Robert V. Wilson, Ph.D.

Education

Ph.D., Mechanical Engineering, Old Dominion University, 1996

M.S., Mechanical Engineering, Old Dominion University, 1993

B.S., Mechanical Engineering, Old Dominion University, 1991

Professional Experience

Research Professor, SimCenter: National Center for Computational Engineering, UTC, Aug 2011 to present

Graduate Faculty, Member, University of Tennessee at Chattanooga, Jan 2007 to present

Associate Research Professor, SimCenter: National Center for Computational Engineering, UTC, Aug 2005 to Aug 2011

Associate Research Engineer, IIHR–Hydroscience and Engineering, University of Iowa, Apr 2005 to Aug 2005

Assistant Research Engineer, IIHR–Hydroscience and Engineering, University of Iowa, Feb 1999 to April 2005

Postdoctoral Associate, IIHR–Hydroscience and Engineering, University of Iowa, Jan 1997 to Feb 1999

University Service

Graduate Student Advisor and Co-Advisor for 5 Master and 3 Doctoral Degree students, Aug 2008 to present

Research Specialties

Unsteady RANS and DES Modeling for Free Surface Flows

Prediction of Six-Degree of Freedom Motions and Maneuvering

Computational Ship Hydrodynamics

Vehicle Design and Analysis

Large-Eddy and Direct Numerical Simulations of Turbulent Flows

High-Performance Parallel Computing

Verification and Validation Methods for Computational Fluid Dynamics Simulations

Professional Memberships

American Society of Mechanical Engineering, Associate Member

American Institute Aerospace of Aeronautics and Astronautics, Associate Member

Professional Activities

Member, Editorial Board, Journal of Marine Science and Technology, 2008 – present

Organizing Committee, 5th Osaka Colloquium, Mar 14-15, 2005, Osaka, Japan

Session Chairman, “Optimization and Submarine Applications,” 5th Osaka Colloquium, Mar 14-15, 2005, Osaka Japan

Session Chairman, “Verification and Validation for Ship Hydrodynamics,” Gothenburg 2000: A Workshop on CFD in Ship Hydrodynamics, Gothenburg Sweden, Sept 2000

Supervision and Training

Aug 2005 to present, supervision and training of graduate students at the SimCenter in the solution of aerodynamic and hydrodynamic problems using the TENASI flow code and related software.

Jan 1997 to Aug 2005, supervision and training of graduate students and post-doctoral associates at IIHR in the solution of ship hydrodynamics problems and the use of CFDSHIP-IOWA RANS code and related software.

Reviewer

AIAA Journal
Computers and Fluids
International Journal Numerical Methods in Fluids
Journal of Computational Physics
Journal of Fluids Engineering
Journal of Flow, Turbulence, and Combustion
Journal of Marine Science and Technology
Journal of Ship Research

Awards and Honors

Lewis F. Moody Award, best paper, ASME Fluids Engineering Division, "Estimating Uncertainty in Computations of Two-Dimensional Separated Flows," A.O. Demuren and R.V. Wilson, 1995

Virginia Space Grant Fellow, Virginia Space Grant Consortium, 1991 – 1993

Government Student Researchers Program Fellow, 1992-1996

Consulting

Old Dominion University, Norfolk, VA, July 2008

Office of Naval Research, Technical Consultant, Secret Security Clearance, 1999 to 2005

Hyundai Heavy Industries, South Korea, July 2000

Code Development

SimCenter: National Center for Computational Engineering, TENASI flow code: general-purpose, unstructured, unsteady free surface RANS/DES/LES code for aerodynamics and hydrodynamics applications on high-performance, parallel architectures using C++ object-oriented programming. The flow code is developed by a core of four to five SimCenter researchers per year with capabilities for multi-regime flow field equations (e.g., incompressible, variable Mach, compressible, free surface capturing, electromagnetics, and structural mechanics), general unstructured polyhedral elements, and dynamic sliding and overset interfaces. Code development efforts supported: staff and student research at the SimCenter; grant and contract work for private and government agencies; and the transition to researchers in academia, private industry, and government labs. Additional information on research supported by the TENASI flow code can be found here: http://www.utc.edu/simcenter. Aug 2005 to present.

