

## 1 PERSONAL

1.1 **Name:** Armin W. Troesch

1.2 **Born:** July 17, 1947  
Flint, Michigan

### 1.3 **Degrees:**

B.S. The University of Michigan, 1969, Naval Architecture and Marine Engineering

M.S.E. The University of Michigan, 1972, Naval Architecture and Marine Engineering

Ph.D. The University of Michigan, 1975, Naval Architecture and Marine Engineering

### 1.4 **Positions at the University of Michigan:**

2017 - The American Bureau of Shipping Professor of Marine Engineering and Offshore Design Performance, Department of Naval Architecture and Marine Engineering, The University of Michigan

2003 - 2011 Chair, Department of Naval Architecture and Marine Engineering, The University of Michigan

1995- Professor, Department of Naval Architecture and Marine Engineering, The University of Michigan

1984-1995 Associate Professor, Department of Naval Architecture and Marine Engineering, The University of Michigan

1980-1987 Director, Ship Hydrodynamics Laboratory, The University of Michigan

1980-1984 Assistant Professor, Department of Naval Architecture and Marine Engineering, The University of Michigan

1976-1979 Assistant Research Scientist and Lecturer, Department of Naval Architecture and Marine Engineering, The University of Michigan

### 1.5 **Positions at Other Institutions or Organizations:**

1987-1988 Research Associate, David Taylor Naval Ship Research and Development Center, Bethesda, Maryland, Intergovernmental Personnel Act Agreement.

1970-1971 Design and Project Engineer, General Dynamics Corporation, Electric Boat Division, Groton, Connecticut.

## 2 TEACHING

### 2.1 New and Revised Courses Introduced at the University of Michigan:

NA 440: Marine Dynamics II, Introduced completely revised course Fall 1977 to 31 students.

NA 540: Marine Dynamics III, Introduced completely revised four hour course Fall 1993 to 19 students.

NA 621: Experimental Marine Hydrodynamics, Spring 1980 (team taught with three others), Taught ten times since to 5 to 12 students.

### 2.2 Doctoral Dissertation Committee Chairmanships:

Scott Slocum, *Nonlinear Springing of a Ship in Irregular Head Seas*, August, 1983.

Robert S. Scher, *Study of Flap-Type Wave Absorbing Devices*, December 1984.

Stuart B. Cohen, *Analysis of Zero-Speed Ship Motions Tests in a Narrow Towing Tank*, August 1986.

Sung Kyun Kim, *Viscous Flows Past Oscillating Cylinders at Low Keulegan-Carpenter Numbers*, April, 1988.

Chang-Gu Kang, *Non-linear Impact Hydrodynamics*, June, 1988.

Jeff Falzarano, *Predicting Complicated Dynamics Leading to Vessel Capsizing*, June 1990.

Amnon Talmor, *Nonlinear Slender-Body Approach for Predicting Planing Hull Performance*, August 1991.

Jong-Hwan Park, *Numerical Stability of the Nonlinear Free-Surface Problem of Two-Dimensional and Three-Dimensional Axi-Symmetric Floating Bodies*, February 1992.

Armin W. Troesch  
March, 2017

Krishnaprasad Thiagarajan, *Flow Past the Sharp Edge of an Oscillating Disk*,  
June, 1993.

Canhai Lai, *Hydrodynamic and Dynamic Analysis of High-Speed Planing Craft*,  
August 1994.

Ming-lun Wang, *A Study of Nonlinear Free Surface Flows*. April, 1995.

Changben Jiang, *Highly Nonlinear Rolling Motion Leading to Capsize*.  
June, 1995.

Lixin Xu, *A Theory for Asymmetric Vessel Impact and Steady Planing*.  
August, 1998.

Carolyn Frank Judge, *Impact of Wedges with Horizontal and Vertical Velocities*.  
April 2000.

Richard Royce, *2-D Impact Theory Extended to Planing Craft with Experimental Comparisons*, (co-chair with Prof. William Vorus, University of New Orleans)  
April, 2001.

Young Woo Lee, *Numerical Simulation of Capsize in Beam Seas*. August 2001.

Hai-ping He, *Viscous Flows Generated by Circular Disks*, (co-chair with Prof. Marc Perlin, UM) December 2002.

Leigh McCue, *Nonlinear Capsizing in Three Degrees of Freedom*, December 2004.

Kevin J. Maki, *Transom Stern Hydrodynamics*, December 2005.

Mohamad Khalid, *Simulation of Euler-Equations of Motion and Blended-Nonlinear Hydrodynamics for Multi-Hulled Vessels*, January, 2007

Laura Kay Alford, *Estimating Extreme Responses Using a Non-Uniform Phase Distribution*, January, 2008

Nabanita Datta, *Hydroelastic Response of Marine Structures to Impact-induced Vibrations*. October 2010

Dae-hyun Kim, *Simulation of Extreme Environmental Loading for Design*,  
September, 2012

David Hodapp, *The Use of High-Fidelity Numerical Models in Ship Structural Fatigue Predictions*, Spring 2014, co-chair with Matthew Collette.

Armin W. Troesch  
March, 2017

Esteban Castro-Feliciano, *Co-Design of Planing Craft and Active Control Systems*,  
May 2016, co-chair with Jing Sun

Oscar Darío Tascón Muñoz, *Parametrically Excited Transverse Plane Instabilities  
of High Speed Planing Hulls*, September, 2016, co-chair with Kevin Maki.

Harleigh C. Seyffert, *Rare Wave Groups and Extreme Marine Structure  
Dynamics*, expected Fall 2018.

**Professional Degree Chairmanships:**

John D. Hicks, Lt.(jg) USCG, *Analysis Method for Planing Hull Vertical  
Motions*, June, 1993.

Richard H. Akers, *Planing Hull Design Environment*, August, 1995

Anthony S. Daniels, *Design and Construction of the Stepped Planing Hull  
Dynamometer*, (co-chair with Prof. Michael Parsons, University of Michigan)  
August, 2002

**MSE Degree Chairmanships:**

Matthew Lake, *Hydrodynamic Coefficient Estimation for Offshore Oil Production  
Platforms*, June 1999

Torbjørn Amundsen, *Extreme Response Estimation of a Flexible Pipe During  
Offshore LNG Loading*, March 2000 (Co-supervisor Prof. Carl Larsen,  
Norwegian University of Science and Technology)

James O'Kane, *Design Estimation of Hydrodynamic Coefficients for Tension Leg  
Platforms, including Component Interaction and the Effects of Current*,  
June 2000.

