

## *Curriculum Vitae*

Sheldon Wang, Ph.D., P.E., ASME Fellow

Tenured Full Professor, McCoy School of Engineering

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Research ID C-4915-2008

### **Education**

PhD, Applied Mechanics, Massachusetts Institute of Technology, 1995

MS, Ocean Engineering, Massachusetts Institute of Technology, 1993

BS, Naval Architecture and Ocean Engineering, Shanghai Jiao Tong University, 1988

### **Professional Experience**

2009- Professor, Engineering, Midwestern State University, Wichita Falls, TX

2004 - 2009 Associate Professor, Mathematical Sciences

New Jersey Institute of Technology, Newark, NJ

1999 - 2004 Tenure Track Assistant Professor, Mechanical Engineering, Polytechnic University (now, Tandon School of Engineering at NYU), Brooklyn, NY

1995 - 1999 Non-tenure Track Assistant Professor, Institute of Paper Science and Technology (now, Renewable Bioproduct Institute at Georgia Tech), Atlanta, GA

1991 - 1995 Teaching/Research Assistant, MIT, Cambridge, MA

### **Teaching Responsibilities**

*Course Taught at Paper Institute:*

Heat Transfer, Fundamentals of Finite Element Procedures, Numerical Analysis, and Advanced Engineering Mathematics.

*Course Taught at Polytechnic:*

Analysis and Design of Machine Elements, Stress Laboratory, Finite Element Method/Laboratory, Stress Analysis, Fluid Laboratory, Kinematics and Dynamics of Machine Elements, and Structural Systems.

*Course Taught at NJIT:*

Linear Algebra and Its Applications, Numerical Methods, Calculus I, II, and III, Partial Differential Equations, Ordinary Differential Equations, and Introduction to Complex Variables.

*Course Taught at MSU Texas:*

Materials Science and Engineering and Lab, Electrical Circuit Design and Lab, Electronic Device and Lab, Mechanisms and Dynamics of Machine Elements, Introduction to Engineering, Introduction to Engineering Design, Engineering Economics, Mathematical Methods for Engineers, Thermodynamics, Fluid Mechanics and Lab, Statics, Mechanics of Solids, Senior Design I and II and Labs.

**Professional Certification and Special Training**

- PE Exam in Thermal and Fluids Systems (passed 2017).
- FE Exam in Mechanical Engineering (passed 2013).
- ABET Faculty Workshop and Symposium 2010, 2012, 2014.
- NSF Summer Institute on Materiomics-Merging Biology and Engineering in Multiscale Structures and Materials 2012.
- Academic Chairpersons Conference 2011.
- NSF Summer Institute on Mechanics of Soft Materials 2010.
- NSF Summer Institute on Multiscale Science Based-Modeling and Simulation 2009.
- NSF Summer Institute on Experimental Validation on Enabling Materials 2009.
- NSF Summer Institute on Science Fundamentals for Nano- and Bio-Mechanics of Materials 2006.
- NSF Summer Institute on Micro and Nano Devices with Applications to Biology and Nanoelectronics 2006.
- NSF Summer Institute on Bio-Inspired Materials 2005.
- NSF Summer Institute on Sustainable Technologies 2005.
- NSF Summer Institute on Surface Engineering and Coatings 2004.
- NSF Summer Institute on Multiscale Modeling and Simulation of Nano Mechanics and Materials 2004.
- NSF Summer Institute on Nanoscale Design of Materials 2003.
- NSF Summer Institute on Nanoscale Mechanical Characterization 2003.
- ASME Workshop: Beyond Micro Device Engineering: Nanotechnology 2000.

- Biomedical Science and Engineering (Emory MiniMedical School) 1999.
- Chemical Hygiene Plan Training (29 CFR 1910.1450(f)) 1999.
- Computational Fluid Dynamics (Patankar) 1998.
- Nonlinear Finite Element Analysis (Hughes and Belytschko) 1997.
- Fracture Mechanics & Failure Analysis (Rosakis, Ortiz, Ravichandran, Kanninen) 1997.
- Web Handling Workshop 1997.
- Paper Properties and Their Measurement 1995.

