

Curriculum Vitae
William Wendell Schultz
<http://www-personal.engin.umich.edu/~schultz/>

BIRTH

September 26, 1952
Detroit, Michigan

EDUCATION

PhD (August 1982) Northwestern University
Applied Mathematics and Engineering Sciences

MSME (December 1977) Purdue University
Mechanical Engineering

BSME (August 1974) Purdue University
Mechanical Engineering with Cooperative Industrial Experience

EMPLOYMENT

Professor of Mechanical Engineering and Applied Mechanics (2000 –)

Professor of Naval Architecture and Marine Engineering (2000 –)

Faculty Director of the Edward Ginsberg Center for Community
Service and Learning (2010 – 2013)

Undergraduate Admissions Faculty (2003 – 2005)

Interdisciplinary Program Advisor (2001 – 2006)

Associate Professor (1991 – 2000)

Undergraduate Program Advisor (1995 – 1997)

Assistant Professor (1/1985 – 8/1991)

University of Michigan

Director, Fluid Dynamics Program, National Science Foundation (2006 – 2009)

Feedstock Logistics Intra-agency Working Group for Biomass Board (2008 – 2009)

Visiting Fellow, DAMTP, Cambridge University (9/1998 – 7/1999)

Von Humboldt Fellow (August 1991 – August 1992)

Institut fuer Schiffbau, Universität Hamburg, Germany

Assistant Professor (July 1982 – December 1984)

Department of Mechanical and Aero Engineering, Rutgers University

ASEE/ONR Summer Faculty Fellow (May 1984 – August 1984)

Marine Technology Division, Naval Research Lab, Washington, D.C.

Research Assistant (September 1979 – August 1982)

Dept. of Engineering Sciences and Applied Mathematics, Northwestern Univ.

Research Engineer (June 1976 – December 1977)
Advanced Research Engineer (January 1978 – August 1979)
Owens/Corning Fiberglas Corp, Technical Center, Granville, Ohio
Research Assistant (January 1975 – June 1976)
Department of Mechanical Engineering, Purdue University

Coop Engineer (September 1971 – June 1974)
Engineer (September 1974 – December 1974)
FMC Corporation, Environmental Equipment Div., Itasca, Illinois

AWARDS

ASEE/ONR Summer Faculty Fellow 1983
Research Achievement Award 1985
ONR Young Investigator Award 1987
Alexander von Humboldt Fellowship 1991
UM Departmental Teaching Award 2000, 2002
daVinci Award (on behalf of ProCEED), Engineering Society of Detroit
ASME Fellow 2000
Faculty Advisor of Year, ASME, COE Univ. Michigan 2004
Ginsberg Center Award for Community Service
& Social Action's Outstanding Faculty 2004
University of Michigan Distinguished Faculty Governance Award 2004
APS/Division of Fluid Mechanics Extraordinary Service Award 2009

CONSULTING

Owens/Corning Fiberglas Corporation, Granville, Ohio,
“Fiber flow modeling,” June 1983 – August 1986.
Kaiser Optical Systems, Ann Arbor, Michigan, “Curtain coating systems,”
August 1986 – January 1987.
Northern Telecom, Ann Arbor, “Air flow in disk storage devices,” Aug 1988.
Impact Protection Technologies, Ann Arbor, “Air flow in football helmet,” 1990.
ICOMP, NASA Lewis, Cleveland, Ohio, “Effective numerical flow
through boundary conditions for aeroacoustics problems,” 1993.
Ford Motor Company, Dearborn, Michigan, “Dynamic coefficients
in lubrication problems,” March 1994–1997.
Analytical Dynamics, Ann Arbor, Michigan, “Time marching lubrication
problems,” March 1995.
Advanced Modular Power Systems, Ann Arbor, Michigan, “Rarefied gas
flow from a beta-alumina emitter,” April–June 1996.
BASF Corp, Wyandotte, Michigan, “Pressurized helical coils,” Apr–Aug 1998
SulfurTech Corporation, Toledo Ohio, “Aeration in water treatment device,”
October 2001–2002.
Motion Technologies, Fallbrook CA, “Lubrication studies,” Aug – Sep 2003.
Detroit Edison, Monroe Michigan, “Reformer evaluation,” Aug 2003 – 2004.
Rick Bernstein (on behalf of wheelchair-bound passengers), “City of Detroit
Department of Transportation complaint,” Nov 2004 – 2005.
Eppsteiner & Fiorica, LLP, “Mold in Consumer Appliances,” Mar 2010.

LIST OF FUNDED RESEARCH PROJECTS

- “An Algorithm for Periodic and Nonperiodic Steep and Breaking Waves,” Naval Research Laboratory No. N00014-85-K-2019, \$25,000, 8/85-8/86.
- “RESEARCH INITIATION: Axisymmetric Analysis of Liquid Jets,” National Science Foundation No. MSM-8504456, \$66,793 for 30 months starting May 1985.
- “The Effect of Grinding Fluid on Wheel Wear,” General Motors Corp. UM N-2GM, \$88,722, 12/85-12/86, (with E. Kannatey-Asibu, co-PI) \$106,000 extension 6/86-6/87.
- “URI: Program for Ship Hydrodynamics,” Funded by Office of Naval Research. One of three Lead-Principle Investigators (15 total principle investigators) \$4,867,000 for five years starting October 1986.
- “Mechanics of Fish Interactions with Rigid Planar Boundaries,” (Paul Webb, project director) National Science Foundation DCB-8701923 (Regulatory Biology) \$395,600 for 36 months starting September 1987.
- “Periodic and Aperiodic Steep and Breaking Waves,” Young Investigator Award, Office of Naval Research, Ocean Engineering Division, N00014-87-K-0509, \$255,000 for 36 months starting July 1987.
- “Periodic and Aperiodic Steep and Breaking Waves,” funded by Naval Research Laboratory N00014-87-K-2021, \$22,000 for 24 months starting July 1987. \$10,000 supplement starting July 1988. \$25,000 supplement starting July 1989.
- “Spectral Methods and Corner Singularities,” DMC-8716766, funded by NSF, Applied Mathematics and Computational Engineering, \$98,000 for 24 months (with J.P. Boyd, co-PI), Sept. 1988.
- “ONR Matching Funds,” \$44,000 for 12 months, beginning September 1988.
- “Modeling the Fluid Mechanics of Paper Forming,” \$39,810 for 12 months beginning June 1989, Kimberly-Clark Corp, \$22,800 extension June 1990, \$16,000 extension June 1991, \$49,000 extension for 12 months, Jan 1992.
- “Mechanics of Fish Interactions with Habitat Protuberances,” (Paul Webb, co-project director) National Science Foundation DCB9017817 (Physiological Processes) \$190,000 for 36 months starting January 1991.
- “Spectral and Spectral Element Methods,” National Science Foundation, Computational Engineering ECS-90012263, \$60,000 for 24 months, Sept. 1991 (with Boyd JP, co-investigator).
- “Short Wave and Surfactant Interactions,” (with Perlin M& D. Dowling) Office