Wayne Arguin, *Simulation of Planing Hull Dynamics in the Transverse Plane*,  
June 2001.

Timothy Conners, *Coupled Surge, Sway, Roll, and Yaw Hydrodynamic  
Coefficients for High Speed Planing Craft*, June 2001.

Michael Obar, *Experimental Study of Vessel Capsizing in Beam Seas*,  
September 2001.

Christopher J. Rose, *Marine Systems Application of Extreme Value Prediction of a  
Vibro-Impact System Subject to Stochastic Excitation*, May 2010

Fredy Zarate, *CFD Modeling of Yawed and Heeled High Speed Planing Hulls*,  
May 2010

Pablo Gabriel Morato Domínguez, *Dynamic transversal instabilities due to coupled pitch-heave-roll motions on a high speed craft*, January 2017  
(conferred by University of Liege "Master of Sciences in Applied Mechanics")  
developed at University of Michigan and University of Rostock in the  
framework of the "EMSHIP" Erasmus Mundus Master Course in "Integrated  
Advanced Ship Design")

### **2.3 Courses Taught at the University of Michigan:**

ME211 Introduction to Statics and Strength of Materials  
NA 310 Ship Strength I  
NA 320 Ship Resistance and Propulsion I  
NA 340 Marine Dynamics I  
NA 401 Small, High Speed Craft  
NA 421 Ship Model Testing  
NA 440 Marine Dynamics II  
NA 490 Directed Study, Research and Special Problems  
NA 520 Marine Hydrodynamics III  
NA 526 Naval Hydrodynamics II (similar to the expanded NA 540)  
NA 540 Marine Dynamics III  
NA 575 Computer-Aided Marine Design Project  
NA 591 Reading and Seminar in Naval Architecture  
NA 621 Experimental Marine Hydrodynamics  
NA 792 Professional Thesis

## **3 RESEARCH**

### **3.1 Grants and Contracts:**

"Diffracted Wave Amplitude and Pressure Field in the Vicinity of a Slender Ship," Office of Naval Research, (with R.F. Beck), 1979, \$36,900.

"Pressure Distribution Model Tests in Waves," U.S. Coast Guard, 1979, \$60,700.

"Underkeel Clearance of Barge Trains," U.S. Coast Guard, 1980, (with Stuart Cohen) \$10,000.

"Nonlinear Ship Springing," American Bureau of Shipping/Maritime Administration, 1980, \$99,200.

"Test and Evaluation of a Wave Power Conversion Device," Q Corporation/  
Department of Energy, 1980-1984, \$65,000.

- "Added Mass and Damping of a Marathon Leg Section," Marathon Marine Engineering Co., 1980, \$5,000.
- "Motion Tests of a Jackup Drilling Rig," Marathon Marine Engineering Co., 1980. \$75,000.
- "Wind Tunnel Tests on the Glomar Explorer," Sante Fe Engineering Co./National Science Foundation, 1981, ( with Roger Van Gunst, AERO) \$23,800.
- "Development of Random Wave Generation Capability in the Naval Tank," DRDA, 1981, \$1,400.
- "Development Funds for Joint NAME and Aerospace Project to Increase Wind Tunnel Capabilities," (Release of overhead on ODECO Semi-Submersible Drill Rig Project), DRDA, 1981, \$10,000.
- "Support for Research Involving Wind Tunnel Experiments on Ships and Ocean Drilling Platforms," DRDA, 1981, \$2,456.
- "Theoretical Evaluation of Non-Linear Springing Excitation," American Bureau of Shipping, 1982, \$35,000.
- "Impact Loads on a Buoyancy Can," EXXON Production Research, 1982, \$20,000.
- "High Speed Ship Propulsion," Ingalls Shipbuilding Company, 1982, \$51,500.
- "Investigation of the Hydrodynamic Characteristics of Tracked Amphibious Personnel Carriers," General Dynamics, 1982, \$102,400.
- "An Investigation of Low Speed Ocean Engineering Experiments," Sea Grant, 1983- 1984, \$76,800.
- "Experimental Determination of Wave Elevations Next to Hulls," Office of Naval Research, 1983, \$31,400.
- "Grant to Support Ph.D. Level Research in the Theoretical Hydrodynamics of Wave Energy Absorbers," Q Corporation, 1983, \$15,000.
- "Ingalls' 84 IRAD Model Ship Program," Ingalls Shipbuilding, 1984, \$59,600.
- "Non-Linear Ship Springing," American Bureau of Shipping, 1984, \$23,000.
- "Bow Flare Impact Studies," University Research Program, Maritime Administration, 1985, \$38,600.
- "Hydrodynamic Research Investigating Roll Damping of Barges," EXXON Production Research Co., 1985, \$104,200.

- "Tandem-Flap Wave Energy Device," Q Corporation/Department of Energy, 1986, \$81,700.
- "Bow Impact Loads Including the Effects of Flare," DOT/Maritime Administration, 1986, \$32,000.
- "Planing Hull Stability Trainingship Program," U.S. Coast Guard, 1986-1988, \$118,600.
- "Nonlinear Aspects of Ship Dynamics," U. S. Coast Guard, 1986-1989, \$39,200.
- "Viscous Hydrodynamic Forces on Non-Circular Cylindrical Members in High Frequency Oscillatory Flow," Michigan Sea Grant Program/Department of Commerce, 1987-1989, \$69,000.
- "Research Project for Aids to Navigation Barge," U. S. Coast Guard, 1987, \$84,400.
- "Support for IPA Appointment," David Taylor Naval Ship Research and Development Center, 1987-1988, \$59,700.
- "Nonlinear Extension of Time-domain Analysis," AHR/Office of Naval Research (with R. F. Beck) 1988 - 1990, \$70,400.
- "Hydrodynamic Impact Investigations," Office of Naval Research, 1989, \$34,700.
- "Seakeeping of Planing Hulls, Phase I," UM/Michigan Sea Grant, 1989, \$63,800.
- "Thermal Wake Flow Visualization Behind a Delta Shaped Wing and Behind a Wake Screen," Naval Research Laboratory, 1989, \$20,000.
- "Predicting Complicated Dynamics Leading to Vessel Capsizing," USCG and Michigan Sea Grant, 1989, \$56,900.
- "Nonlinear Extension of Time-Domain Analysis, Phases II - V," AHR/Office of Naval Research (with R. F. Beck) 1990 - 1994, \$196,100.
- "Seakeeping of Planing Hulls, Phase II," UM/Michigan Sea Grant , 1991, \$108,400.
- "Numerical Simulation of Downstream Wake," Naval Research Laboratory/Office of Naval Research, 1990, \$39,800.
- "Hydrodynamic Forces on Bodies Undergoing Small Amplitude Oscillations in a Uniform Stream," UM/Michigan Sea Grant/Industry Consortium 1990, \$83,700.