### **Recent Research and Scholarly Activity**

#### A. Books and Book Chapters

- **S. Wang**, “Essential Mathematical Tools for Engineers,” ISBN 979-8-9855412-9-8 Sentia Publishing, 2022.
- **S. Wang** and L. Zhang, “Immersed Methods for Coupled Systems of Continua,” ISBN-10 9813234504, World Scientific Publishing Co., 2023.
- Z. Li, **S. Wang**, and L. Zhang, “Simulation of Fluid-Structure Interaction Problems,” Special Issue of Computer Modeling in Engineering & Sciences, Vol. 119, Number 1, pp. 1-3, 2019.
- **S. Wang**, “Immersed Methods for Compressible Fluid-Solid Interactions” in Multiscale Simulation and Mechanics of Biological Materials, Chapter 12, Wiley, ISBN 978-1118350799, 2013.
- T. Wu, **S. Wang**, and B. Cohen, “Modeling of Proteins and Their Interactions with Solvent” in Advances in Cell Mechanics. Chapter 3, pp. 55-116, Springer, ISBN 978-3642175893, 2011.
- **S. Wang**, “Immersed Boundary/Continuum Methods” in Computational Modeling in Biomechanics. Chapter 1, pp. 3-49, Springer, ISBN 978-9048135745, 2010.
- **S. Wang**, Fundamentals of Fluid-Solid Interactions: Analytical and Computational Approaches, Elsevier, 978-0444528070, 2008.
- A. Fogelson, **S. Wang**, and Wing-Kam Liu, “Immersed Boundary Method and Its Extensions,” Special Issue of Computer Methods in Applied Mechanics and Engineering, Vol. 197, Issues 25-28, pp. 2047-2372, 2008.
- **X. Wang**, “Instability Analysis of Fluid-Solid Systems,” in Computational Mechanics for the Twenty-First Century, Chapter 14, Saxa-Coburg Publications, ISBN 1-874672-13-X, 2000.

- W.K. Liu, Y. Liu, A. Gerstenberger, D. Farrell, L. Zhang, and **S. Wang**, “Immersed Finite Element Method and Applications to Biological Systems,” in *Finite Element Methods: 1970’s and Beyond*, Chapter 4, pp. 233-248, ISBN 84-95999-49-8, 2004.

#### B. Journal Papers

- **S. Wang**, L. Rowlan, D. Cook, C. Conray, R. King, and C.A. Taylor, “Dynamics of Pump Jacks with Theories and Experiments,” *Upstream Oil and Gas Technology*, 2023.
- **S. Wang**, E. Tonge, I. Sekanyo, E. Portmann, S.M. Azzouz, “On the State-of-the-Art of Solar, Wind, and Other Green Energy Resources and Their Respective Storage Systems,” *Eng*, 4(1), 857-883, 2023.
- T. Grejtak, **S. Wang**, and J. Shao, “Modeling of a Blast Furnace with Both CFD and Thermodynamics Principles,” *Appl. Mech.*, 3(2), 1019-1039, 2022.
- **S. Wang**, E. Ndip-Agbor, and E. Atamenwan, “On Hierarchical Applications of Finite Element Methods and Classical Applied Mechanics Approaches for Complex Structures,” *Appl. Mech.*, 3(2), 464–480, 2022.
- **S. Wang**, L. Rowlan, A. Henderson, S.T. Aleman, T. Creacy, and C.A. Taylor, Viscoelastic Representation of the Operation of Sucker Rod Pumps. *Fluids*, 7(70), pp. 1-12, 2022.
- **S. Wang** and J. Mou, “Buckling Analysis of a Large Shelter with Composites,” *Materials*, 14(23), 7196, pp. 1-13, 2021.
- **S. Wang**, “Scaling, Complexity, and Design Aspects in Computational Fluid Dynamics,” *Fluids*, 6, 362, pp. 1-17, 2021.
- **S. Wang**, “A Revisit of Implicit Monolithic Algorithms for Compressible Solids Immersed Inside a Compressible Liquid,” *Fluids*, 6, 273, pp. 1-25, 2021.
- **S. Wang**, L. Rowlan, M. Elsharafi, M.A. Ermila, T. Grejtak, and C.A. Taylor, “On Leakage Issues of Sucker Rod Pumping Systems,” *ASME Journal of Fluids Engineering*, Vol. 141(11), 2019.
- **S. Wang**, Y. Yang, and T. Wu, “Model Studies of Fluid-Structure Interaction Problems,” *Computer Modeling in Engineering and Sciences*, Vol. 119(1), pp. 5-34, 2019.
- **S. Wang**, T. Grejtak, and L. Moody, “Structural Designs with Considerations of Both Material and Structural Failure,” *ASCE Practice Periodical on Structural Design and Construction*, 04016025, Vol. 22(2), pp 1-8, 2016.