- of Naval Research N00014-93-1-0867, \$198,000, Two years starting July 93.
- “AASERT: Surfactant Interactions,” Office of Naval Research N00014-94-I-0850, (D. Dowling, PI) \$137,255 for two years starting June 1994.
- “The Mechanics and Modeling of Wet Paper Forming” (Noel C. Perkins, PD) \$43,328 TAPPI Foundation, 18 months starting June 1994.
- “Thermo-Fluid Teaching Module--Hydraulics and Internal Flows,” Greenfield Coalition. (M Schumack, PD, Univ. Detroit Mercy), National Science Foundation. \$17,000 for 12 months starting May 1995.
- “URI: Ocean Surfaces Processes,” Office of Naval Research N00014-92-J-1650, (J Vesecky and G. Meadows, co-PD, subacct. approx. \$70,000/year). Five years starting November 1991.
- “Nonisothermal analytical and experimental study of viscoelastic fiber drawing,” (E Arruda, PD), National Science Foundation (Material Processing) CMS-9414-891-194-2584 \$223,571 for 36 months starting September 1994.
- “Lubrication Flow in Elastomeric Lip Seals,” (K. Ludema, PD), Ford Motor Co. Continuing funding of subacct approximately \$110,000/year, Jan 95-Dec 98.
- “Modeling and Evaluation of Paper Forming Process Employing Crescent Former Machines,” Beloit Corp. (N Perkins, Co-PI) \$10,000 for 4 months starting May 96. \$25,044 extension starting May 97.
- “On the boundary conditions at an oscillating contact line: A Physical/Numerical Experimental Program,” (Perlin M, PD), NASA (NRA-94-OLMSA-05), \$396,700 for 52 months starting March 96.
- “Strengthening civic engagement of students in mechanical engineering,” Kellogg Faculty Committee on Civic Engagement, (D Brei, Co-PI) \$12,000, June 1998-June 1999.
- “Workshop on improving undergraduate fluid mechanics education,” NSF Division of Undergraduate Education \$104,517, 9/1/00 – 8/30/01.
- “Computations of flow of the molten pool during gas metal arc welding,” General Motors Corp., starting May 1998, (E. Kannatey-Asibu, PI), continuing center grant of approximately \$1M/year, WWS support 5% calendar year and 0.5 GSRA.
- “Development of a predictive model and warning system of imminent dam failures for Michigan, Provost Fund for Road Scholars,” (A. Cotel, PI) \$14,780, 1/00 – 5/04.
- “Using Nonlinearity and Contact Lines – Control Fluid Flow in Microgravity,” (M. Perlin, PI), NASA Microgravity Physics, \$298,500 for 48 mos. starting Apr 2000.

“GOALI: Gas-solid multiphase flow dynamics using electrical impedance tomography,” (S. Ceccio, PI) NSF \$300,000 for 48 Months starting August 2000.

“Rheological characterization of inks,” (M. Solomon, PI), Flint Ink, Gift \$50,000, September 2003.

“Modeling and visualization of clutch performance,” (Steve Ceccio, co-PI) \$106,932 + \$93,680, Dynax Corporation, August 2003 – July 2005.

“NASA BioScience and Engineering Institute,” (J. Grotberg, PI) \$6.4M for 5 years starting Sep 2003.

“Low Energy Vapor Distillation Method,” (W. Schultz, PI), Levine Group, \$100,000, 2006 for 12 months.

“Physics-based simulations of washing machine processes,” (D. Dowling, PI), Whirlpool Corporation, \$548,874, 3/1/03 – 2/29/08.

“Project/Proposal Title: Michigan AmeriCorps Partnership - 2010-2011, State of Michigan Department of Human Services, \$299,214, 09/01/10 – 08/31/11.

“Grantee Support MI AmeriCorps – 2010-2011,” Various sponsors – Community Partnerships, \$90,360, 09/01/10 – 08/31/11.

“CFSEM America Reads Tutoring Corps 2010,” Community Foundation for Southeast Michigan, \$56,000, 06/16/10 – 06/15/11.

“America Reads – Ginsberg Center Literacy,” Skillman Foundation, \$39,000, 07/01/10 – 06/30/11.

“Ypsilanti Health Initiative,” State of Michigan Department of Human Services, \$358,098, 09/01/09 – 06/30/11.

“Grantee Support MI AmeriCorps – 2009-2010,” Various sponsors – Community Partnerships, \$100,550, 09/01/09 – 05/31/11.

“Michigan AmeriCorps Recovery 2009,” State of Michigan Department of Human Services, \$296,863, 05/01/09 – 04/30/11.

“Project/Proposal Title: Michigan AmeriCorps Partnership – 2011-2012,” State of Michigan Department of Human Services, \$319,142, 09/01/11 – 08/31/12, pending.

“America Reads – Ginsberg Center Literacy,” Skillman Foundation, \$55,000, 07/01/11 – 06/30/12, pending.

“Global Extension of the Michigan Research Responsibility and Ethics Training Program,” NSF, 9/2011-8/2014, \$330,000 (\$83,485 to WWS), K. Barald, PI, pending.