- "A Nonlinear Probabilistic Approach to Fishing Vessel Capsizing - Phase I,  
"UM/Michigan Sea Grant (with S. W. Shaw) 1991, \$62,100.
- "Resistance, Seakeeping and Dynamic Stability of High-speed Planing Craft,"  
UM/Michigan Sea Grant, ( with K.-P. Beier) 1993, \$66,700.
- "A Nonlinear Probabilistic Approach to Fishing Vessel Capsizing - Phase II,"  
UM/Michigan Sea Grant (with S. W. Shaw) 1993, \$34,400.
- "Nonlinear Seakeeping Experiments," AHR/Office of Naval Research, 1993,  
\$20,000.
- "Of the Safety of Native American Fishing Boats in Grand Traverse Bay when  
Trap Netting," Michigan Sea Grant, 1993, \$7,600.
- "International Collaboration on an Advanced, Workstation-based Design Package  
for Small Planing Craft," OVPR, University of Michigan, 1994, \$2,500.
- "Prediction of Impact Loads Due to Extreme Vessel Motions," Office of Naval  
Research, 1994 - 1996, \$450,000.
- "Workshop on Nonlinear Sea Loads and Ship Response: A Basis for Ship  
Structural Design," Office of Naval Research, 1994, \$6,000.
- "High Speed Planing Boat Shock Mitigation Modeling," Office of Naval Research,  
1995, \$50,000.
- "High Speed Planing Boat Shock Mitigation Modeling," Office of Naval Research,  
1996, \$70,000.
- "Prediction of Impact Loads Due to Extreme Vessel Motions," Office of Naval  
Research, 1996- 1997, \$125,000.
- "Shock Reduction of Planing Boats," Gulf Coast Region Maritime Technology  
Center, 1996-1997, \$60,000.
- "Transfer of High Speed Planing Craft Technology to the Private Sector," National  
Coastal Research Institute, 1996-1997, \$71,548.
- "Shock Reduction of Planing Boats," Gulf Coast Region Maritime Technology  
Center, 1997-1998, \$60,000.
- "Risk Analysis of Commercial Fishing Vessels Operating in Extreme Seas,"  
UM/Michigan Sea Grant (with S. W. Shaw) 1997-1999, \$70,000  
(\$35,000/year).



"Transfer of High Speed Planing Craft Technology to the Private Sector - Enhancement Project," National Coastal Research Institute, 1998-1999, \$38,000.

"Shock Reduction of Planing Boats," Gulf Coast Region Maritime Technology Center, 1998-1999, \$55,000.

"Hydrodynamic Damping of a Slender Spar Structure," UM//Industry Consortium 1997-1998, \$33,000.

"Hydrodynamic Damping of a Slender Spar Structure," UM//Industry Consortium 1999-2000, \$40,000.

"Joint Industry Project in the Hydrodynamics of Thin Plates," Various offshore oil and exploration companies, 1998-2001. \$225,000.

"Link Foundation Fellowship," 1999-2000. \$22,000.

"Brain Korea," Mokpo National University, Chonnam, Korea 2000. \$61,000.

"Undergraduate Ocean Engineering Grant," Exxon/Mobil Corp. 2001 \$20,000.

"Stern Flap Design," Office of Naval Research, 2001-2004. \$161,000.

"NNRI – Design Loads Generator Coupled with Reliability-based Structural Design," Office of Naval Research, 2002-2006. \$599,848.

"NNR-NE – Tools for Multi-hull Design," Office of Naval Research, 2003-2006. \$159,769. (This is a subcontract of a larger \$747,000 ONR project with R. Beck as PI)

"DD(X) Independent Design Review Team," Office of Naval Research, 2004-2005. \$72,500.

"Model Tests of a Typical RIB in Waves," Department of Homeland Security, 2004-2005. \$76,000.

"Mission Configurable Modular Combatant Craft," Battelle Memorial Institute, 2004. \$31,300.

"Sloshing Experiments of Liquid Natural Gas Carriers," ExxonMobil Corporation, 2004. \$50,000.

"Drop Tests of a Typical MKIII Corrugation Panels," ExxonMobil Corporation, 2004-2005. \$50,000.

"MURI – Optimal Vessel Maneuvering in Evolving Nonlinear Wave Fields," Office of Naval Research, 2005-2010. \$416,000 part of \$5M. Robert Beck, PI.

"Architectural Concepts and Hydrodynamics Technologies for High Speed Sealift to Austere Ports," Office of Naval Research, 2005-2008. \$1,396,654.

"DDX Phase IV Hull Form Program," Computer Sciences Corporation/ONR/NAVSEA, 2006-2008, \$1.07M. (Various other co-PI's at Michigan and other universities)

"Modeling the Dynamic Behavior of a Ship Structure in URANS Codes with structured or Unstructured Solution Grids" ONR, 2006-2008, \$300,066 (co-PI's, A. Troesch, N. Vlahopoulos)

"D.O.0021 Summer Naval Surface Ship Design Program (SNSSDP) ", NAVSEA, 2006-2007, \$120,018 (co-PI's: A. Troesch, Tom Lamb)

"Fellowship Support for University of Michigan's Sequential Graduate/Undergraduate Studies Program (SGUS) in Naval Architecture and Marine Engineering", ONR, 2006-2007, \$70,000

"Experimental, Numerical and Design Study of 135' - 140' Luxury Yacht, " ARES MARINE, INC, 2007, \$60,000.