- **S. Wang** and Y. Guo, “Causality of Manufacturing Processes with Significant Time Delays,” *TAPPI Journal*, 14(11), pp 725-738, 2015.
- T. Wu, **S. Wang**, B. Cohen, and H. Ge, “Molecular Modeling of Normal and Sickle Hemoglobins,” *International Journal for Multiscale Computational Engineering*, 8, pp 237-244, 2010.
- **S. Wang**, L.T. Zhang, and W.K. Liu, “On Computational Issues of Immersed Finite Element Methods,” *Journal of Computational Physics*, 228, pp. 2535-2551, 2009.
- S. Lim, A. Ferent, **S. Wang**, C.S. Peskin, “Dynamics of a Closed Rod with Twist and Bend in Fluid,” *SIAM J. Scientific Computing*, 31(1), pp. 273-302, 2008.
- **S. Wang**, “On Issues of Immersed Boundary/Continuum Methods,” *AMS Contemporary Mathematics*, 466, pp. 147-177, 2008.
- **S. Wang**, “An Iterative Matrix-Free Method in Implicit Boundary/Continuum Methods”, *Computers & Structures*, 85, pp. 739-748, 2007.
- P.N. Watton, X.Y. Luo, **S. Wang**, G.M. Bernacca, P. Molloy, D.J. Wheatley, “Dynamic Modelling of Prosthetic Chorded Mitral Valves Using the Immersed Boundary Method”, *Journal of Biomechanics*, 40, pp. 613-626, 2007.
- **S. Wang**, “From Immersed Boundary Method to Immersed Continuum Method”, *International Journal for Multiscale Computational Engineering*, Vol. 4(1), 127-145, 2006.
- W.K. Liu, Y. Liu, D. Farrell, L. Zhang, **X. Wang**, Y. Fukui, N. Patankar, Y. Zhang, C. Bajaj, X. Chen, and H. Hsu, “Immersed Finite Element Method and Its Applications to Biological Systems”, *Computer Methods in Applied Mechanics and Engineering*, Vol. 195, pp. 1722-1749, 2006.
- Y. Liu, L. Zhang, **X. Wang**, and W.K. Liu, "Coupling of Navier-Stokes Equations with Protein Molecular Dynamics and Its Application to Hemodynamics," *International Journal for Numerical Methods in Fluid*, Vol. 46, pp. 1237-1252, 2004.
- L. Zhang, A. Gerstenberger, **X. Wang**, and W.K. Liu, “Immersed Finite Element Method,” *Computer Methods in Applied Mechanics and Engineering*, Vol. 193, pp. 2051-2067, 2004.

