URRICULUM VITAE

JEFFREY S. MARSHALL

Department of Mechanical Engineering
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March 2025

EDUCATION

Ph.D., Department of Mechanical Engineering
University of California, Berkeley, 1987 (adviser: P.M. Naghdi)

M.S., Department of Mechanical, Aerospace and Nuclear Engineering
University of California, Los Angeles, 1984 (adviser: V.K. Dhir)

B.S., Department of Mechanical, Aerospace and Nuclear Engineering
University of California, Los Angeles, 1983 (summa cum laude)

EMPLOYMENT

Permanent Appointments

Aug. 2006 – present Professor, Dept. of Mechanical Engineering, 2006-present
Associate Dean for Research and Graduate Education, College of Engineering & Mathematical Sciences, 2019-present
Fellow, Gund Institute for Environment, 2018-present
Interim Director, VT Space Grant & NASA EPSCoR, May-Oct 2019
Director, UVM Smart Grid IGERT Program, 2012-2019
Sustainability Faculty Fellow, 2017-2018
Director, School of Engineering, 2006-2007
The **University of Vermont**, Burlington, Vermont

June 2017 – present Senior Fellow and Member
New England Research and Development, LLC, Jamestown, RI

Aug. 1993 – July 2006
Professor, 2001-2006
Department Chair, Mechanical & Industrial Engineering, 2001-2005
Interim Department Chair, Mechanical Engineering, 2000-2001
Associate Professor, 1993-2001
Department of Mechanical and Industrial Engineering
Faculty Associate, Iowa Institute of Hydraulic Research, 1993-2006
Faculty Associate, Interdisc Prog Appl Math Comp Sci, 1995-2006
The **University of Iowa**, Iowa City, Iowa

May 1989 – Jun 1993 Assistant Professor, Department of Ocean Engineering

Florida Atlantic University, Boca Raton, Florida

Oct 1988 – Apr 1989 Engineer, **Creare, Inc**., Hanover, New Hampshire

Jan 1988 – June 1988 Research Associate, **University of California, Berkeley**

Extended Visits

June – Aug 2011 Visiting Faculty Member, **Sandia National Laboratories**, Albuquerque, New Mexico

Nov 2007 Visiting Scholar, **Tsinghua University**, Thermal Engineering Department, Beijing, China

Sept 1999 – Dec 1999
Visiting Scholar, **Institut de Mécanique des Fluides de Toulouse (IMFT),** Toulouse, France

May – July 1991, 1992, 1993, 1994, 1996, 1997
Summer Faculty Fellow, **Naval Undersea Warfare Center**, Newport, Rhode Island (through ASEE/ONR Summer Faculty Research Program)

RESEARCH INTERESTS

Fluid mechanics and particulate flows; renewable energy (wind energy, algae biofuels, solar panel dust mitigation); complex systems; vortex dynamics and vortex-structure interaction; biofluid flows, Lagrangian and multiscale computational methods; thin-film flows

GOOGLE SCHOLAR INFORMATION

	All	Since 2020
Citations	6086	2781
h-index	36	21
i10-index	105	44

ARCHIVAL PUBLICATIONS

A. Books

3. Marshall, J.S., *Physics of Vortex Flows*, Springer Nature, Switzerland (in press, 2025).

2. Marshall, J.S., and Li, S., *Adhesive Particle Flow – A Discrete-Element Approach*, Cambridge University Press, New York (2014) (ISBN: 978-1-107-03207-1).

1. Marshall, J.S., *Inviscid Incompressible Flow*, John Wiley & Sons, New York (2001) (ISBN: 0-471-37566-7).

B. Edited Volumes

1. Benim, A.C., Marshall, J.S., Karabasov, S.A., Drikakis, D., Eds. *Advances in Computational Methods for Fluid Flow,* Special Issue of *Computation* (2025).

C. Patents

2. Marshall, J.S., Chen, D., Vachon, N., Hitt, D.A., and Wu, J.R., "Aeroacoustic duster," U.S. Patents 08695156 (2014) and 9480375 (2016).

1. Grant, J.R., Huyer, S.A., Uhlman, J.S. and Marshall, J.S., "Algorithms and code for computing three-dimensional unsteady flow by solution of the vorticity equation on a Lagrangian mesh," U.S. Patent 6424923 (2002).