"Design Tools for the Sea-Base-Connector Transformable Craft (T-Craft) Prototype Demonstrator," ONR, 2007-2008, \$1,396,654. (PI: A. Troesch; co-PI's R. Beck, S. Ceccio, L. Doctors (UNSW), D. Karr, K. Maki, N. Vlahopoulos, J. Young (Princeton), S. Zalek)

"Ship Design and Simulation Tools for Complex Marine Systems - ref: BAA 08-001," ONR, 2008-2012, \$1,294,286. (PI: A. Troesch; co-PI's R. Beck, D. Karr, K. Maki, S. Zalek)

"Design Tools for The Sea-base-connector Transformable Craft (T-Craft) Prototype Demonstrator - Phase II," 2009-2010, \$460,779. (PI: A. Troesch; co-PI's K. Maki, N. Vlahopoulos)

"Seakeeping Performance Prediction for the Design of Advanced Naval Vessels, " Awarded Dt: 2010 – 2012, \$1,173,32. (PI: K. Maki; co-PI's A. Troesch (AWT's part is \$235,000), N. Vlahopoulos)

"Harvesting Hydrokinetic Energy Using Vortex Induced Vibration and Fish Biometrics, " Awarded Dt: 2010 – 2010, \$60,332. (PI: A Troesch; co-PI's M. Bernitsas)

"Stochastic Environments Leading to Design Responses in Nonlinear Seakeeping Simulations, " Awarded: 2011 – 2015, ONR \$765,167. (PI: A. Troesch)

"Support of the Theory TEMPEST Theory Advisory Panel," Awarded: Nov. 2012 – 2013, NSWC-CD \$12,775: co-PI A. Troesch's part.

"Probabilistic Assessment of Design Events for Complex Systems," Awarded: 2015 – 2019, ONR \$409,172. (PI: A. Troesch)

Other miscellaneous sponsored projects involving basic research or commercial testing in the Ship Hydrodynamics Laboratory (SHL) and/or the Aerospace Engineering Department Wind Tunnel. Dr. Troesch supervised these projects in his capacity as Director of the SHL:

1979 - 1981	\$153,700
1981 - 1982	\$106,500
1982 - 1983	\$200,760
1983 - 1984	\$238,200
1984 - 1985	\$120,900
1985 - 1986	\$ 80,000
1986 - 1987	\$170,800

## 4 PUBLICATIONS

### 4.1 Articles in Journals, Transactions, or Archives and Chapters in books: (Students are underlined)

Troesch, A.W., "The Diffraction Forces for a Ship Moving in Oblique Seas," Journal of Ship Research, Vol. 23, No. 2, June 1979, pp. 127-139.

Phelps, V. and Troesch, A.W., "Full Scale Wake and Boundary Layer Instrumentation Feasibility Study," Ocean Engineering, Vol. 7, 1980, pp. 281-304.

Beck, R.F. and Troesch, A.W., "Wave Diffraction Effects in Head Seas," International Shipbuilding Progress, Vol. 27, No. 316, December, 1980, pp. 306-315.

Troesch, A.W., "Sway, Roll, and Yaw Motion Coefficients Based on a Forward Speed, Slender Body Theory, Part I," Journal of Ship Research, Vol. 25, No. 1, March 1981, pp. 8-15.

Troesch, A.W., "Sway, Roll, and Yaw Motion Coefficients Based on a Forward Speed, Slender Body Theory, Part II," Journal of Ship Research, Vol. 25, No. 1, March 1981, pp. 16-20. (This paper was submitted ten months after "Part I" above. The decision to publish them together in the same issue was made by the editor.)

Cuong, H.T., Troesch, A.W., and Birdsall, T.G., "The Generation of Digital Random Time Histories," Ocean Engineering, Vol. 9, 1982, pp. 581-588.

Troesch, A.W., VanGunst, R.W., and Lee, S., "Wind Loads on a 1:115 Model of a Semi-Submersible," Marine Technology, Vol. 20, No. 3, 1983, pp. 283-289.

Scher, R., Troesch, A.W., and Zhou, G., "The Experimental and Theoretical Evaluation of a Twin-Flap Wave Energy Absorbing Device," Ocean Engineering, Vol. 10, No. 5, 1983, pp. 325-346.

Troesch, A.W., "Wave Induced Hull Vibrations - An Experimental and Theoretical Study," Journal of Ship Research, Vol. 28, No. 2, June 1984, pp. 141-150.

Troesch, A.W., "Effects of Non-Linearities on Hull Springing," Marine Technology, Vol. 21, No. 4, October 1984, pp. 356-363.

Troesch, A.W., "Marine Engineering," article in 1987 Yearbook of Science and Technology, McGraw- Hill, New York, New York, pp. 282-285.

Cohen, S. and Troesch, A.W., "The Interaction of a Floating Body with Vertical Walls," International Shipbuilding Progress, Vol. 35, No. 401, 1988, pp. 189-199.

Kim, S. and Troesch, A., "Streaming Flows Generated by High Frequency-Small Amplitude Oscillations of Arbitrarily Shaped Cylinders," Physics of Fluids A, Vol.1, No. 6, June 1989, pp. 975-985.

Falzarano, J., Steindl, A., Troesch, A., and Troger, H., "Rolling Motion of Ships Treated as Bifurcation Problem," Bifurcation and Chaos: Analysis, Algorithms, and Applications, Editors: R. Seydel, et.al., Publisher: Basel Birkhauser, Würzburg, 1990.

Troesch, A. and Kim, S., "Hydrodynamic Forces Acting on Cylinders Oscillating at Small Amplitudes," Journal of Fluids and Structures, Vol. 5, 1991, pp. 189-199.

Falzarano, J., Shaw, S., and Troesch, A., "Application of Global Methods for Analyzing Dynamical Systems to Ship Rolling Motion and Capsizing," International Journal of Bifurcation and Chaos in Applied Sciences and Engineering, March, 1992, pp. 101-116.