PROFESSIONAL ACTIVITIES

Member

American Physical Society
American Society of Mechanical Engineers
American Society of Engineering Education
Society of Industrial and Applied Mathematics
Society of Rheology
von Humbolt Association of America

Reviewer

J. Fluid Mechanics	AICHE Journal	Science
J. Gel-Sol Sci. & Tech.	J. Ship Research	Nature
ASHRAE Trans.	American Zoologist	Physics of Fluids
National Science Foundation	J. Comput. Physics	J. Rheology
J. Manufacturing Engin.	J. Non-Newtonian Fluid Mechanics	
Int. J. Num. Meth. Eng.	J. Heat Transfer	
Int. J. Heat & Mass Transfer	J. Exp. Biology	
SIAM J. Appl. Math	J. Theo. Biology	
J. Fluids Engineering	J. Engineering Mech.	
Num. Meth. for P.D.E.	J. Applied Mech.	
Int. J. Num. Meth. Fluids	Comput. & Chem. Engin.	

Committees and Service

ASME Applied Mechanics Division, Fluids Committee, 1986 –
Executive Board member, Program of Ship Hydrodynamics, 1986 – 1991
Five Year Review Committee of MEAM, U. Mich, 1987.
Engineering/Science/Mathematics Committee, U. Mich, 1985 – 1987
Office of Technology Transfer Review Committee, U. Mich, 1996.
Inter. Scientific Committee, ICDF, Cairo Egypt, 1994, 1996.
ASME U. Mich. Faculty Advisor, 1994 – 2004
IAESTE Faculty Advisor, 1999 –
MEAM Undergraduate Program Chair, 1995 – 1997
MEAM Advisory Committee, 1996 – 98, 2000 – 2004
Founder, Science Club for students at risk in Ann Arbor Public Schools, 1997–
College of Engineering MLK Chair, 1997 – 1998
Center for Adv. Polymer Engin. Res., Director 1996 – 1997, Exec board 1997–
College of Engineering Curriculum Committee, 1998.
Workshop ‘Improving UG Fluids Education’, Chair, Ann Arbor, Oct 2000
College of Engineering Rules Committee, Member 1999, Chair 2000 – 2002
Center Research on Learning & Teaching Fac Adv Comm, 2000 – 2002
Academic Affairs Advisory Committee, 2000 – 2004, Chair 2001 – 2004
Co-Founder, Program for Civic Engagement in Engineering Design, 1998 –
Engineering Space Allocation Policy for Student Organizations, 2001–
Tony Maxworthy Symposium, SES, Co-chair, 2003
APS, Division of Fluid Dynamics Nominating committee, 2003 – 2005
University Faculty Senate Assembly, 2004 – 2007

National Center for Institutional Diversity, Charter Steering Committee, 2004 –
Ginsberg Center Long-Range Planning Committee, 2005
University Residency Appeal Committee, 2005 – 2008
ME Faculty Honors and Awards Committee, 2006
ME Undergraduate Program Committee, 2009-2010
UM Research Policy SACUA Committee, Chair 2009-
College of Engineering Nomination Committee, Chair 2009-2010
UM Accreditation Review Panelist, 2010
College of Engineering Interdisciplinary Program Review, Chair, 2010
University of Michigan Faculty Director of Ginsberg Center for
Community Service and Learning. 2010-2013
Inst. Math. Analysis Workshop Co-chair, “Natural Locomotion in Fluids and
on Surfaces: Swimming, Flying, and Sliding,” 6/2010 (with co-editorship)
UM Broader Impacts Committee, OVPR, 2010-
ME Undergraduate Program Committee, 2010-
UM Wallenberg Executive Committee, Rackham, 2010-
UM Program in the Environment Advisory Committee, 2010-
Media and Science Relations Committee, American Physical Society, 2011-

PUBLICATIONS

Joyce M., Schultz WW and Strom A, “Replacement of secondary clarifiers by dynamic straining,” U.S. EPA Technical Report EPA-679/2-75-045, 1976.

Schultz WW and Goldschmidt VW, “Energy savings through shutdown of water heaters,” *ASHRAE Trans.* 83, 1977.

Schultz WW and Goldschmidt VW, “Effect of distribution lines on standby loss of service water heaters,” *ASHRAE Trans.* 84, 1978.

Schultz WW and Goldschmidt VW, “Energy performance of a residential electric water heater,” *ASHRAE Trans.* 87, 1981.

Schultz WW and Davis SH, “One-dimensional liquid fibers,” *J. Rheology* 26:331-345, 1982.

Schultz WW and Goldschmidt VW, “Distribution efficiency and character of start-up and shut-down of flow in hot water distribution lines,” *ASHRAE Trans.* 88, 1983.

Schultz WW and Davis SH, “Effects of boundary conditions on the stability of slender viscous fibers,” *J. Appl. Mech.* 106:1-5, 1984.

Schultz WW, Zebib A, Davis SH and Lee Y, “Nonlinear stability of Newtonian fibers,” *J. Fluid Mech.* 149:455-475, 1984.

Schultz WW, “Slender viscoelastic fiber flow,” *J. Rheology* 31:733-750, 1987.

Schultz WW and Hong SW, "[Solution of potential problems using an over-determined complex boundary integral method](#)," *J. Comput. Phys.* 84:414-440, 1989.

Lee NY, Schultz WW and Boyd JP, "[Stability of fluid in a rectangular enclosure by spectral method](#)," *Int. J. Heat Mass Trans.* 33:513-520, 1989.

Georgiou G, Olson LG, Schultz WW and Sagan S, "A singular finite element for Stokes flow: The stick-slip problem," *Int. J. Num. Meth. Fluids* 9:1353-1367, 1989.

Schultz WW, Lee NY and Boyd JP, "Chebyshev pseudospectral method of viscous flows with corner singularities," *J. Scientific Computing* 4:1-24, 1989.

Georgiou G, Schultz WW and Olson L, "Singular finite elements for the sudden expansion and die-swell problems," *Int. J. Num. Meth. Fluids* 10:357-372, 1990.

Joo SW, Schultz WW and Messiter AF, "An analysis of the initial wavemaker problem," *J. Fluid Mech.* 214:161-183, 1990.

