

MARK R. SCHUMACK
CURRICULUM VITAE
(December 5, 2007)

Professor
Mechanical Engineering Department
University of Detroit Mercy

EDUCATION:

Ph.D. in Mechanical Engineering, University of Michigan (Ann Arbor), May 1991.

M.S. in Mechanical Engineering, University of Michigan (Ann Arbor), April 1988.

B.S. in Mechanical Engineering (magna cum laude), University of Michigan (Ann Arbor), December 1980.

EMPLOYMENT:

Professor of Mechanical Engineering, University of Detroit Mercy, Detroit, MI, August 2005 – present. Teach and conduct research in the thermal sciences area. Supervisor of the Heat Transfer and Fluid Mechanics Laboratories.

Chairman, Department of Mechanical Engineering, University of Detroit Mercy, Detroit, MI, January 1999 – August 2002. Responsible for administration of undergraduate and graduate programs in mechanical engineering.

Visiting Researcher, Netherlands Energy Research Center, Petten, the Netherlands, September-December 1998. Taught a weekly seminar series on Computational Fluid Dynamics. Tailored a CFD code for analysis of airflow over wind turbine blades.

Associate Professor of Mechanical Engineering, University of Detroit Mercy, Detroit, MI, Jan. 1996 - 2005. Same responsibilities as above.

Assistant Professor of Mechanical Engineering, University of Detroit Mercy, Detroit, MI, Jan. 1991- 1996. Same responsibilities as above.

Research and Teaching Assistant, University of Michigan, Ann Arbor, MI, 1986-1990. Studied grinding fluid flow under a grant from General Motors Corporation and computational fluid dynamics under a grant from NSF. Taught fluid mechanics laboratories and introductory thermodynamics.

Design Engineer, Cleveland Electric Illuminating Company, Cleveland, OH, June 1982-Aug. 1986. Supervised design of reactor coolant systems at the Perry Nuclear Power Plant. Responsibilities included redesign of systems, supervision

of contractor design and installation, and development and presentation of technical arguments to the Nuclear Regulatory Commission.

Research Assistant, Eindhoven University of Technology, Eindhoven, the Netherlands. Sept.-Dec. 1979. Built a scale model of a water-pumping windmill and performed windtunnel tests.

HONORS:

Faculty Achievement Award (University of Detroit Mercy), 1997.
Engineering Teacher of the Year 1997, 1998, 1999, 2003, 2005, 2006, and 2007 (University of Detroit Mercy); nominee for Engineering Teacher of the Year award in 1991, 1993, 1994, 1996, 2002, and 2004.
Cornerstone Award (College of Engineering & Science), 2006.
Arthur C. Haman Service Award (College of Engineering & Science), 2007.

Best Paper Award (3rd place), Energy Conversion and Conservation Division of the American Society for Engineering Education, Annual Conferences in 2005 and 2006.

Member of honorary fraternities Tau Beta Pi and Pi Tau Sigma.

PROFESSIONAL ACTIVITIES:

Member of the College Core Curriculum Committee, 2007-present.

Member of the University Committee for Course Evaluations, 2007-present.

College of Engineering & Science faculty representative to the McNichols Faculty Assembly, 2005-06.

Co-organizer for Michigan Interfaith Power & Light 3rd Annual Conference held at UDM on November 3, 2005.

College Assessment Coordinator, 2003-2006.

Treasurer, Program Chair, Vice Chair, and Chair, successively, Energy Conversion and Conservation Division of ASEE, 2002-05.

Co-chairperson, Faculty Development Committee, University of Detroit Mercy, August 1998 - May 2000.

Faculty Advisor, American Society of Mechanical Engineers, Sept. 1993-1998.

Chief Faculty Advisor, Tau Beta Pi, Sept. 1993 - Dec. 1996.

Faculty Advisor, Pi Tau Sigma, Sept. 1999 – 2002 and 2006 - present.

Consultant, Ford Motor Company, Dearborn, MI, June-Sept. 1992. Performed heat and mass transfer analysis on automotive air conditioning system evaporators.

Member of American Society of Mechanical Engineers, American Society of Engineering Education, Engineering Society of Detroit.

Instructor for the Professional Engineer Examination refresher courses in fluid mechanics and heat transfer.

Passed the Fundamentals of Engineering exam (then known as the EIT exam) in 1984 in Ohio.

Reviewer for various journals and texts.

PUBLICATIONS:

“Implementation of a Service-Learning Component in Engineering and Its Effect on Students’ Attitudes and Identity,” *European Journal of Engineering Education*, accepted September 2007, with N. Dukhan (main author) and J. Daniels.

“A Student-Centered Solar Photovoltaic Installation Project,” *2007 ASEE Annual Conference Proceedings*, with Robert Ross, Arthur Haman, Will Wittig, Tim Rourke, Krysten Dzwigalski, Meghann Mouyianis, David Chew, and Chris Keimig.

“Service Learning Case Study in Heat Transfer,” *International Journal for Service Learning in Engineering*, vol. 1, no. 2, pp. 1 – 15, Spring 2007, with Nihad Dukhan (main author), John Daniels, and Michael Jenkins.

