Professor Eric Paterson, Virginia Polytechnic Institute and State University (Virginia Tech), USA*

- Friday 20:00 – #4 Support Vector Machine Learning Model of the Nonlinear Viscous Ship Roll Hydrodynamics  
*Y. Ma, D. F. H. Larson and P. D. Sclavounos (MIT)*
- 20:10 – #137 Observing PIV Measurements Through the Lens of Data Clustering  
*D. D'Agostino, M. Andre, P. Bardet, A. Serani, M. Felli and M. Diez (Sapienza Univ. of Rome, CNR-INM, et al.)*
- 20:20 – #2 A Hydrodynamic Digital Twin Concept for Underwater Vehicles  
*L. Jiang, S. Signal, B. Jeffries, B. Earley, K. Junghans, D. Hess and W. Faller (NSWCCD, Applied Simulation Technologies)*
- 20:30 – #54 Anisotropic RANS Turbulence Modeling for Ship Wakes in an Active Ocean Environment  
*D. Wall and E. Paterson (Virginia Tech)*
- 20:40 – #135 Numerical Predictions of Flow Instabilities Near a Critical Layer at the Laboratory Scale  
*J. Gilbert, J. Pitt and E. Paterson (Virginia Tech)*

**Q&A Session VIII-A: *Hydrodynamics of Maneuvering and Control (Part-2) & Hydroelasticity for Ships and Propellers***

Session Chair: *Dr. David Kring, Navatek Ltd, Rhode Island, USA*

- Friday 21:00 – #72 Prediction of Heading Stability under Wind and Waves  
*A. Cura-Hochbaum and S. Uharek (Technical Univ. Berlin)*
- 21:10 – #34 Free-running Model Tests for Assessing Maneuverability of a Damaged Surface Combatant  
*J. Seo, J. Park, Y. Kim, K. P. Rhee, H. K. Yoon and S. H. Rhee (Chungnam National Univ., Seoul National Univ., et al.)*
- 21:20 – #131 Augmenting Maneuverability of UUVs with Cycloidal Propellers  
*M. Desai, R. Gokhale, A. Halder, M. Benedict and Y-L. Young (Univ. of Michigan, Texas A&M Univ.)*
- 21:30 – #105 Structural Response due to the Slamming of High-Speed Craft by Water Entry and Towing Tank Experiments  
*M. J. Javaherian, Z. Ren, C. Q. Judge and C. Gilbert (Virginia Tech, United States Naval Academy)*
- 21:40 – #67 FSI and MDO for Weight Reduction of a Grillage Panel of a Fast Deep-V Planing Hull Subject to Slamming in Waves  
*M. Diez, E. J. Lee, A. M. Powers, A. M. Fullerton, R. R. Lewis and F. Stern (CNR-INM, NSWCCD, Univ. of Iowa)*
- 21:50 – #7 Numerical Simulations of Isotropic and Orthotropic Flexible Hydrofoils in Calm Water and Head Waves  
*K. I. Matveev and M. P. Wheeler (Washington State Univ.)*

**Q&A Session VIII-B: *Near- and Far-Field Ship Wave and Wake Hydrodynamics***

Session Chair: *Dr. Sung-Eun Kim, U.S. Office of Naval Research Global Asia, USA*

- Friday 21:00 – #3 An Investigation of Advanced Boundary Element Methods  
*T. Zangle, J. Seekins, C. O'Reilly and D. Kring (Navatek LLC)*
- 21:10 – #74 Experimental and Numerical Studies of the Flow around the JBC Hull Form at Straight Ahead Condition and 8° drift Angle  
*I. Shevchuk, A. Sahab and M. Abdel-Maksoud (Hamburg Univ. of Technology)*
- 21:20 – #127 Relative Importance of Turbulence, Surface-Active Substances, and Surface Currents on Roughness Modification of Short Surface Waves in Ship Wakes, *R. Somero and E. Paterson (Virginia Tech)*
- 21:30 – #107 Study of Nonlinear Interaction between Waves and Ocean Currents Using High-Fidelity Simulation and Machine Learning  
*T. Li, A. Xuan and L. Shen (Univ. of Minnesota)*
- 21:40 – #125 Numerical Simulations of the Internal Waves Produced by a Submerged Body in a Stratified Fluid  
*L. K. Brandt, D. T. Conroy and J. W. Rottman (Leidos Inc.)*
- 21:50 – #140 Ocean Wave Simulations with Air-Sea Interaction and One-Way Coupling to a Domain with a Surface Vessel  
*D. T. Conroy, D. Wyatt, T. O'Shea, K. Delaney and A. Fullerton (Leidos Inc., Naval Warfare Center)*

22:00 – 22:15 **Closing**

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