Schultz WW and Gervasio C, "A study of the singularity in the die swell problem," *Q. J. Mech. Applied Math.* 43:407-425, 1990.

Joo SW, Messiter AF and Schultz WW, "Evolution of weakly nonlinear water waves in the presence of viscosity and surfactant," *J. Fluid Mech.* 229:135-158, 1991.

Olson LG, Georgiou G and Schultz WW, "[An efficient finite element method for treating singularities in Laplace's equation](#)," *J. Comput. Phys.* 96:391-410, 1991.

Schumack M, Schultz WW, Chung J-B and Kannatey-Asibu E, "[Analysis of fluid flow under a grinding wheel](#)," *J. Engin. for Industry* 113:190-197, 1991.

Schumack M, Schultz WW and Boyd JP, "Spectral method solution of the Stokes equations on nonstaggered grids," *J. Comput. Phys.* 94:30-58, 1991.

Cao Y, Schultz WW and Beck R, "Three dimensional desingularized boundary integral method for potential problems," *Int. J. Num. Meth. Fluids* 12:785-803, 1991.

Webb PW, Sims D, and Schultz WW, "The effects of an air/water surface on the fast start performance of rainbow trout (*Oncorhynchus mykiss*)," *J. Experimental Biology* 155:219-226, 1991.

Bertram V, Schultz WW, Cao Y and Beck R, "Nonlinear computations of wave resistance for a submerged spheroid," *Ship Technology Research* 38:3-5, 1991.

Georgiou G, Olson LG, and Schultz WW, "The integrated singular basis function method for the stick-slip and the die-swell problems," *Int. J. Num. Meth. Fluids* 13:1251-1265, 1991.

- Schumack M, Schultz WW, and Boyd JP, "Taylor vortices between elliptical cylinders," *Physics Of Fluids* A4:2578-2581, 1992.
- Li L, Schultz WW, and Merte, Jr. H, "The velocity potential and lift force for two spheres moving perpendicular to the line joining their centers," *J. Eng. Math.* 27:147-160, 1993.
- Gou S, Messiter AF and, Schultz WW, "Capillary-gravity waves in a surface tension gradient. I. Discontinuous change," *Phys. Fluids* A5:966-972, 1993.
- Cao Y, Beck RF, and Schultz WW, "Numerical computations of two-dimensional solitary waves generated by moving disturbances," *Int. J. Num. Meth. Fluids* 17:905-920, 1993.
- Schultz WW, "Book Review--Fundamentals of Two-Fluid Dynamics by Joseph and Renardy," *Appl. Mech. Reviews* 46:B90-B91, 1993.
- Schultz WW, Huh J, and OM Griffin, "Potential energy in steep and breaking waves," *J. Fluid Mech.* 278:201-228, 1994.
- Schultz WW, "Book Review--Adaptive Finite and Boundary Element Methods by Brebbia and Aliabadi," *Appl. Mech. Reviews* 47:B51, 1993.
- Turnbull P, Perkins NC, and Schultz WW, "Contact-induced nonlinearity in oscillating belts and webs," *J. Vibration & Control* 1:459-479, 1995.
- Peltzer RD, Griffin OM, Wang HT, and Schultz WW, "Kinematic and dynamic evolution of deep water breaking wave packets," *J. Geophys. Res. (Oceans)* 101:16515-16531, 1996.
- Schultz WW and Jiang L, "Book Review--Water waves: Relating modern theory to advanced engineering applications by Matuir Rahman," *Appl. Mech. Reviews* 49:B44, 1996.
- Jiang L, Ting C, Perlin M, and Schultz WW, "Moderate and steep Faraday waves: Instabilities, modulation and temporal asymmetries," *J. Fluid Mech.* 329:275-307, 1996.
- Gupta G, Schultz WW, Arruda EM and Liu X, "Nonisothermal model of glass fiber drawing stability," *Rheol. Acta* 35:584-596, 1996.
- Turnbull P, Schultz WW, Perkins NC, and Beuther P, "One-dimensional dynamic model of a paper forming process," *Tappi J.* 80:245-253, 1997.
- Gupta G and Schultz WW, "Nonisothermal study of Newtonian slender glass fibers," *J. Nonlinear Mech* 33:151-163, 1997.
- Gou S, Schultz WW, and Tryggvason G, "Vortical motion interacting with a

deforming, contaminated free surface,” Chapt. 7: Viscous-Free Surface Interaction, P. Tyvand ed., *Computational Mechanics Publications* V.16, p179-202, 1998.

Schultz WW, Vanden-Broeck J-M, Jiang L and Perlin M, “Highly nonlinear standing waves with small capillary effect,” *J. Fluid Mech.* 369: 253-272, 1998.

Jiang L, Perlin M and Schultz WW, “Period tripling and energy dissipation of breaking standing waves,” *J. Fluid Mech.* 369: 273-299, 1998.

Lapham GS, Dowling DR, and Schultz WW, “In-situ force balance tensiometry,” *Experiments in Fluids* 27:157-166, 1999.

Jiang L, H-J Lin, Schultz WW, and Perlin M, “Unsteady ripple generation on steep gravity-capillary waves,” *J. Fluid Mech.* 386:281-304, 1999.

Yih C-S and Schultz WW, “Linear and nonlinear waves in flowing water,” in *Fluid Dynamics at Interfaces* (honoring C-S Yih), Wei Shyy, editor, Cambridge University Press, 1999.

Lu X, Arruda EM and Schultz WW, “[The effect of processing parameters on glass fiber birefringence development and relaxation](#),” *J. Non-Newtonian Fluid Mech.* 86:89-104, 1999.

Perlin M and Schultz WW, “[Capillary effects on surface waves](#),” *Ann. Review Fluid Mech.* 32:241-274, 2000.

Lapham GS, Dowling DR and Schultz WW, “[Linear and nonlinear gravity-capillary waves with a soluble surfactant](#),” *Experiments in Fluids* 30:448-457, 2001.

Merte Jr H, Park J, Schultz WW and Keller RB, “Criteria for approximating certain microgravity flow boiling characteristics in Earth gravity,” *Annals New York Acad. Sci.* 974:481-503, 2002.