Iowa Institute of Hydraulic Research, CFDSHIP-IOWA flow code: general-purpose, structural, unsteady free surface RANS code for ship hydrodynamics on high-performance, parallel architectures. Development in support of staff and student basic research at IIHR and transitioned to researchers in academia (U. of Iowa, U. of Michigan, Penn State, RPI, Osaka Prefecture University, West Virginia University); industry (Northrop Grumman Corp, Jacobs Sverdrup Arnold AFB, FORCE Technology Denmark, General Dynamics, Northrup Grumman Newport News, Proteus Engineering, Anteon Corp.); and government labs (NSWC Carderock, NSWC Costal Systems Station, Naval Air Warfare Center Weapons Division, China Lake).

May 2002 to Aug 2005, co-developer with Dr. P. Carrica and Prof. F. Stern.

Aug 2001 to May 2002, co-developer with Prof. F. Stern.

Jan 1997 to Aug 2001, co-developer with Dr. E. Paterson and Prof. F. Stern.

Selected Journal Publications

1. Olivieri, A., Pistani, F., Wilson, R., Campana, E., and Stern, F., "Scars and Vortices Induced by Bow and Shoulder Wave Breaking," Vol. 129, *J. Fluids Eng.*, Nov. 2007, pp. 1445-1459.
2. Wilson R., Carrica, P., and Stern F., "Simulation of Ship Breaking Bow Waves and Induced Vortices and Scars," Vol. 54, No. 4 *Int. J. Num. Methods Fluids*, June 2007, pp. 419-451.
3. Carrica, P., Wilson R., and Stern F., "An Unsteady Single-Phase Level Set Method for Viscous Free Surface Flows," Vol. 53, No. 2, *Int. J. of Num. Methods Fluids* , Jan. 2007, pp. 229-256.