“Development of Teaching Laboratory Test Equipment as a Senior Capstone Design Project,” *Proceedings of the Spring 2007 American Society for Engineering Education North Central Section Conference*, with Nassif Rayess (main author).

“The Hubbert Curve: Enabling Students to Meaningfully Model Energy Resource Depletion,” *2006 ASEE Annual Conference Proceedings*. This paper won third place in the Energy Conversion and Conservation Division’s Best Paper competition.

“Solution of Complex Pipe Flow Problems Using Spreadsheets in an Introductory Fluid Mechanics Course,” *2004 ASEE Annual Conference Proceedings*.

“Use of a Spreadsheet Package to Demonstrate Fundamentals of Computational

Fluid Dynamics and Heat Transfer," *International Journal of Engineering Education*, vol. 20, no. 6, pp. 974-983 (2004).

"Outcomes Assessment in an Energy Systems Course," *2004 ASEE Annual Conference Proceedings*. This paper won third place in the Energy Conversion and Conservation Division's Best Paper competition.

"Incorporation of an Energy Conservation Theme into Thermal Science Courses," *2002 ASEE Annual Conference Proceedings*.

"The Ford/University of Detroit Mercy Engineering Opportunity Program," *2001 ASEE Annual Conference Proceedings*, with Leo Hanifin.

"Analysis of an Automotive Windshield Washer Fluid Delivery System," *SAE 2000 Transactions – Journal of Passenger Cars – Mechanical Systems*, with Mahmoud Yousef Ghannam (2001).

"Development and Implementation of the Thermophysics Knowledge Area for the Greenfield Coalition for New Manufacturing Engineering Education," *International Conference on Engineering Education '97 Proceedings*, with Shuvra Das, Michael Vaksman, and Kevin Belfield (1997).

"Thermophysics for Manufacturing Engineers: A Nontraditional Approach," *1997 ASEE Annual Conference Proceedings*, with Michael Vaksman, Shuvra Das, Kevin Belfield, Mukasa Ssemakula, Roger Pryor, Vladimir Sheyman, and William W. Schultz (1997).

"Teaching Heat Transfer Using Automotive-related Case Studies with a Spreadsheet Analysis Package," *International Journal of Mechanical Engineering Education*, vol. 25, no. 3, pp. 177-196 (1997).

"A Model for Automotive Windshield Washer Spray Delivered by a Fluidic Nozzle," *Proc Instn Mech Engrs (Journal of Automotive Engineering)*, vol. 210, pp. 327-333, with Mahmoud Ghannam (1996).

"Application of the Pseudospectral Method to Thermohydrodynamic Lubrication," *International Journal for Numerical Methods in Fluids*, vol. 23, pp. 1145-1161 (1996).

"Taylor Vortices Between Elliptical Cylinders," *Physics of Fluids A* **4**, no. 11, with W.W. Schultz and J.P. Boyd (1992).

"Analysis of Fluid Flow Under a Grinding Wheel," *Journal of Engineering for Industry* **113**, with J. Chung, W.W. Schultz, and E. Kannatey-Asibu, Jr (1991); also in *Tribological Aspects in Manufacturing*, edited by M.H. Attia and R. Komanduri, American Society of Mechanical Engineers (1991).

"Spectral Method Solution of the Stokes Equations on Nonstaggered Grids," *Journal of Computational Physics* **94**, no. 1, with W.W. Schultz and J.P. Boyd (1991).

PRESENTATIONS:

"Implementation and Impact of a Service-Learning Project in Mechanical Engineering," poster presentation at the National Conference on Service Learning in Engineering, sponsored by the National Science Foundation and hosted by National Academy of Engineering, Washington DC; with Nihad Dukhan (presenter), John J. Daniels and Michael G. Jenkins (May 24-25, 2006).

"Spectral Methods in Fluid Dynamics," seminar presentation at the Denmark Technical University, Lyngby, Denmark (December 1998).

"Incorporation of a Laser Doppler Velocimeter/Water Tunnel System into the Thermal Sciences Curriculum," poster presentation at the ASEE Annual Conference in Seattle (June 1998).

"Multimedia Courseware Development," workshop offered at the American Society of Engineering Education North Central Section annual meeting in Detroit, with T. Savage and B. Shellnut (April 1998).

"Star-CD and DOE Applied to Design a Fluidic Device," presented by M.Y. Ghannam at the STAR-CD North American Users Conference in Detroit, with J.M. Weaver (April 1998).

"A Survey of Fluid Flow and Heat Transfer Models for the Grinding Process," invited presentation at the Abrasives and Grinding Expo in Detroit, sponsored by SAE and ESD (May 1997).

"Analysis of the Oil-Whirl Instability," presented by W.W. Schultz at the 50th Annual Meeting of the American Physical Society Division of Fluid Dynamics in San Francisco, with H.C. Han and J.P. Boyd (November 1997).