Schultz WW and Webb PW, “[Power requirements of swimming: Do new methods resolve old questions?](#)” *Integrative and Comparative Biology* 42:1018-1025, 2002.

Son DJ, Seo DK and Schultz WW, “A comparison study between Navier-Stokes equation and Reynolds equation in lubricating flow regime,” *KSME Int J.* 17:599-605, 2003.

Wang F, Hou WK, Hu SJ, Kannatey-Asibu E, Schultz WW and Wang PC, “[Modelling and analysis of metal transfer in gas metal arc welding](#),” *J. Physics D–Appl. Phys.* 36:1143-1152, 2003.

Huang CK, Lee JH, Schultz WW and Ceccio SL, “[Singularity image method for electrical impedance tomography of bubbly flows](#),” *Inverse Problems* 19:919–93, 2003.

- Bian X, Perlin M, Schultz WW, Agarwal M, "[Axisymmetric slosh frequencies of a liquid mass in a circular cylinder](#)," *Phys. Fluids*. 15:3659–3664, 2003.
- Yoo J-S, Schultz WW, "[Thermal convection in a horizontal porous layer with spatially periodic boundary temperatures: Small Ra flow](#)," *Int. J. Heat Mass Transfer* 46:4747–4750, 2003.
- Lee J and Schultz WW, "[Eigenvalue analysis of Timoshenko beams and axisymmetric Mindlin plates by the pseudospectral method](#)," *J. Sound Vibration* 269:609–621, 2004.
- Perlin M, Schultz WW and Liu Z, "[High Reynolds number oscillating contact lines](#)," *Wave Motion* 40:41–56, 2004.
- Jiang L, Perlin M and Schultz WW, "[Contact line dynamics and damping for oscillating free surface flows](#)," *Phys. Fluids* 16:748–758, 2004.
- Xu G, Schultz WW, Kannatey-Asibu Jr E, "[Application of a front tracking method in gas metal arc welding \(GMAW\) simulation](#)," *J. Manufacturing Sci. and Engin.* 127:590-597, 2005.
- Aphale CR, Cho J, Schultz WW, Ceccio SL, "[Modeling and parametric study of torque in open clutch plates](#)," *J. Tribology* 128:422-430, 2006.
- Aphale CR, Schultz WW, Ceccio SL, "[The Influence of Grooves on the Fully Wetted and Aerated Flow Between Open Clutch Plates](#)," *J. Tribology* 132:011104-1-7, 2010.
- Wang F, Schultz WW, Xu G, Hu SJ, Kannatey-Asibu, Jr. E, Hou W, "[Development of free surface tracking algorithms for fusion welding simulations](#)," submitted to *Int. J. Num. Meth. Eng.*
- Bian X, Schultz WW, Perlin M, "[Liquid slug motion and contact lines in an oscillatory capillary tube](#)," submitted to *J. Fluid Mech.*
- Aphale CR, Schultz WW, Ceccio SL, "[Aeration in Lubrication with Application to Drag Torque Reduction](#)," to appear *J. Tribology*, 2011.
- Akabay DT, Dowling DR, and Schultz WW, "Combining a large deformation plate model with the immersed boundary method," submitted to *J. Comput. Phys.*
- Schultz WW, Worster MG, and Anderson DM, "Solidifying sessile water droplets," under final preparation.
- Hoge F, Schultz WW, Boedo S and Vanden Broek C, "[Flow in the grooves of journal bearings](#)," under revision for *J. Tribology*.
- Hoge F and Schultz WW, "Numerical solution of the dynamic coefficients of oil-lubricated journal bearings with arbitrary groove angle," under revision for *J. Tribology*.

Chen E-J, Schultz WW and Perkins NC, "A two-dimensional viscous model of a wet paper forming process," under revision for *TAPPI J.*

Han H-C, Schultz WW, Boyd JP and Schumack MR, "The dynamic stability of journal bearings," in preparation.

PRESENTATIONS (since 1995)

Gupta G, Schultz WW, Lu X, & Arruda EM, "Nonisothermal study of viscoelastic slender fiber drawing," Soc. Rheology Annual Meeting, Sacramento, October 1995.

Han H-C, Schultz WW, Boyd JP, Schumack MR, "Journal bearing dynamic stability," 48th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Irvine, November 1995.

Gupta G, Schultz WW, Lu X, and Arruda EM, "Nonisothermal analytical and experimental study of viscoelastic fiber drawing," NSF Design & Mfg Grantees Conf, Albuquerque, January 1996.

Schultz WW, Jiang L, Perlin M, "Steep Faraday waves," 11th International Workshop on Water Waves and Floating Bodies, Hamburg, Germany, April 1996.

Jiang L, Perlin M, Schultz WW, "Steep and Breaking Faraday Waves," 21st ONR Symposium on Naval Hydrodynamics, Trondheim, Norway, June 1996 (with publication).

Gupta G, Schultz WW, Lu X, and Arruda E, "Nonisothermal study of viscoelastic slender fiber drawing stability," (with publication) XIIth Congress of the Society of Rheology, Quebec, August 1996.

E-J Chen, Schultz WW, and Perkins N, "Viscous mechanics of paper forming process," 49th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Syracuse, NY, November 1996.

Lapham GS, Dowling DR, Schultz WW, "General purpose in-situ surface tension measurement," 49th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Syracuse, NY, November 1996.

Jiang L, Schultz WW, Perlin M, "Parasitic capillary waves and Wilton's ripples under Faraday resonance," 49th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Syracuse, NY, November 1996.

Jiang L, Schultz WW, Perlin M, "Capillary ripples on standing waves," 12th Int Workshop on Water Waves and Floating Bodies, Marseilles, March 1997.

Schumack M, Das S, Vaksman M, Belfield K, Semakula E, Pryor R, Schultz WW, "Thermophysics for manufacturing engineers: A nontraditional approach," Emerging Issues in Manufacturing Education, ASEE Annual Conf, Milwaukee, WI, June 1997.