4. Tahara, Y., Wilson, R., Carrica, P., and Stern, F., "RANS Simulation of a Container Ship Using a Single-Phase Level Set Method with Overset Grids and the Prognosis for Extension to Self-Propulsion Simulator," Vol. 11, No. 4, *J. Marine Science and Technology*, 2006, pp. 209-228.
5. Wilson, R., Carrica, P., and Stern, F., "Unsteady RANS Method for Ship Motions with Application to Roll for a Surface Combatant," *Computers & Fluids*, Vol. 35, p.501-524, 2006.
6. Wilson, R., Carrica, P., and Stern F., "URANS Simulation for a High-Speed Transom Stern Ship with Breaking Waves," *Int. J. of CFD*, Vol. 20, No. 2, Feb. 2006, pp.105-125. Carrica, P., Wilson R., and Stern F., "Unsteady RANS Simulation for Forward Speed Diffraction of a Surface Combatant," *Computers & Fluids*, Vol. 35, p.545-570, 2006.
7. Wilson, R., Carrica, P., and Stern F., "URANS Simulation for a High-Speed Transom Stern Ship with Breaking Waves," *Int. J. of CFD*, Vol. 20, No. 2, Feb. 2006, pp.105-125.
8. Stern, F., Wilson, R., and Shao, J., 2006, "Quantitative V&V of CFD simulations and certification of CFD codes,"*Int. J. for Num. Methods in Fluids*, Volume 50, Issue 11 , Pages 1335 - 1355.
9. Weymouth, G. Wilson R., and Stern F., "RANS CFD Prediction of Pitch and Heave Ship Motions in Head Seas," *Journal Ship Research*, Vol. 49(2), June, 2005, pp. 80-97.
10. Wilson R., Shao J., and Stern F., "Discussion: "Criticisms of the "Correction Factor" Verification Method" (Roache, P., 2003, *ASME J. Fluids Eng*., 125, pp. 732-733)," *ASME J. Fluids Eng*, Vol. 126, No. 4, 2004.
11. Stern F., and Wilson, R., "Author's Closure," *ASME J. Fluids Eng*., Vol. 124(3), 2002, pp.810-811.
12. Wilson R., Stern F., Coleman H., and Paterson E., "Comprehensive Approach to Verification and Validation of CFD Simulations-Part2: Application for RANS Simulation of A Cargo/Container Ship," *ASME J. Fluids Eng*., Vol. 123, Dec. 2001, pp. 803-810.
13. Stern F., Wilson R., Coleman H., and Paterson E., "Comprehensive Approach to Verification and Validation of CFD Simulations-Part 1: Methodology and Procedures," *ASME J. Fluids Eng*., Vol. 123, Dec. 2001, pp. 793-802.
14. Demuren A., Wilson R., and Carpenter M., "Higher-Order Compact Schemes for Numerical Simulation of Incompressible Flows, Part I: Theoretical Development", *Numerical Heat Transfer*, Part B, 39(3), March 2001, pp. 207-230.
15. Wilson R., Demuren A., and Carpenter M., "Higher-Order Compact Schemes for Numerical Simulation of Incompressible Flows, Part II: Applications", *Numerical Heat Transfer*, Part B, 39(3), March 2001, pp. 231-255.
16. Wilson R., Demuren A., "Numerical Simulation of Turbulent Jets with Rectangular Cross-Section", *ASME J. Fluids Eng*, 120, June 1998, pp. 285-290.
17. Wilson R., Demuren A., "Numerical Simulations of Two-Dimensional, Spatially Developing Mixing Layers", *Numerical Heat Transfer*, Part A, 29, 1996, pp. 485-509.
18. Demuren A., Wilson R., "Estimating Uncertainty in Computations of Two-Dimensional Separated Flows", *ASME J. Fluids Eng*, 216, June 1994, pp. 216-220.

Selected Conference Proceedings

1. Ji, L., Sreenivas, K., Hyams, D., and Wilson, R., "A Parallel Universal Mesh Deformation Scheme for Hydrodynamic Applications," Proceedings of the 28th ONR Symposium on Naval Hydrodynamics, Pasadena, CA, 12-17 Sep. 2010.
2. Ji, L., Wilson, R., Sreenivas, K., and Hyams, D., "A Parallel Universal Mesh Deformation Scheme," 28th AIAA Applied Aerodynamics Conference, June 2010, Chicago, AIAA-2010-4938.
3. Wilson, R., Lei, J., Karman, Jr., S.L., Hyams, D., Sreenivas, K., Taylor, L., and Whitfield D., 2008, "Simulation of Large Amplitude Ship Motions for Prediction of Fluid-Structure Interaction," Proceedings of the 27th ONR Symposium on Naval Hydrodynamics, Seoul, Korea, 5-10 Oct. 2008.
4. Karman, Jr., S.L., and Wilson, R., 2008, "Hierarchical Unstructured Mesh Generation with General Cutting for Free Surface Simulations," Proceedings of the 27th ONR Symposium on Naval Hydrodynamics, Seoul, Korea, 5-10 Oct. 2008.