Troesch, A.W., Karr, D.G., and Beier, K.-P., "Global Contact Dynamics of an Ice-Structure Interaction Model," International Journal of Bifurcation and Chaos in Applied Sciences and Engineering, September, 1992, pp. 607-620.

Troesch, A.W., "On the Hydrodynamics of Vertically Oscillating Planing Hulls," Journal of Ship Research, Vol. 36, No. 4, December 1992, pp. 317-331.

Troesch, A. and Falzarano, J., "Modern Nonlinear Dynamical Analysis of Vertical Plane Motion of Planing Hulls," Journal of Ship Research, September 1993, pp. 189-199.

Park, J.H. and Troesch, A.W., "Numerical Modeling of Short-Time Scale Nonlinear Water Waves Generated by Large Vertical Motions of Non-Wallsided Bodies," Journal of Ocean Engineering and Technology, Vol. 7, No. 1, 1993 (Published by Korea Committee for Ocean Resources and Engineering. Revised version of Proceedings of the 19th Symposium on Naval Hydrodynamics, 1992).

Karr, D., Troesch, A., and Wingate, W.C., "Nonlinear Dynamic Response of a Simple Ice-Structure Interaction Model," Journal of Offshore Mechanics and Arctic Engineering, November 1993. (also Proceedings, 11th International Conference on Offshore Mechanics and Arctic Engineering, Calgary, Alberta, Canada, 1992)

Troesch, A.W., "Modeling Issues Associated With Nonlinear Dynamics of Mooring Systems," Nonlinear Dynamics of Marine Vehicles, DSC-Vol. 51, OMAE-Vol.1, ed. J. Falzarano and F. Papoulias. Publisher AMSE, New York, NY. November, 1993, pp. 29-40.

Hicks, J.D., Troesch, A.W. and Jiang, C., "Simulation and Nonlinear Dynamics of Planing Hulls," Nonlinear Dynamics of Marine Vehicles, DSC-Vol. 51, OMAE-Vol.1, ed. J. Falzarano and F. Papoulias. Publisher AMSE, New York, NY., November, 1993, pp. 41-56 (revised version published in Journal of Offshore Mechanics and Arctic Engineering, Vol. 117, No. 1, February, 1995).

Hsieh, S-R., Shaw, S., and Troesch, A.W., "A Predictive Method for Vessel Capsize in Random Seas," Nonlinear Dynamics of Marine Vehicles, DSC-Vol. 51, OMAE-Vol.1, ed. J. Falzarano and F. Papoulias. Publisher AMSE, New York, NY., November, 1993, pp. 103-124.

Troesch, A. and Hicks, J.D., "The Efficient Use of Simulation in Planing Hull Motion Analysis," Naval Engineers Journal, January 1994, pp. 75-85. (Also Proceedings, ASNE Intersociety High Performance Marine Vehicle Conference, Washington D.C., June 1992.)

Meadows, L., Meadows, G., Troesch, A., Cohen, S., Beier, K.-P., Root, G., and Griffin, O.W., "LaGrangian Velocity Profiles in the Wake of a High Speed Vessel," Ocean Engineering, Vol. 21. No. 2, 1994, pp. 221-242.

Hsieh, S-R., Troesch, A.W., Shaw, S., "A Nonlinear Probabilistic Method for Predicting Vessel Capsizing," Proceedings of the Royal Society, London. **446**, 1994, pp. 195-211.

Thiagarajan, K.P. and Troesch, A., "Hydrodynamic Damping Estimation and Scaling for Tension Leg Platforms," Journal of Offshore Mechanics and Arctic Engineering, Vol. 116, 1994, pp. 70-76. (Also Proceedings, 12th International Conference on Offshore Mechanics and Arctic Engineering, Glasgow, Scotland, June, 1993, pp. 70-76.)

Woodward, J.B., Parsons, M.G., and Troesch, A.W., "Ship Operational and Safety Aspects of Ballast Water Exchange at Sea," Marine Engineering, Vol. 31, No. 4, October, 1994, pp. 315-326.

Hicks, J. D., Troesch, A. W., and Jiang, C., "Simulation and Nonlinear Dynamics of Planing Hulls," Journal of Offshore Mechanics and Arctic Engineering, Vol. 117, No. 1, February, 1995, pp. 38-45. (This is a revised version of Nonlinear Dynamics of Marine Vehicles, DSC-Vol. 51, OMAE-Vol.1, ed. J. Falzarano and F. Papoulias. Publisher AMSE, New York, NY., November, 1993, pp. 41-56 article.)

Lai, Canhai and Troesch, A.W., "Modelling Issues Related to the Hydrodynamics of Three Dimensional Steady Planing," Journal of Ship Research, Vol. 39, No. 1 March, 1995.

Schauer, T., Romberg, B., Jiang, C., and Troesch, A. W., "Risk Assessment of Small Fishing Vessel Trap Net Operations," Marine Technology, Vol. 32, No.3, July, 1995, pp 231-243.

Karr, D.G., Troesch, A.W., and Levi, R., "Some Effects of Threshold Singularities on a Dynamical System with Intermittent Contact and Breakage," Journal of Sound and Vibration, **185**(4), 1995, pp 609-625.

Lai, Canhai and Troesch, A.W., "A Vortex Lattice Method for High Speed Planing," International Journal for Numerical Methods in Fluids, Vol. 22, 1996, pp. 495-513.

Jiang, C., Troesch, A. W., and Shaw, S. S. "Highly Nonlinear Rolling Motion of Biased Ships in Random Beam Seas," Journal of Ship Research, Vol. 40, No. 2, June 1996, pp. 125-135.

Wang, M.-L., Troesch, A.W., and Maskew, B., "Comparisons of Two Different Mixed Eulerian-Lagrangian Schemes Based on a Study of Flare-Slamming Hydrodynamics," Journal of Offshore Mechanics and Arctic Engineering, Vol.18, No. 3, August 1996, pp.174-183.

Wang, M.-L. and Troesch, A.W., "Numerical Stability Analysis for Free Surface Flows," , " International Journal for Numerical Methods in Fluids, Vol.24, 1997, pp.893-912.