Lapham GS, Dowling DR, Schultz WW, "Surfactant damping of water waves," 50th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, San Francisco, November 1997.

Jiang L, Liu Z, Perlin M, Schultz WW, "Contact-line dynamics for water waves and high-Re flows," 50th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, San Francisco, November 1997.

Song D-J, Schultz WW, "A computational validity study of Reynolds equation in lubricating flow regime," 50th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, San Francisco, November 1997.

Schultz WW, Han H-C, Boyd JP, Schumack M, "Analysis of the oil-whirl instability," 50th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, San Francisco, November 1997.

Subramani AK, Beck RF and Schultz WW, "Suppression of wave-breaking in nonlinear water wave computations," 13th International Workshop on Water Waves and Floating Bodies, Delft, March 1998.

Lu X, Arruda EM and Schultz WW, "The effect of processing parameters on glass fiber birefringence development and relaxation," Conf. on Relaxation Phenomena, Banff, Canada, May 1998.

Chen E-J, Schultz WW, and Perkins NC, "A two-dimensional viscous model of a wet paper forming process," TAPPI Engineering Congress, Chicago, September 1998.

Lapham G, Dowling DR, and Schultz WW, "Nonlinear water waves with soluble surfactant," 51st Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Philadelphia, November 1998.

Schultz WW, Huang C, and Ceccio SL, "An analysis of two-dimensional electrical impedance tomography," 51st Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Philadelphia, November 1998.

Zhu S, Schultz WW, and Subramani AK, "An effective numerical beach for nonlinear water wave computations," Austral-Asia Conf, December 1998.

Smith ET, Schultz WW, Barber JR and Kannatey-Asibu E, "Oscillations in a weld pool," ASME Summer Meeting, 1999.

Liu Z, Schultz WW and Perlin M, "High Reynolds number oscillating contact lines," 52nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics,

New Orleans, November 1999.

Schultz WW, Liu Z, and Perlin M, "Film flow inside an oscillatory rotating cylinder," 52nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, New Orleans, November 1999.

Perlin M and Schultz WW, "Non-intrusive surface-tension measurement," 52nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, New Orleans, November 1999.

Schultz WW, Ceccio S, Tortora P, and Cocco R, "Examination of gas-solid multiphase flow dynamics using electrical impedance tomography," DOE Multiphase Fluid Dynamics Research Consortium, Mendenhall, PA, Sept 1999.

Stott N, Schultz WW, Brei DE, and DMW Hoffman, "ProCEED: A program for civic engagement in engineering design," 2000 ASEE Annual Conference and Exposition, St. Louis, June 2000. [Conference Best Paper Award]

Schultz WW, Worster MG & Anderson D, "Solidifying sessile water droplets," EUROMECH Colloquium 408, Interactive Dynamics of Convection and Solidification, Chamonix, France, March 2000.

Georgiou G, Tsamopoulos J, and Schultz WW, "Steady flow of a two-dimensional film under pressure," ECCOMAS 2000, Barcelona, 11-14 September, 2000 and XIIIth International Congress on Rheology, Cambridge (UK), August 2000G

Schultz WW, Perlin M, and Liu Z, "Axially rotating horizontal circular cylinder flows of thin films," 53rd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Washington DC, November 2000.

M Farina, Stahmer JL, Schultz WW, Brei DE, "Challenges in establishing a program for civic engagement in engineering design," Engineering Education Division for the 2001 ASEE Annual Conference, Albuquerque, NM.

Perlin M, Schultz WW, Smith MK, and Foss JF, "Improving undergraduate fluid mechanics across the curriculum," 2001 ASEE Annual Conference, Albuquerque, NM.

Lee J, Schultz WW, Ceccio SL, "Electrical impedance tomography by pseudospectral method," 54th Meeting of the American Physical Society, Division of Fluid Mechanics, San Diego, November 2001.

Agarwal M, Schultz WW, Perlin M, Bian X, "The motion of water slugs in horizontally oscillated glass tubes," 54th Meeting of the American Physical Society, Division of Fluid Mechanics, San Diego, November 2001.

Zondervan R, Constantine A, Brei DE, Schultz WW, "Outcomes survey study of ProCEED projects in mechanical engineering capstone design course," ASEE Annual

Conf and Exposition, Montreal, June 2002.

Xu G, Kannatey-Asibu, Jr. E, Schultz WW, Wang PC, "Simulation of gas metal arc welding short circuiting transfer using a front tracking method," Proc. of IMECE, Int. Mechanical Engineers Congress and Exposition, New Orleans, November 2002.

Bian X, Perlin M, Schultz WW, "[Steady Slug Flow in a Circular Tube](#)," 55th Meeting of the American Physical Society, Division of Fluid Mechanics, Dallas, November 2002.

Tortora PR, Ceccio SL, Schultz WW, O'Hern TJ, Torczynski JR, Trujillo SM, "An electrical-impedance tomography system for collecting validation-quality data from gas-solid flows," 3rd World Congress on Industrial Process Tomography, September 2003.

Lay K, Schultz W, Perlin M, "[An experimental and numerical investigation of thin film flow in an axially rotating horizontal cylinder](#)," 56th Meeting of the American Physical Society, Division of Fluid Mechanics, Meadowlands, November 2003.

Tortora P, Ceccio S, Schultz WW, Torczynski J, O'Hern T, Trujillo S, "[The effective permittivity of dielectric-particle distributions](#)," 56th Meeting of the American Physical Society, Division of Fluid Mechanics, Meadowlands, November 2003.

Bian X, Schultz WW, Perlin M, "[Forced motion of liquid slugs](#)," 56th Meeting of the American Physical Society, Division of Fluid Mechanics, Meadowlands, Nov 2003.

Schultz WW, Seo D, Terpenning M, "Saliva and swallowing studies," KAIST/University of Michigan Joint Meeting, Daejeon, Korea, May 2004.

Schultz WW, Aphale C, Cho J, Ceccio SL, "Clutch studies at the University of Michigan," Dynax Corporation, Chitose, Japan, May 2004.

Akcabay DT, Dowling DR, Schultz WW, "[Two-dimensional simulations of the dynamics of densely-packed fluid loaded cloth](#)," 57th Meeting of the American Physical Society, Division of Fluid Mechanics, Seattle, November 2004.