5. Lee, D., Maki, K., Wilson, R., Troesch, A., and Vlahopoulos, N., “Dynamic Response of a Marine Vessel Due to Wave-Induced Slamming,” Int. Sym. On Vibro-Impact Dynamics of Ocean Systems and Related Problems, Troy, Michigan, 2-3 Oct. 2008.
6. Wilson, Robert V., “A Review of Computational Ship Hydrodynamics,” UTC-CECS-SimCenter-2008-03, September 2008.
7. Wilson, R., Nichols, III, S., Mitchell, B., Karman, S., Betro, V., Hyams, D., Sreenivas, K., Taylor, L., Briley, R., and Whitfield D., “Simulation of a Surface Combatant with Dynamic Ship Maneuvers,” 9th Int. Conf. in Num. Ship Hydro., University of Michigan, 5-8 Aug. 2007.
8. Carrica, P.M., Wilson, R.V., Noack, R., Xing, T., Kandasamy, M., Shao, J., Sakamoto, N., and Stern, F., “A Dynamic Overset, Single-Phase Level Set Approach for Viscous Ship Flows and Large Amplitude Motions and Maneuvering,” 26th Symposium on Naval Hydrodynamics, Rome Italy, September. 17-22, 2006.
9. Wilson, R.V., Nichols, III, D.S., Mitchell, B., Karman, S.L., Hyams, D.G., Sreenivas, K., Taylor, L.K., Briley, W.R., and Whitfield, D.L., “Application of an Unstructured Free Surface Flow Solver for High Speed Transom Stern Ships,” 26th Symposium on Naval Hydrodynamics, Rome Italy, September. 17-22, 2006.
10. Wilson R. and Stern F., “URANS Simulations For A High-Speed Transom Stern Ship With Breaking Waves,” Proceedings of FAST 2005, 8th Int. Conf. on Fast Sea Transportation, June 27-30, 2005, Saint-Petersburg, Russia.
11. Sakamoto N., Wilson R., and Stern F., “RANS Simulations for High Speed Ships in Deep and Shallow Water,” Proceedings of FAST 2005, 8th Int. Conf. on Fast Sea Transportation, June 27-30, 2005, Saint-Petersburg, Russia.
12. Kandasamy, M., Xing, T., Wilson, R., and Stern, F., “Vortical and Turbulent Structures and Instabilities in Unsteady Free-Surface Wave Induced Separation,” Proceedings of 5th Osaka Colloquium, March 14-15, 2005, Osaka Japan.
13. Wilson R., Carrica P., and Stern F., “RANS Simulation for a Container Ship using a Single Phase Level Set and Overset Grid Method,” Proceedings of CFD Tokyo 2005 Workshop, Tokyo Japan, March 2005.
14. Carrica P., Wilson R., and Stern F., “Unsteady RANS Simulation for Forward Speed Diffraction of a Surface Combatant,” Proceedings of CFD Tokyo 2005 Workshop, Tokyo Japan, March 2005.
15. Miller, R. Wilson, R., and Carrica, P., Gorski, J., “RANS Simulation of a Naval Surface Combatant Using a Single-Phase Level Set Method with Overset Grids,” Proceedings of the CFD Workshop Tokyo 2005, Tokyo, Japan, 9-11, March 2005.
16. Tahara, Y., Wilson, R., and Carrica, P., “Comparison of Free Surface Capturing and Tracking Approaches in Application to Modern Container Ship and Prognosis for Extension to Self-Propulsion Simulator,” Proceedings of the CFD Workshop Tokyo 2005, Tokyo, Japan, 9-11, March 2005.
17. Wilson, R., Carrica, P., Hyman, M., and Stern, F., “A Steady and Unsteady Level-Set Method for Large Amplitude Ship Motions and Maneuvering,” Proceedings 25th ONR Symposium on Naval Hydrodynamics, St Johns, Canada, August 2004.
18. Stern, F., Wilson, R., and Shao, J., “Quantitative Approach to V&V of CFD Simulations and Certification of CFD Codes with Examples,” Proceedings International Symposium Advances Computational Heat Transfer (Invited paper), Kirkenes-Bergen, Norway, 19-24 April 2004.
19. Xing, T., Kandasamy, M., Wilson, R. and Stern, F., “DES and RANS of Unsteady Free-surface Flows,” 42nd AIAA Aerospace Sciences Meeting, Reno, Nevada, 5-8 Jan 2004, Division for Fluid Dynamics.
20. Weymouth G., Wilson, R., and Stern, F., “RANS CFD Prediction of Pitch and Heave Ship Motions in Head Seas,” Proceedings of the 8th Int. Conf. on Numerical Ship Hydrodynamics, Busan, S. Korea, September 2003.
21. Stern F., Wilson R., Longo J., Carrica P., Xing T., Tahara Y., Simenson C., Kim J., Shao J., Irvine M., Kandysamy M., Ghosh S., and Weymouth G., “Paradigm for Development of Simulation Based Design for Ship Hydrodynamics,” Proceedings of the 8th Int. Conf. on Numerical Ship Hydrodynamics, Busan, S. Korea, September 2003.
22. Stern, F., Wilson, R., and Shao, J., “Statistical Approach to CFD Code Certification,” AIAA 2003-6345, Applied Aerodynamics Special Session on CFD Uncertainty, 41st Aerospace Sciences Meeting, Reno, Nevada, 6-9 January 2003.
23. Wilson R. and Stern F., “Unsteady RANS Simulation of a Surface Combatant with Roll Motion”, Proceedings of 24th Symposium on Naval Hydrodynamics, Fukuoka, Japan, July 8-13, 2002.