- **X. Wang** and W.K. Liu, “Extended Immersed Boundary Method Using FEM and RKPM,” *Computer Methods in Applied Mechanics and Engineering*, Vol. 193, pp. 1305-1321, 2004.
- J. Mou, G.R. Straley, and **X. Wang**, “A Study of the Spontaneous Air Flow through a Moving Porous Medium,” *Advances in Engineering Software*, Vol. 34(8), pp. 507-514, 2003.
- **X. Wang**, “Instability Analysis of Some Fluid-Structure Interaction Problems,” *Computers & Fluids*, Vol. 32(1), pp. 121-138, 2003.
- P. Carbonell, **X. Wang**, and Z.P. Jiang, “On the Suppression of Flow-Induced Vibration with a Simple Control Algorithm,” *Communications in Nonlinear Science and Numerical Simulation*, Vol. 8(1), pp. 49-64, 2003.
- **X. Wang** and F. Bloom, “Stability Issues of Concentric Pipes Conveying Steady and Pulsatile Fluids,” *Journal of Fluids & Structures*, Vol. 15(8), pp. 1137-1152, 2001.
- A.G. Giorges, L.J. Forney, and **X. Wang**, “Numerical Study of Multi-Jet Mixing,” *Transaction of Institution of Chemical Engineers*, Vol. 79, Part A, pp. 515-522, 2001.
- W.Z. Bao, **X. Wang**, and K.J. Bathe, “On Inf-Sup Conditions of Mixed Finite Element Formulations for Acoustic Fluids,” *Mathematical Models & Methods in Applied Sciences*, Vol. 11(5), pp. 883-901, 2001.
- A.G. Giorges, **X. Wang**, and L.J. Forney, “The Jet Shape of Concentric Mixers,” *The Canadian Journal Chemical Engineering*, Vol. 79(1), pp. 87-93, 2001.
- **X. Wang** and J.K. Hale, “On Monodromy Matrix Computation,” *Computer Methods in Applied Mechanics and Engineering*, Vol. 190, pp. 2263-2275, 2001.
- **X. Wang**, “Velocity Pressure Mixed Finite Element and Finite Volume Formulation with ALE Descriptions for Nonlinear Fluid-Structure Interaction Problems,” *Advances in Engineering Software*, Vol. 31(1), pp. 35-44, 2000.
- L.J. Forney, Z. Feng, and **X. Wang**, “Jet Trajectories of Transverse Mixers at Arbitrary Angle in Turbulent Tube Flow,” *Transaction of Institution of Chemical Engineers*, Vol. 77, Part A, pp. 754-758, 1999.
- Z. Feng, **X. Wang**, and L.J. Forney, “Single Jet Mixing at Arbitrary Angle in Turbulent Tube Flow,” *Journal of Fluids Engineering*, Vol. 121, pp. 762-765, 1999.

- **X. Wang** and F. Bloom, “Dynamics of a Submerged and Inclined Concentric Pipe System with Internal and External Flows,” *Journal of Fluids & Structures*, Vol. 13, pp. 443-460, 1999.
- **X. Wang**, A.G. Giorges, and C. Park, “Simulation of a Deformable Ball Passing through a Step Diffuser,” *Computers & Structures*, Vol. 72, pp. 435-456, 1999.
- M. Ostoja-Starzewski and **X. Wang**, “Stochastic Finite Elements as a Bridge between Random Material Microstructure and Global Response,” *Computer Methods in Applied Mechanics and Engineering*, Vol. 168(1/4), pp. 35-49, 1999.
- **X. Wang**, “Analytical and Computational Approaches for Some Fluid-Structure Interaction Analyses,” *Computers & Structures*, Vol. 72(1/3), pp. 423-433, 1999.
- **X. Wang**, “Numerical Analysis of Moving Orthotropic Thin Plates,” *Computers & Structures*, Vol. 70(4), pp. 467-486, 1999.
- **X. Wang**, Z. Feng, and L.J. Forney, “Computational Simulation of Turbulent Mixing with Mass Transfer,” *Computers & Structures*, Vol. 70(4), pp. 447-465, 1999.
- **X. Wang** and K.J. Bathe, “On Mixed Finite Elements for Acoustic Fluid-Structure Interactions,” *Mathematical Models & Methods in Applied Sciences*, Vol. 7(3), pp.329-343, 1997.
- **X. Wang**, “Finite Element Analysis of Air-Sheet Interactions and Flutter Suppression Devices,” *Computers & Structures*, Vol. 64(5/6), pp. 983-994, 1997.
- **X. Wang** and K.J. Bathe, “Displacement/Pressure Based Mixed Finite Element Formulations for Acoustic Fluid-Structure Interaction Problems”, *International Journal for Numerical Methods in Engineering*, Vol. 40(11), pp. 2001-2017, 1997.
- K.J. Bathe, C. Nitikitpaiboon, **X. Wang**, “A Mixed displacement-based finite element formulation for acoustic fluid-structure interaction”, *Computers & Structures*, Vol. 56(2/3), 225-237, 1995.