Thiagarajan, K.P. and Troesch, A., "Effects of Appendages and Small Currents on the Hydrodynamic Heave Damping of TLP Columns," Journal of Offshore Mechanics and Arctic Engineering, Vol.120, No. 1, February 1998, pp.37-42. (Revised version of article in Proceedings, 15th OMAE, June, 1996)

Xu, L., Troesch, A. W., and Vorus, W. S. "Asymmetric Vessel Impact and Planing Hydrodynamics," Journal of Ship Research, Vol.42, 5. September 1998.

Chen, S-L, Shaw, S., and Troesch, A. W. "A Systematic Approach to Modeling Nonlinear Multi-DOF Ship Motions in Regular Beam Seas," Journal of Ship Research, Vol.43, 1. March 1999, pp. 25-37.

Xu, L., Troesch, A. W., and Peterson, R. "Asymmetric Vessel Impact and Dynamic Response of Vessels," Journal of Offshore Mechanics and Arctic Engineering, Vol.121, No. 2, May 1999, pp. 83-89. (Revised version of paper in Proceedings, 17<sup>th</sup> OMAE, July, 1998)

McGee, S. P., Troesch, A. W., Vlahopoulos, N., "Damage Length Predictor for High Speed Craft," Marine Technology, Vol. 36, No.4, Winter, 1999, pp 203-210.

Chen, S.-L., Shaw, S.S., H.K. Khalil and A.W. Troesch, "Robust Stabilization for Nonlinear Multi-DOF Ship Model in Regular Beam Seas," Journal of Dynamic Systems, Measurement, and Control, March 2000. (Revised version of paper in Proceedings of the '96 ASME IMECE, Atlanta, Georgia, October, 1996.)

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Troesch, A.W., Miner, E.W., Swean, T.F. " Turbulent Ship Wake Predictions Using SURFWAKE," Office of Naval Research Ship Wake Consortium Workshop, October 4-5, 1988.

Beck, R.F. and Troesch, A.W., "Nonlinear Time Domain," ONR/ARI Nonlinear Ship Motions Workshop, Ann Arbor, April 13, 1989.

Stewart, M.B., Cohen, S.B., and Troesch, A.W. " Experiments with Unsteady, Free Surface, Three-Dimensional Vortices in a Thermally Stable, Stratified Fluid," Naval Research Laboratory, Memorandum Report 6630, 1990.

Troesch, A.W. and Thiagarajan, K., "Graphic Visualization of Simulated Downstream Wakes Generalized by Various High-speed Hull Forms," ONR Code 12 Ship Wake Consortium Report, 1991.

Troesch, A.W. and Beck, R.F., "Nonlinear Time Domain," ONR/ARI Nonlinear Ship Motions Workshop, Berkeley, January 16-17, 1991.

Griffin, O., Troesch, A.W., Thiagarajan, K. " Far-field Surface Wake Predictions for Frigates," ONR Ship Wake Consortium Workshop, May 21-22, 1991.

Beck, R.F. and Troesch, A.W., "Nonlinear Time Domain," ONR/ARI Nonlinear Ship Motions Workshop, MIT March 24, 1992.

Troesch, A. W., "Application of Nonlinear Dynamics Analysis to Mooring Systems," Sea Grant College Program, Marine Industry Collegium, University of Michigan, May, 1993.

Troesch, A. W., and Wang, M. "An Experimental Study for Slamming Flow and Green Water on Deck," Department of Naval Architecture and Marine Engineering, The University of Michigan, Report No. 327, September 1994.

Troesch, A. W., Perlin, M., and He, H., "JIP on Hydrodynamics of Thin Plates Part I," Department of Naval Architecture and Marine Engineering, The University of Michigan, August, 1999

Troesch, A. W., Perlin, M., and He, H., "JIP on Hydrodynamics of Thin Plates Part II," Department of Naval Architecture and Marine Engineering, The University of Michigan, April, 2001

## **5. SERVICE**

### **5.1 Major Committees at the University of Michigan:**

#### **i) Department:**

Ph.D. Examination Committee, Structures, 1996-

NAME Hydrodynamic Facilities Advisory Committee, member  
1982, chairman 1991.

Ph.D. Examination Committee, Dynamics, chairman, 1982-

Ph.D. Examination Committee, Hydrodynamics, 1982- 1992

Ad-hoc Committee to Consider the Role of Women in the Department,  
chairman, 1985

Ad-hoc Committee on Undergraduate Curriculum, 1989

NAME Academic Affairs Committee - Chairman

NAME Long Term Goals Committee

NAME Re-appointment and Tenure and Promotion committees - Chairman

NAME Faculty Advisor, SOLAR BOAT Team

**ii) College:**

5-Year NAME Departmental Review, Chair

CoE Faculty Advisory Committee on Excellence

Faculty Advisor for the UM chapter of Michigan Society of Professional  
Engineers, Student chapter.

Martin Luther King Day Committee, Chair, 1997

College Curriculum Committee, 1997, 2000-, Chair, 2001-

Honors and Awards Committee, 1997 – 1998, 2013-

College Technology Transfer & Commercialization Task Force, 1998-1999

College OSIA Selection Committee, 1999

College Enrollment Management Task Force Committee, 2000

CoE Task Force of International Programs, 2007

CoE Department-Based External Relations Program Workshop, 2010

CoE Student Leadership Awards Committee, 2012

CoE Cognate Panel, 2012-2015

**5.2 Administrative Duties at the University of Michigan:**

Director, Ship Hydrodynamics Laboratory, 1980-1987

U.S. Coast Guard Student Advisor/Liaison (graduate and undergraduate) 1986-2011

Graduate Program Advisor – Hydrodynamics/Dynamics, 1988-

Faculty Mentor, UM Mentorship Program, 1995-2002

### 5.3 **Service to Government or Professional Organizations:**

Corresponding Member, Society of Naval Architects and Marine Engineers, Panel HS-12 (Hull Instrumentation), 1981- 1992

Member, Executive Committee, American Towing Tank Conference, 1982-1988

Member, Society of Naval Architects and Marine Engineers, Panel H-5 (Analytical Ship-Wave Relations), 1983-

Papers Chairman, Great Lakes and Great Rivers Section, Society of Naval Architects and Marine Engineers 1984-1986

Office of Naval Research High School Traineeship, summer 1991-1993

Saline High School Student Internship, Fall term 1991

Undergraduate Research Opportunity Program, Mentor, 1992-1999

Member, American Bureau of Shipping Americas Small Vessel Committee, American Bureau of Shipping, 1993-2000

Member, Design Review Board, McDermott Corporation, 1993-1994.