24. Wilson R. and Stern F., “Verification and Validation for RANS Simulation of a Naval Surface Combatant,” 40th Aerospace Sciences Meeting and Exhibit, Reno, Nevada, AIAA 2002-0904, Jan. 2002.
25. Wilson R., Paterson E., and Stern F., “Verification and Validation of a Naval Combatant,” Proceedings of CFD Gothenburg 2000 Workshop, Gothenburg Sweden, September 2000.
26. Demuren A., Wilson R., “Streamwise Vorticity Generation in Laminar and Turbulent Jets”, Proceedings of the 3rd ASME/JSME Joint Fluids Engineering Conference, FEDSM99-6807, San Francisco, July 18-23, 1999.
27. Stern F., Wilson R., Coleman H., and Paterson E., “Verification and Validation of CFD Simulations”, Proceedings of the 3rd ASME/JSME Joint Fluids Engineering Conference, FEDSM99-6913, San Francisco, July 18-23, 1999.
28. Wilson R., Paterson E., Leighton R., Longo J., and Stern F., “Unsteady Modeling of a Naval Combatant in Head Waves: RANS CFD and EFD”, Proceedings of 22nd Symposium on Naval Hydrodynamics, Washington D.C., August 9-14, 1998.
29. Wilson R. and Demuren A., “On the Origin of Streamwise Vorticity in Complex Turbulent Jets”, Proceedings of the ASME Fluids Engineering Division Summer Meeting, FEDSM98-5004, Washington D.C., June 21-25, 1998.
30. Paterson E., Wilson R., and Stern F., “Verification/Validation of Steady Flow RANS CFD for Naval Combatant”, Proceedings of 1st Symposium on Marine Applications of Computational Fluid Dynamics, Washington D.C., May 1998.
31. Wilson R. and Demuren A., “Large-Eddy Simulation of Complex Turbulent Jets”, Proceedings of ASME Fluids Engineering Division Summer Meeting, FEDSM97-5214, Vancouver BC, Canada, June 1997.
32. Wilson R. and Demuren A., “Numerical Simulation of Turbulent Jets with Rectangular Cross-Section”, Proceedings of the ASME Fluids Engineering Division Summer Meeting, FED-Vol. 238(3), San Diego, California, July 1996, pp. 121-128.
33. Wilson R. and Demuren A., “Estimating Uncertainty in Computations of Two-Dimensional Separated Flows”, Proceedings of the Quantification of Uncertainty in Computational Fluid Dynamics, FED-Vol 158, Washington D.C., June 1993, pp. 9-18.
34. Wilson R., “On the Prediction of Multigrid Efficiency Through Local Mode Analysis”, Proceedings of Sixth Copper Mountain Conference on Multigrid Methods, Part 2, eds. N. Melson, T. A. Manteuffel, and S. F. McCormick, NASA Langley Research Center, Hampton, Va. 1993, pp. 679-689.