KA Lay, Schultz WW, Perlin M, "[An experimental and numerical investigation of thin film flow in an axially rotating horizontal cylinder: Part II](#)," 57th Meeting of the American Physical Society, Division of Fluid Mechanics, Seattle, November 2004.

Aphale CR, Cho J, Schultz WW, Ceccio SL, Yoshioka T, Hiraki H, "[Modeling and parametric study of torque in open clutch plates](#)," ASME/STLE International Joint Tribology Conference, Long Beach, California, October 2004.

Kim SJ, Hasselbrink, Jr. EF, Schultz WW, "Recent advances in electrokinetics pumping for microfluidic systems," KAIST/University of Michigan Joint Meeting, San Francisco, July 2005.

Akcabay DT, Schultz WW, Dowling DR, "[Simulations of densely-packed cloth motion](#)

[in water](#),” 58th Meeting of the American Physical Society, Division of Fluid Mechanics, Chicago, November 2005.

Aphale CR, Schultz WW, Ceccio SL, “[Surface modification of clutch plates to reduce disengaged drag torque](#),” 58th Meeting of the American Physical Society, Division of Fluid Mechanics, Chicago, November 2005.

Meadows LA, Nidiffer J, Ball SR, Davis CSG, Finelli CJ, Schultz WW, “Work in progress: An initial assessment of the effect of the first year experience on under-represented student retention in engineering,” 36th Annual Frontiers in Education, San Diego, October 2006.

Merte H, Schultz WW, Liu QY, “[Orientation and Related Buoyancy Effects in Low-velocity Flow Boiling](#),” 5th Interdisciplinary Transport Phenomena - Fluid, Thermal, Biological, Materials and Space Science, Bulgaria, October 2007, with publication vol 1161, 202-210.

Aphale CR, Schultz WW and Ceccio SL, “[Aeration in Disengaged Clutches](#)”, 7th Int. Conference on Multiphase Flow, ICMF, Tampa FL, May 30 – June 4, 2010 with publication.

INVITED LECTURES (since 1995)

“Steep Standing Waves,” Seoul National Univ. and POSTECH Univ., May 1996.

“Viscoelastic Fiber Spinning,” KAIST, Korea and Nam Young Univ., May 1996.

“Nonisothermal Study of Viscoelastic Drawing Resonance,” (with publication) Symposium on Rheology and Computational Fluid Mechanics in memory of Tasos Papanastasiou, Nicosia, Cyprus, July 1996.

“Fluid-Structure Interaction Problems,” SE Michigan ASME Awards Banquet, Troy Michigan, June 1997.

“Oil-Whirl Instability,” Theoretical and Applied Mechanics Dept, Univ. Illinois, October 1997.

“Dynamic Modeling Wet Paper Formation,” (with E-J Chen and NC Perkins) Special Session on Mathematics in Industry, AMS Fall mtg, Milwaukee, October 1997.

“Linear and Nonlinear Waves in Flowing Water,” (with C.-S. Yih) US National Congress in Applied Mechanics, Symposium honoring C.-S. Yih, Gainesville, Florida, June 1998.

“Fish Swimming Stability,” DAMTP Fluid Mech. Colloquium, Cambridge U, Jan 1999.

“Oil Whirl Instability,” DAMTP Continuum Mech. Colloquium, Cambridge U, Feb 1999.

“Electrical Impedance Tomography,” Mathematics Department, Univ. E. Anglia, March 1999 and Mathematics Department, Loughborough U, March 1999.

“A Two-dimensional Viscous Model of Crescent Forming,” (with E-J Chen and NC Perkins) Kimberly-Clark Corp., Neenah, Wisconsin, September 1999.

“An Experimental and Numerical Investigation of Nonisothermal Viscoelastic Glass Fiber Drawing and Annealing,” (with E Arruda and X.-Y. Lu) Transport Phenomena in Material Processing and Manufacturing, IMECE WAM, Nashville, November 1999.

“Wave Motion near Contact Lines,” (with M Perlin and Z Liu) IUTAM Symposium on Free Surface Flows, University of Birmingham, July 2000.

“Viscoelastic Fiber Spinning,” Fluid Mechanics Group, Stanford University, April 2000.

“Power Requirements of Swimming: Do New Methods Resolve Old Questions?” (with P. Webb) Society for Integrative and Comparative Biology, Anaheim, CA, Jan 2002.

“Contact Line Flow in a Rotating Horizontal Tube,” (with Z. Liu and M. Perlin), “14th U.S. National Congress on Theoretical and Applied Mechanics, Blacksburg, June 2002.

“Modeling Fish Swimming,” Northwestern U., ESAM 25th Anniv., September 2002.

“Fish Swimming,” Notre Dame, November 2002.

“Fish Swimming Stability,” (with P Webb), Symposium on Fluids, Energy, and Acoustics, Mexico City, Mexico, June 2004.

“My Vision in Fluid Mechanics,” National Science Foundation/CTS, DC, February 2006.

“Oscillatory Contact Lines,” WSEAS 07 Fluids Conf., Gold Coast, Australia, January 2007.

“Oscillatory Contact Lines,” Levich Institute, CUNY, New York, February 2007.

While program manager at NSF from 9/2006 to 9/2009, WWS averaged 2 lectures per month on many topics regarding NSF and personal research activities.

“US National Science Foundation Priorities in Cyber, Interdisciplinary and Engineering Activities: A Personal Perspective,” University of Western Ontario, January 2010.

“Fish Swimming Stability,” GALCIT, Cal Tech, March 2010.

“So you want to do Social Justice?” North Campus Service Day, March 2010.

“Oscillatory Contact Lines,” Yeungnam Univ., May 2010.

PATENTS

“Rotary fiber forming spinner,” No. 4270943, June 2, 1981.

“Apparatus for forming mineral fibers,” No. 4300932, November 17, 1981.

“Method and apparatus for forming mineral fibers,” No. 43002234, November 24, 1981.