Member and Fellow, The Society of Naval Architects and Marine Engineers - current

Member, American Physical Society (1992-1999)

Member, American Society of Mechanical Engineers - current

Member, International Ship Structures Committee, sub-committee Environment (1996-2001)

Editorial Board (Associate Editor): *Ocean Engineering* - current

Editorial Board of *Marine Systems & Ocean Technology* – Sociedade Brasileira de Engenharia Naval - current

Editorial Board of *Marine Structures* – current

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Editorial Board of *Journal of Naval Architecture and Ocean Engineering (JNAOE)* – current

Scientific Committee of IUTAM Symposium on “Fluid-Structure Interaction in Ocean Engineering” held in Hamburg, Germany, July 2007

Invited Guest Editor for Special Issue on Mathematical Modeling of Marine Structures, *Journal of Applied Mathematics*, 2012

ABET Program Evaluator 2013-

Symposium organizer: “Prof. Robert F. Beck Honoring Symposium on Marine Hydrodynamics”, 34rd International Conference on Ocean, Offshore and Arctic Engineering – OMAE 2015; May 31-Jun 5, 2015, St. John’s

### **Consulting Activities:**

Expert witness in litigation involving marine accidents; e.g. testimony on possibility of wave loads leading to rudder failure on AMOCO Cadiz off France.

Marine dynamic and hydrodynamic calculations and consultations for companies such as EXXON Production Research, Total Petroleum, Crowley Maritime Corp., American Bureau of Shipping, McDermott Corporation, Bethlehem Steel Corp., SwiftShips, Inc., United States Coast Guard etc.

## **6. OTHER**

### **6.1 Honors and Awards:**

Tau Beta Pi, 1968

Wilbur N. Landers Scholar, The Society of Naval Architects and Marine Engineers, 1971-1972

Outstanding Achievement Award, Department of Naval Architecture and Marine Engineering, The University of Michigan, 1969

Outstanding Achievement Award, Department of Naval Architecture and Marine Engineering, The University of Michigan, 1975

Outstanding Faculty Member, Quarterdeck Society, Department of Naval Architecture and Marine Engineering, 1978-1979

Who's Who in America, Forty-fourth edition, 1986.

Outstanding Faculty Member, Quarterdeck Society, Department of Naval Architecture and Marine Engineering, 1988-1989

Departmental Teaching Award, 1992, 1994

Recipient of the American Society of Naval Engineers' "Jimmie" Hamilton Award for the best original paper published in the *Naval Engineers Journal* during the year 1994.

Who's Who in Science and Engineering, Third Edition, 1996, Fourth Edition, 1998. Fifth Edition, 2000.

Who's Who in American Education, Sixth Edition, 2003

Keynote Speaker: "Recent Advances in the Analysis of High Speed Planing Hydrodynamics and Dynamics," SOBENA '96, keynote, September, 1996.

College of Engineering Service Award in NAME, 1997

Who's Who in the World, Fifteenth Edition, 1998

College of Engineering Faculty Award in NAME, 1999

College of Engineering Teaching Excellence Award, 2002

Recipient of United States Coast Guard Certificate of Merit, 2002

Elected Fellow of Society of Naval Architects and Marine Engineers, 2002

Society of Naval Architects and Marine Engineers, Taylor Medal, 2011

EMSHIP Scholar and Visiting Professor, Invited lecture series, Ecole Centrale de Nantes, FRANCE, May 11 – June 8, 2012.

Society of Naval Architects and Marine Engineers, American Bureau of Shipping - Captain Joseph H. Linnard Prize for the best paper contributed to the 2011 Annual Meeting and appearing in the Transactions of the Society, 2012

Keynote Speaker, "Ship Dynamics in Extreme Seas", EMSHIP Lloyd's Register Foundation Day, 15th May 2013, Ecole Centrale de Nantes (ECN), Nantes, France.

EMSHIP Scholar and Visiting Professor, Invited lecture series, Ecole Centrale de Nantes, FRANCE, April 30 – May 18, 2013.

Rosenblatt-Michigan Award, 2014.



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Keynote Speaker, "Probabilistic Design Loads Generator for Nonlinear Responses and Loads", International Symposium on the Safety and Reliability of Deepsea Oil and Gas Transportation System , Tianjin University, Tianjin, China. May 13, 2015.

The American Bureau of Shipping Professor of Marine Engineering and Offshore Design Performance, March 1, 2017

## 6.2 Collaborative Activities:

*Provided sponsored research support for (full or partial) and conducted daily technical discussions with the following Visiting Research Scientists and Scholars:*

### JAPAN

Professor Hisaaki Maeda Institute of Industrial Science, University of Tokyo, Tokyo.

Project: American Bureau of Shipping, "Ship Springing."

Professor Makoto Ohkusu, Kyushu University, Fukuoka.

Project: American Bureau of Shipping, "Ship Springing."

Professor Mikio Takaki, Hiroshima University, Hiroshima.

Project: EXXON Corp, "Ship Rolling."

Professor Kimio Saito, Osaka University, Osaka.

Project: "Hydroelastic Ship Response."

### CHINA

Mr. Guojun Zhou, China Ship Scientific Research Center, Wuxi.

Project: Department of Energy and Q Corp. "Wave Energy."

### KOREA

Assistant Professor Dong Joon Kim, National Fisheries University of Pusan, Pusan.

Project: "Extreme Loads in a Seaway."

Professor Jong-Hwan Park

Mokpo National University, Chonnam,

Project: "Planing Boat Dynamics"

*Collaborated with the following faculty in journal articles and sponsored research projects:*

Professor Robert F. Beck, University of Michigan.

Adjunct Associate Professor Klaus-Peter Beier, University of Michigan.

Assistant Professor Jeffery Falzarano, University of New Orleans.

Associate Professor Dale G. Karr, University of Michigan.

Professor Carl Larsen, Norwegian University of Science and Technology

Associate Professor Guy A. Meadows, University of Michigan.