### **External Research Funding**

- GM (1 Proposal funded, PI).
- ABIOMED (1 Proposal funded, PI).
- DHS System (1 Proposal funded, PI).
- Thermal Science (1 Proposal funded, PI).
- BioSUN (1 Proposal funded, PI).

- Current to Current (1 Proposal funded, PI).
- ArrowMP (1 Proposal funded, PI).
- Wichita Tank (1 Proposal funded, PI).
- WPT (1 Proposal funded, PI).
- NASA (1 Proposal funded via Northwestern University, Co-PI).
- NSF (2 Proposals funded, PI).
- NIH (1 Proposal funded via ABIOMED, Co-PI).
- Navy (1 Proposal funded via GEM, Co-PI).

#### **External Education Funding**

- Foundation: Alcoa (Arconic) Foundation (5 Proposals funded, PI).
- Corporate: Shanghai Dian Zhi Ya Cultural Exchange Co. (1 Proposal funded, PI).
- Government: THECB (6 Proposals funded, PI).

#### **Recent Research and Education Funding (2010 to Present)**

1. **S. Wang**, MSU Texas, and General Motors (GM) Research Grant, “Control of Doser/Meter Piston for Uniform Volumetric Output,” PI, \$60,000, funded, September 2022 – September 2023.
2. **S. Wang**, MSU EURECA Undergraduate Research Project, “On More Friendly Refrigerants: AAARS Score,” with student researcher Anna Razavi, Aryian Razavi, and Yoseph Helal and Co-PI Dr. Hallford and Dr. Terry Griffin, funded, September 2022 – June 2023.
3. **S. Wang**, MSU EURECA Undergraduate Research Project, “On More Environmentally Friendly Refrigerants,” with student researcher Anna Razavi, Aryian Razavi, and Andrea Repici and Co-PI Dr. Hallford, funded, September 2021 – June 2022.
4. **S. Wang**, Arconic Foundation “Young Engineer Summer Camp,” PI, \$120,000, funded, June 2016 – May 2019.
5. **S. Wang**, Texas Higher Education Coordinating Board (THECB) “Young Engineer Summer Camp,” PI, \$ 11,727, funded, June 2017.
6. **S. Wang**, Alcoa Foundation “Young Engineer Summer Camp,” PI, \$40,000, funded, June, 2016.
7. **S. Wang**, Texas Higher Education Coordinating Board (THECB) “Young Engineer Summer Camp,” PI, \$13,158, funded, June 2016.