D. Book Chapters (students underlined)

5. Yang, M., Li, S., Liu, G., and Marshall, J.S., "Investigation of dynamic behavior of a particle-loaded single fiber using discrete element methods," In: *Discrete Element Modelling of Particulate Media*. C.Y. Wu (ed.), RSC Publishing, pp. 103-112 (2012).

4. Marshall, J.S., Chesnutt, J.K.W. and Udaykumar, H.S., "Mesoscale analysis of blood flow," In: *Image-based Computational Modeling of the Human Circulatory and Pulmonary Systems*, K.B. Chandran, H.S. Udaykumar, J.Reinhardt eds., Springer Publications, New York, Chapter 6, pp. 235-266 (2011).

3. Marshall, J.S. and Ettema, R., "Contact-line instabilities of driven liquid films," *Advances in Fluid Mechanics*, Vol. 41 (In: *Instability of Flows*, M. Rahman ed.), WIT Press, Southampton, England, pp. 1-41 (2004).

2. Marshall, J.S. and Beninati, M.L., "Turbulence evolution in vortex-dominated flows," *Advances in Fluid Mechanics*, Vol. 25 (In: *Nonlinear Instability, Chaos and Turbulence* II, L. Debnath and D.N. Riahi eds.), WIT Press, Southampton, England, pp. 1-40 (2000).

1. Marshall, J.S., A structural theory of anisotropic turbulence. In: Casey, J., Crochet, M.J. (eds), *Theoretical, Experimental, and Numerical Contributions to the Mechanics of Fluids and Solids*. Birkhäuser Basel (1995). https://doi.org/10.1007/978-3-0348-9229-2_38

E. Journal Articles (students underlined)

139. Gessman, S. and Marshall, J.S., "Chains and islands: particle agglomeration on a three-phase electric curtain," *Powder Technology* (to be submitted, 2025).

138. DesRoberts, B., and Marshall, J.S., "Particle removal from a flat surface using a translating bounded vortex flow," *Powder Technology* (submitted, 2025).

137. Lotfabadi, A.K., Ghorbansarvi, A., Ossareh, H., and Marshall J.S., "Cost-optimized energy storage operation for a grid-connected solar PV system at community and individual scales," *Journal of Energy Storage* (submitted, 2025).

136. Fitzgerald, N., Hudson, C., Wshah, S., Heymsfield, A., and Marshall, J.S., "Knowledge-guided machine learning for shape parameter and drag coefficient prediction of falling snowflakes," *Artificial Intelligence for Earth Systems* (submitted, 2025).

135. DesRoberts, B., and Marshall, J.S., "Effect of nozzle translation on a bounded vortex flow," *Physics of Fluids*, Vol. 37, 023611 (15 pages)(2025).

134. Chivers, T. and Marshall, J.S., "Visualizing particle velocity from dual-camera mixed reality video images using 3D particle tracking velocimetry," *Journal of Visualization*, Vol. 28, pp. 1-19 (2025).

133. Jabarifar, M., and Marshall, J.S., "Capture of blowing particles during transport through a vegetated barrier," *Journal of Aerosol Science*, Vol. 184, 106517 (17 pages)(2025).

132. Jabarifar, M. and Marshall, J.S., "Efficient computational model for particle capture by a heterogeneous filter," *Aerosol Science and Technology*, Vol. 58, No. 12, pp. 1405-1420 (2024).

131. Tavangar, T., Hosseinpoor, M., Marshall, J.S., Yahia, A., and Khayat, K.H., "Four-way CFD-DEM coupling to simulate concrete pipe flow: Mechanism of formation of lubrication layer," *Cement and Concrete Research*, Vol. 179, No. 6, 107479 (20 pages)(2024).

130. Storm, R., and Marshall, J.S., "Pore-scale modeling of particle transport in a porous bed," *Journal of Fluid Mechanics*, Vol. 979, A9 (30 pages)(2024).

129. Ahmadinejad, M. and Marshall, J.S., "Magnetic nanoparticle interaction with a hydrogel in an oscillating magnetic field," *Physics of Fluids*, Vol. 36, No. 1, 013104 (17 pages)(2024).