COURSES TAUGHT

Undergraduate

- Thermodynamics I, II
- Fluid Mechanics
- Environmental Control of Buildings
- Dynamics
- Introduction to Manufacturing
- Senior Laboratory
- Engineering for Community

Graduate

- Advanced Fluid Mechanics I, II
- Hydrodynamic Stability
- Singular Perturbation Methods in Fluid Mechanics
- Wave Motion in Fluids
- Engineering for Community

GRADUATE STUDENT CHAIR

C Gervasio, “Improved eigenfunction expansion method for the die swell problem in an axisymmetric jet,” MS, Rutgers Univ, 1986. (Currently: VP Republic National Bank)

NY Lee, PhD, “Chebyshev spectral solution of viscous flow with corner singularities,” 1987. (Currently: Div Manager, Korea Inst of Energy and Resources, Taejon, Korea)

SW Joo, PhD, “A study of waves with capillary effects,” 1989 (Co-chair A Messiter). (Currently: VP of International Programs, Prof. ME, Yeungnam U)

GC Georgiou, PhD (Chem Eng), “Singular finite elements for Newtonian flow problems with stress singularities,” 1989 (Co-chair E Gulari, Currently: Prof. Math, U Cyprus)

MR Schumack, PhD, 1990, “A spectral domain decomposition method with applications to flows between cylinders, (Co-chair J Boyd, Currently: Prof. ME, U Detroit Mercy)

J Huh, PhD, “A numerical study of capillary-gravity waves,” 1991. (Currently: Sr. Research Eng, Korea Atomic Energy Institute Taejon, KOREA)

Y Cao, PhD (Naval Arch.) “Computations of nonlinear gravity waves by a desingularized boundary integral method,” 1991 (Co-chair R Beck, Currently: Principal Consultant, C-Z Marine Technology, Inc.)

J Lee, PhD, “Finite element models of laser welding,” 1992 (Co-chair K Ludema, Currently: Assoc Prof and Chair, Mechanical Eng, Hong-ik University)

K Park, PhD, “An asymptotic analysis of gas lubrication of rough surfaces,” 1993 (Co-chair K Ludema, Currently: Sankyo Corporation)

MY Hsi, PhD, “Boundary element method simulation of axisymmetric free surface flow,” 1993 (Co-Chair WP Graebel, Currently: Ford Motor Co.)

S Gou, PhD, “Waves with surfactants,” 1994, (Co-chair A Messiter, Currently: Bellcore)

J Ivanenok, MS, “Modeling of the sodium vapor flow in remote condensing alkali metal thermal-electric,” 1994 (Currently: Rain Bird, Golf National Manager)

P Turnbull, PhD, “Analysis of a paper forming process,” 1995 (Co-chair: N Perkins) (Currently: Technical Specialist, Visteon Corp.)

H-C Han, PhD, “Spectral boundary element methods for the stability of journal bearings,” 1995 (Co-Chair Boyd JP) (Currently: Ford Motor Co)

J-J Lin, PhD, “The vortical structure of capillary-gravity waves: An experimental investigation,” 1997 (Co-chair Perlin M).

L Jiang, PhD, “Nonlinear gravity-capillary water waves,” 1997 (Co-chair Perlin M) (Currently: Senior Staff Engineer, Intel Corp).

E-J Chen, PhD, “Analysis of crescent former paper manufacturing,” 1998 (Co-chair N Perkins) (Currently: Research Engineer, Boeing Corp)

G Lapham, PhD, “Wave-surfactant interaction,” 1998 (Co-Chair Dowling DR and Perlin M) (Currently: Applied Thermal Sciences).

X-Y Liu, PhD, “Experimental and analytical investigation of nonisothermal visco-elastic,” glass fiber drawing 1999 (Chair Arruda EM) (Currently: Ford Motor Company).

Z Liu, PhD, “Oscillatory contact lines,” 2001 (Co-chair Perlin M) (Currently: CSO Aker Engineering, Inc.)

J Park, MS, “Pool boiling,” 2001 (Co-Chair H Merte, Currently: Northwestern PhD stud)

M Agarwal, “Oscillatory flow in tubes,” MS, 2002 (Co-chair Perlin M).

C Huang, PhD, “Optimization of auxiliary power devices,” 2003, (Currently: Product Design Engineer, Ford Motor Co.)

G Xu, PhD, 2004, "Simulation of drop formation and metal transfer in gas metal arc welding," (Co-chair EK Asibu) (Currently: Intel Corporation)

X Bian, PhD, 2004, "Liquid slug motion in an oscillatory capillary tube," (co-chair Perlin M) (Currently: CSO Aker Engineering, Inc.)

K Lay, PhD, 2006, "An experimental and numerical investigation of rimming flow," (Co-chair Perlin M) (Currently: Postdoctoral Associate, University of Michigan).

C Aphale, PhD 2006, "Drag reduction at low and high Reynolds numbers," (co-chair S Ceccio) Currently: Sr. Res. Engr., ExxonMobil).

D Akcabay, PhD 2007, "Physics-based washing machine simulations," (co-chair D Dowling).

B Han, PhD 2013, "Low temperature desalination"

M Manolidis, PhD 2012, "Breakup of ice logjams," (co-chair N Katopodes)

POSTDOCTORAL ASSOCIATES AND VISITORS

S-W Hong (Currently: Head, Marine Dynamics Lab, Korean Research Institute of Ships & Ocean Engineering)

R Q-N Zhou (Currently: AECL Research, Chalk River Ontario)

G Gupta, 9/94 - 12/96

D-J Song, Yeungnam Univ, 3/96 - 3/97

N Bessonov, Russian Academy of Sciences, 5/97 - 6/98

C Huang, Institute Engr Thermophysics, Beijing, 1/98-2/99

Prof. S Zhu, University of Wollongong, Australia, 1/98-6/98

Prof. J-H Lee, Hongik University, Korea, 7/00-8/01

Prof. J-S Yoo, Andong National University, Korea, 1/02-1/03

Prof . X-L Chen, Shanghai Jiao Tong University, China, 1/05-5/05

Prof. W Ellermeier, Darmstadt Universität, 7/05-9/05

revised: April 2011