"Authorware as a Platform for Multimedia Instruction," invited workshop presented at Wayne State University to the Southeastern Michigan Alliance for Reinvestment in Technological Education (April 1997).

"Thermodynamics Curriculum Development for Engineering Using Multimedia Tools," presented by M.A. Vaksman at the 213th National ACS Meeting (April 1997).

"Thermophysics Curriculum Development Plan," poster presented at the Manufacturing Engineering Curriculum Workshop, with S. Das, M. Vaksman, K. Belfield, W.W. Schultz, M. Ssemakula, R. Pryor, and S. Joo (1995).

"A Model for Automotive Windshield Washer Spray Delivered by a Fluidic Nozzle," presented by graduate student Mahmoud Ghannam at the ASME Graduate Student Technical Conference (1995).

"Journal Bearing Dynamic Stability," presented by Heng-chu Han, with William W. Schultz and John P. Boyd, at the American Physical Society Division of Fluid Dynamics Annual Meeting (1995).

"Analysis of Fluid Flow Under a Porous Grinding Wheel," presented at the ASME Graduate Student Technical Conference, with graduate student Adel Khanfar (1993).

"Numerical Solution of Unsteady Flow Through an Exhaust System for Optimum Component Spacing," presented by graduate student Jeff Sloss at the ASME Graduate Student Technical Conference (1993).

"Spectral Methods with Applications to Fluid Dynamics," invited presentation for the Mechanical Engineering Department lecture series at Wayne State University (1992).

"Analysis of Fluid Flow Under a Grinding Wheel," invited poster at the ASME winter annual meeting, with J. Chung, W.W. Schultz, and E. Kannatey-Asibu, Jr (1991).

"Hydrodynamic Stability Calculations Using the Spectral Element Method," presented at the American Physical Society Division of Fluid Dynamics Annual Meeting, with W.W. Schultz and J.P. Boyd (1990).

"Spectral Element Solution of Fluid Flow Problems," presented at the SIAM Annual Meeting, with W.W. Schultz and J.P. Boyd (1990).

"Spectral Method Solution of Fluid Flow Problems on Nonstaggered Grids," presented at the APS Division of Fluid Dynamics Annual Meeting, with W.W. Schultz and J.P. Boyd (1989).

FUNDED RESEARCH:

"Improving the Energy Density of Hydraulic Hybrid Vehicles (HHVs) and Evaluating Plug-In HHVs," funded by the Michigan-Ohio University Transportation Center, October 2007 – August 2008, with Mohammad Elahinia (Principal Investigator) from the University of Toledo. Amount: \$16,781 to UDM.

“Development of an Automotive Alternative Fuels Module: ‘Fueling the Car of Tomorrow’,” funded by the Michigan-Ohio University Transportation Center and Ford Motor Company, November 2006 – December 2007, with Mark Benvenuto, Stokes Baker, James Graves, Dan Maggio, and Art Haman. Amount: \$63,000.

“Multipurpose Educational Modules to Teach Hydraulic Hybrid Vehicle Technologies,” funded by the Michigan-Ohio University Transportation Center, November 2006 – December 2007, with Mohammad Elahinia (Principal Investigator) from the University of Toledo. Amount: \$10,000 to UDM.

“Large Scale Solar Photovoltaic Demonstration Project,” funded by the U.S. Department of Energy through the State of Michigan Energy Office, August 2005 – July 2006, with Robert Ross, Arthur Haman, and Will Wittig. Amount: \$53,135.

“Development of an Automotive Air Conditioning System for Laboratory Use,” funded by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, January – August 2006. Amount: \$5,000.

“Thermophysics Laboratory Development,” funded by the Greenfield Coalition of the NSF, January 2002 – May 2006, with Kirstie Plantenberg, Principal Investigator. Amount: \$36,981.

Principal Investigator, “Determination of Loss Coefficients for Chips in Annular Passages,” funded by Ford Motor Company, October 1999 – February 2000. Amount: \$18,000.

Principal Investigator, “Acquisition of a Laser Doppler Velocimeter/Water Tunnel System,” funded by NSF, grant #DUE-9650147, August 1996 - July 1998. Amount: \$31,105 (matched with \$38,736 from corporate sources).

Principal Investigator, “Thermophysics Knowledge Area Curriculum Development,” funded by the Greenfield Coalition of the NSF, June 1995-2000. Amount: \$244,000.

Principal Investigator, “Modeling and Development of a Windshield Washer System, Phase II,” funded by Ford Motor Company, Jan. - Aug. 1995. Amount: \$44,000.

Principal Investigator, “Analysis of Door-Closing Efforts,” funded by Ford Motor Company, May 1993-Aug. 1994. Amount: \$89,000.

Principal Investigator, “Modeling and Development of a Windshield Washer System, Phase I,” funded by Ford Motor Company, Jan. 1993-Dec. 1993. Amount: \$58,000.

OTHER GRANTS:

Computer Science, Engineering, and Mathematics Scholarships (CSEMS), funded by the National Science Foundation, Aug. 2000 – July 2002, with Dean Leo Hanifin. Amount: \$220,000.