128. Loth, E., and Marshall, J.S., "Restitution coefficient models for collisions of airborne particles and drops," *Journal of Aerosol Science*, Vol. 173, 106186 (29 pages)(2023). [editor-invited review article in celebration of JAS 50th anniversary]

127. Tavangar, T., Hosseinpoor, M., Marshall, J.S., Yahia, A., and Khayat, K.H., "Discrete-element modeling of shear-induced particle migration during concrete pipe flow: Effect of size distribution and concentration of aggregate on formation of lubrication layer," *Cement and Concrete Research*, Vol. 166, 107113 (24 pages)(2023).

126. Alagumalai, A., Yang, L., Ding, Y., Marshall, J.S., Mesgarpour, M., Wongwises, S., Rashidi, M.M., Taylor, R.A., Mahian, O., Sheremet, M., Wang, L.P., and Markides, C.N., "Nano-engineered pathways for advanced thermal energy storage systems," *Cell Reports Physical Science*, Vol. 3, No. 8, 101007 (21 pages)(2022).

125. Karki, A., Marshall, J.S., and Wu, J.R., "Effect of ultrasound amplitude and frequency on nanoparticle diffusion in an agarose hydrogel," *Journal of the Acoustical Society of America*, Vol. 152, No. 1, pp. 640-650 (2022).

124. Curran, K., and Marshall, J.S., "Stochastic model of oscillatory diffusion for colloidal particles in a fixed porous bed," *Chemical Engineering Science*, Vol. 246, 116993 (11 pages)(2021).

123. Marshall, J.S., Arnold, C., Curran, K., and Chivers, T., "Statistics of particle diffusion subject to oscillatory flow in a porous bed," *Chemical Engineering Science*, Vol. 231, 116239 (12 pages)(2021).

122. Seksinsky, D., and Marshall, J.S., "Droplet impingement on a surface at low Reynolds number," *Journal of Fluids Engineering*, Vol. 143(2), 021304 (16 pages)(2021).

121. Jin, X. and Marshall, J.S., "Mechanics of biofilms formed of bacteria with fimbriae appendages," *PLoS ONE*, Vol. 15, No. 12, e0243280 (22 pages)(2020).

120. Jin, X. and Marshall, J.S., "Influence of cell interaction forces on growth of bacterial biofilms," *Physics of Fluids*, Vol. 32(9), 091902 (19 pages)(2020).

119. Jin, X., Marshall, J.S., and Wargo, M.J., "Hybrid model of bacterial biofilm growth," *Bulletin of Mathematical Biology*, Vol. 82, 27 (32 pages) (2020).

118. Chen, S., Li, S., and Marshall, J.S., "Exponential scaling in early-stage agglomeration of adhesive particles in turbulence," *Physical Review Fluids*, Vol. 4, No. 2, 024304 (17 pages)(2019).

117. Mahian, O., Kolsi, L., Amani, M., Estellé, P., Ahmadi, G., Kleinstreuer, C., Marshall, J.S., Taylor, R.A., Abu-Nada, E., Rashidi, S., Niazmand, H., Wongwises, S., Hayat, T., Kasaeian, A., and Pop, I., "Recent advances in modeling and simulation of nanofluid flows. Part II: Applications," *Physics Reports*, Vol. 791, pp. 1-59 (2019).

116. Mahian, O., Kolsi, L., Amani, M., Estellé, P., Ahmadi, G., Kleinstreuer, C., Marshall, J.S., Siavashi, M., Taylor, R.A., Niazmand, H., Wongwises, S., Hayat, T., Kolanjiyil, A., Kasaeian, A., and Pop, I., "Recent advances in modeling and simulation of nanofluid flows. Part I: Fundamentals and theory," *Physics Reports*, Vol. 790, pp. 1-48 (2019).

115. Marshall, J.S., "Local stochastic vortex structure method for synthetic turbulence computation in flight simulators," *AIAA Journal*, Vol. 57, No. 2, pp. 543-552 (2019).

114. Dizaji, F., Marshall, J.S., and Grant, J.R., "Collision and breakup of fractal particle agglomerates in a shear flow," *Journal of Fluid Mechanics*, Vol. 862, pp. 592-623 (2019).

113. Ma, D., Marshall, J.S., and Wu, J.R., "Measurement of ultrasound-enhanced diffusion coefficient of nanoparticles in an agarose hydrogel," *Journal of the Acoustical Society of America*, Vol. 144, No. 6, pp. 3496-3502 (2018).

112. Marshall, J.S., "Modeling and sensitivity analysis of particle impact with a wall with integrated damping mechanisms," *Powder Technology*, Vol. 339, pp. 17-24 (2018).