8. **S. Wang**, MSU EURECA Undergraduate Research Project, “Aquaponics: The Future of Farming,” with student researcher William Statham and Co-PI Dr. Guo, funded, January 2016.
9. **S. Wang**, MSU EURECA Undergraduate Research Project, “Beam Column Buckling Issues and Materials or Structural Failures,” with student researchers Latham Moody and Thomas Grejtak, funded, January 2016.
10. **S. Wang**, MSU EURECA Undergraduate Research Project, “Computational Study of Film Boiling Droplet Motion on Micro- and Nanoscale Ratchets,” with student researchers Kiran Chapagain and Daniel Goodey and Co-PI Dr. Ok, Dr. Guo and Dr. Elsharafi, funded, January 2016.
11. **S. Wang**, MSU UGROW Undergraduate Research Project, “Noise and Power Law Distribution of Complex Systems,” with student researcher Suman Bhandari, funded, June 2016.
12. **S. Wang**, Alcoa Foundation “Young Engineer Summer Camp,” PI, \$20,000, funded, June 2015.
13. **S. Wang**, Texas Higher Education Coordinating Board (THECB) “Young Engineer Summer Camp,” PI, \$14,000, funded, May 2015.
14. **S. Wang**, WPT, Wichita Falls, “On Design Issues of High Efficiency Power Transmission Systems,” PI, \$29,772, funded, July 2015.
15. **S. Wang**, MSU EURECA Undergraduate Research Project, “Beam Column Buckling Issues and Material or Structural Failures,” PI, \$4,000, funded, January 2015.
16. **S. Wang**, MSU UGROW Undergraduate Research Project, “Monitoring and Improving a Combustion Chamber with Thermodynamics and Computational Fluid Dynamics: Another Step for Emission Reduction,” PI, \$3,000, funded, June 2015.
17. **S. Wang**, MSU Faculty Internal Research & Creative Project, “Reduced Order Modeling of Fluid-Solid Interaction Systems,” PI, \$5,000, funded, October 2014.
18. **S. Wang**, MSU College of Science & Mathematics Research Grant, “Experimental and Analytical Studies of Leakage Issues of Rod Pumping Systems,” PI, \$1,400, funded, October 2014.
19. **S. Wang**, Alcoa Foundation “Young Engineer Summer Camp,” PI, \$20,000, funded, June 2014.

20. **S. Wang**, Texas Higher Education Coordinating Board (THECB) “Young Engineer Summer Camp,” PI, \$12,500, funded, May 2014.
21. **S. Wang**, Transland, Co., Wichita Falls, “Welding Material Testing,” PI, \$1,224, funded, April 2014.
22. **S. Wang**, Alcoa Foundation “Young Engineer Summer Camp,” PI, \$20,000, funded, June 15, 2013.
23. **S. Wang**, Shanghai Dian Zhi Ya Cultural Exchange Co. “Chinese High School Student Winter Camp,” PI, \$56,727, funded, Jan. 15, 2013.
24. **S. Wang**, ArrowMP and FAA “Mobile Airport Traffic Control Tower System Design,” PI, \$19,392, funded, Nov. 10, 2011.
25. **S. Wang**, Wichita Tank “Analysis of Structural Designs of Holding Tanks,” PI, \$13,431, funded, Jan. 3, 2011.
26. **S. Wang**, Global Engineering and Materials, Inc. and ONR “Immersed Boundary Methods with Heat Transfer”, PI, \$3,501.10, awarded, 2010.
27. **S. Wang**, THECB ESP “MSU YES Camp,” PI, \$18,000, awarded, June, 2010.

### **Awards and Honors**

- Elected Fellow of ASME, March 2023.
- Award of Appreciation from Commissioner of Higher Education in Texas, Raymund Paredes, November 2013.
- Certificate of Appreciation from Commissioner of Higher Education in Texas, Raymund Paredes, August 2011.
- NSF Fellow for Summer Institutes on Nanotechnologies, 2003-2012.
- ASEE Air Force Summer Faculty Fellow (2008, 2009).
- Othmer Junior Faculty Fellow, Polytechnic University, Brooklyn, NY (2002-2004).
- Travel Grant Award, U.S. Association for Computational Mechanics, 2006.
- Travel Grant Award, IACM World Congress, Vienna, Austria, 2002.
- University Excellent Student (Top 0.5%), 1985 and 1987, Shanghai Jiao Tong University, China
- Medalist, University Physics Competition, 1985, Shanghai Jiao Tong University, China
- Champion, University Mathematics Competition, 1985, Shanghai Jiao Tong University, China.