Professor Michael Parsons, University of Michigan.

Professor Steven W. Shaw, Michigan State University.

Professor Hans Troger, Technical University, Vienna, Austria. (Prof. Troger was host to Ph.D. student J. Falzarano. Two co-authored publications resulted)

Professor Jack B. Woodward, University of Michigan.

*Collaborated with the following government and industry engineers and scientists in writing journal articles and conference and workshop proceedings:*

Dr. Owen Griffin, Naval Research Laboratories.

Mr. S. Lee, ODECO Corporation.

Dr. Brian Maskew, Analytical Methods, Incorporated.

Dr. E. Wayne Miner, Naval Research Laboratories.

Dr. John O'Dea, David Taylor Naval Ship Research and Development Center.

Dr. Michael Stewart, Naval Research Laboratories.

Dr. Thomas Swean, Naval Research Laboratories.

### **6.3 Activities of professional nature:**

#### **Workshops organized and chaired:**

"Workshop on Nonlinear Sea Loads and Ship Response: A basis for Ship Structural Design," Chair. Supported by Office of Naval Research, July 7-8, 1994. 40 participants.

#### **Select Invited professional activities:**

Invited lecturer to give talks on Marine Hydrodynamics including topics on viscous streaming flows, oscillating bodies between vertical walls, and hydrodynamic impact loads - April 1986, Kyushu University, Fukuoka, JAPAN.

Invited lecturer to give talks on hydrodynamic streaming flows and impact hydrodynamics - October, 1987, David Taylor Naval Ship Research and Development Center, Bethesda, Maryland

Invited lecturer: "High Speed Vehicle Dynamics" - August 1992, Korean Research Institute of Ship and Ocean Engineering, Dae-Jeon KOREA.

Invited panel participant: "Onset of Capsize - the Determination of Stability Boundaries," Fifth International Conference on Stability of Ships and Ocean Vehicles, (STAB '94), Melbourne, Florida, November 8, 1994.

Invited Session Chair: Fifth International Conference on Stability of Ships and Ocean Vehicles, (STAB '94), Melbourne, Florida, November 10, 1994.

Invited Session Chair: Sixth International Symposium on Practical Design of Ships and Mobile Units, (PRADS '95), Seoul, KOREA, September 21, 1995.

Invited lecturer: "Planing Hull Hydrodynamics and Dynamics" - September 1995, SAMSUNG Heavy Industries, Daeduk R&D Center, Dae-Jeon KOREA.

Panel Moderator, Small Craft Symposium, Ypsilanti, MI, 1996.

Invited keynote paper: "Recent Advances in the Analysis of High Speed Planing Hydrodynamics and Dynamics," Proceedings 16th Congresso Nacional de Transportes Marítimos E Construcao Naval, 1996, pp. 1-14. Presented at SOBENA '96, Rio de Janeiro, September, 1996.

Invited lecturer: "Tension Leg Damping - Effects of Currents and Appendages" - September 1996, Escola Politécnica da Universidade de Sao Paulo, Sao Paulo, BRAZIL

Invited lecturer: "Tension Leg Damping - Effects of Currents and Appendages" - September 1996, University Federale Rio de Janeiro, Rio de Janeiro, BRAZIL

Invited Session Chair. Third International Workshop on Theoretical Advances in Ship Stability and Practical Impact, Crete - sponsored by National Technical University of Athens, October, 1997.

Invited Lecturer. Planing hydrodynamics and dynamics; impact hydrodynamics. INSEAN – Istituto Nazionale per Studi ed Esperienze di Architettura Navale, Roma, Italy, June-July (two weeks) 1999.

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Invited Session Chair. Sixth International Workshop on Theoretical Advances in Ship Stability and Practical Impact, Webb Institute, Glen Cove, NY -, October, 2002.

Invited Session Chair: 26th International Conference on Offshore Mechanics and Arctic Engineering June 10-15, 2007, San Diego, California, USA

Invited Member of Scientific Committee: IUTAM Symposium on “Fluid-Structure Interaction in Ocean Engineering”, Hamburg, Germany, July, 2007

Invited Session Chair: IUTAM Symposium on “Fluid-Structure Interaction in Ocean Engineering”, Hamburg, Germany, July, 2007

Invited Session Chair: PRADS 2007, Session: B14 Loads 2, Houston TX., October 1, 2007

Invited Speaker: Naval Architecture and Marine Engineering at the Univeristy of Michigan, University of Ulsan, Ulsan, KOREA, October 15, 2007.

Invited Speaker: Design Loads Generator Research, Hyundai Heavy Industries, Ulsan, KOREA, October 16, 2007.

Invited Speaker: Mechanical Engineering Seminar Series, Wayne State University, Michigan, March 20, 2008.

Invited Speaker: International Symposium on Vibro-Impact Dynamics of Ocean Systems, Wayne State University, Michigan, October 2, 2008.

Invited Speaker: Ocean Engineering Seminar Series, University of California, Berkeley, February 20, 2009.

Invited Speaker: Educational Forum: 1st International Conference on Ship Design and Naval Engineering, Cartagena de Indias, Colombia, March 27, 2009

Invited Session Chair: 12th Ship Stability Workshop, June 12-15, 2011, Washington, D. C.

Invited Speaker: Design Loads Generator for Lifetime Structural Loads Analysis, December 13, 2012, Norwegian University of Science and Technology, Trondheim, Norway

#### **6.4 Other Relevant Information:**

Professional engineer, State of Michigan, registration No. 25784. (1980-2004)

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Participant in the National Science Foundation's United States-Japan Cooperative Science Program entitled, "Ship Motions in Shallow and Restricted Water," 1979-1980.

Reviewer for journal articles submitted to Physics of Fluids, Journal of Ship Research, Journal of Applied Mathematics and Physics, Journal of ASME/OMAE, Journal of Fluid Mechanics, Journal of Waterway, Port, Coastal and Ocean Engineering and Nonlinear Dynamics.

Invited discussor for Transactions of the Society of Naval Architects and Marine Engineers.

Reviewer of research proposals for the Australian Research Council, Louisiana Board of Regents, Connecticut Sea Grant Program, Gulf Coast Region Maritime Technology Center, and New Jersey Sea Grant Program.