111. Dizaji, F.F., Marshall, J.S., and Grant, J.R., "A stochastic vortex structure method for interacting particles in turbulent shear flows," *Physics of Fluids*, Vol. 30, 013301 (16 pages)(2018).

110. Saunders, D.C., Marshall, J.S., and Hines, P.D., "The effect of time scales on wind farm power variability with nonlinear model predictive control," *Wind Energy*, Vol. 20, No. 11, pp. 1891-1908 (2017).

109. Dizaji, F.F., and Marshall, J.S., "On the significance of two-way coupling in simulation of turbulent particle agglomeration," *Powder Technology*, Vol. 318, pp. 83-94 (2017).

108. Jin, X., and Marshall, J.S., "The role of fluid turbulence on contact electrification of suspended particles," *Journal of Electrostatics*, Vol. 87, pp. 217-227 (2017).

107. Myers, O., Del Maestro, A., Wu, J.R., and Marshall, J.S., "Long-range interacting pendula: A simple model for understanding complex dynamics of charged particles in an electric curtain device," *Journal of Applied Physics*, Vol. 121, 154501 (10 pages)(2017).

106. Saunders, D.C., and Marshall, J.S., "Transient lift force on a blade during cutting of a vortex with non-zero axial flow," *Journal of Fluid Mechanics*, Vol. 819, pp. 258-284 (2017).

105. Dizaji, F.F., and Marshall, J.S., "An accelerated stochastic vortex structure method for particle collision and agglomeration in homogeneous turbulence," *Physics of Fluids*, Vol. 28, 113301 (24 pages) (2016).

104. Green, A.M., Marshall, J.S., Ma, D., and Wu, J.R., "Acoustic streaming and thermal instability of flow generated by ultrasound in a cylindrical container," *Physics of Fluids*, Vol. 28, 104105 (19 pages) (2016).

103. Marshall, J.S., "A model of ultrasound-enhanced diffusion in a biofilm," *Journal of the Acoustical Society of America*, Vol. 139, No. 6, pp. EL228-EL233 (2016).

102. Marshall, J.S. and Wu, J.R., "Acoustic streaming, fluid mixing, and particle transport by a Gaussian ultrasound beam in a cylindrical container," *Physics of Fluids*, Vol. 27, 103601 (21 pages) (2015).

101. Ma, D., Green, A.M., Willsey, G.G., Marshall, J.S., Wargo, M.J., and Wu, J.R., "Effects of acoustic streaming from moderate-intensity pulsed ultrasound for enhancing biofilm mitigation effectiveness of drug-loaded liposomes," *Journal of the Acoustical Society of America*, Vol. 138, No. 2, pp. 1043-1051 (2015).

100. Saunders, D.C., and Marshall, J.S., "Vorticity reconnection during vortex cutting by a blade," *Journal of Fluid Mechanics*, Vol. 782, pp. 37-62 (2015).

99. Yang, M., Li, S., and Marshall, J.S., "Effects of long-range particle-particle hydrodynamic interaction on the settling of aerosol particle clouds," *Journal of Aerosol Science*, Vol. 90, pp. 154-160 (2015).

98. Green, A.M. and Marshall, J.S., "Structure and dynamics of bounded vortex flows with different nozzle impingement heights," *ASME Journal of Fluids Engineering*, Vol. 137, 101202 (14 pages) (2015).

97. Ghazi, C.J. and Marshall, J.S., "Influence of the entrance region on particle capture during transport through a crack," *Aerosol Science and Technology*, Vol. 49, No. 3, pp. 134-143 **(**2015).

96. Faletra, M., Marshall, J.S., Yang, M., and Li, S., "Particle segregation in falling polydisperse suspension droplets," *Journal of Fluid Mechanics*, Vol. 769, pp. 79-102 (2015).

95. Marshall, J.S. and Renjitham, S., "Simulation of particulate fouling at a microchannel entrance region," *Microfluidics and Nanofluidics*, Vol. 18, No. 2, pp. 253-265 (2015).

94. Marshall, J.S. and Fuhrmann, A., "Effect of rainfall transients on thermal and moisture exposure of underground electric cables," *International Journal of Heat and Mass Transfer*, Vol. 80, pp. 660-672 (2015).

93. Myers, O., Wu, J., Marshall, J.S., and Danforth, C.M., "Computational studies of multiple-particle nonlinear dynamics in a spatio-temporally periodic potential," *Journal of Applied Physics*, Vol. 115, 244908 (8 pages) (2014).

92. Ghazi, C.J. and Marshall, J.S., "A CO_2 tracer-gas method for local air leakage detection and characterization," *Flow Measurement and Instrumentation*, Vol. 38, pp. 72-81 (2014).

91. Faletra, M., Palmer, N. and Marshall, J.S., "Effectiveness of opinion influence approaches in highly clustered online social networks," *Advances in Complex Systems*, Vol. 17. No. 2, 1450008 (26 pages) (2014).

90. Marshall, J.S., "Capillary torque on a rolling particle in the presence of a liquid film at small capillary numbers," *Chemical Engineering Science*, Vol. 108, pp. 87-93 (2014).

89. Myers O., Wu, J.R., and Marshall, J.S., "Nonlinear dynamics of particles excited by an electric curtain," *Journal of Applied Physics*, Vol. 114, 154907 (13 pages) (2013).

88. Sala, K. and Marshall, J.S., "Stochastic vortex structure method for modeling particle clustering and collisions in homogeneous turbulence," *Physics of Fluids*, Vol. 25, No. 10, 103301 (21 pages) (2013).

87. Marshall, J.S. and Sala, K., "Comparison of methods for computing the concentration field of a particulate flow," *International Journal of Multiphase Flow*, Vol. 56, pp. 4-14 (2013).

86. Chesnutt, J.K.R. and Marshall, J.S., "Simulation of particle separation on an inclined electric curtain," *IEEE Transactions on Industry Applications*, Vol. 49, No. 3, pp. 1104-1112 (2013).

85. Marshall, J.S., Hines, P., Zhang, J.D., Minervini, F., and Renjitham, S., "Modeling the impact of electric vehicle charging on transient heat transfer around underground cables," *Electric Power Systems Research*, Vol. 97, pp. 76-83 (2013).

84. Fuhrmann, A., Marshall, J.S. and Wu, J.-R., "Effect of acoustic levitation force on aerodynamic particle removal from a surface," *Applied Acoustics*, Vol. 74, pp. 535-543 (2013).

83. Maynard, A.B. and Marshall, J.S., "Force on a small particle attached to a plane wall in a Hiemenz straining flow," *ASME Journal of Fluids Engineering* 134, 114502 (5 pages) (2012).

82. Candon, S. and Marshall, J.S., "Vortex ring deformation, capture and entrainment by a columnar vortex," *Physics of Fluids*, Vol. 24, No. 9, 093604 (21 pages) (2012).

81. Renjitham, S. and Marshall, J.S., "Integral vorticity transport method on an overset grid," *International Journal for Numerical Methods in Fluids*, Vol. 69, pp. 567-589 (2012).

80. Qian, D., Marshall, J.S. and Frolik, J., "Control analysis for solar panel dust mitigation using an electric curtain," *Renewable Energy*, Vol. 41, pp. 134-144 (2012).

79. Schade, P. and Marshall, J.S., "Capillary effects on a particle rolling on a plane surface in the presence of a thin liquid film," *Experiments in Fluids*, Vol. 51, No. 6, pp. 1645-1655 (2011).

78. Li, S., Marshall, J.S., Liu, G. and Yao, Q., "Adhesive particulate flow: the discrete element method and its application in energy and environmental engineering," *Progress in Energy and Combustion Science*, Vol. 37, No. 6, pp. 633-668 (2011).

77. Maynard, A.B. and Marshall, J.S., "Particle removal from a surface by a bounded vortex flow," *International Journal of Heat and Fluid Flow*, Vol. 32, No. 5, pp. 901-914 (2011).

76. Huang, Y. and Marshall, J.S., "Experiments on bounded vortex flows and related particle transport," *ASME Journal of Fluids Engineering*, Vol. 133, No. 7, 071204 (9 pages) (2011).

75. Eppstein, M.J., Grover, D.K., Marshall, J.S. and Rizzo, D.M., "An agent-based model to study market penetration of plug-in hybrid electric vehicles," *Energy Policy*, Vol. 39, pp. 3789-3802 (2011). [Erratum, Energy Policy, 2012]

74. Marshall, J.S., "Viscous damping force during head-on collision of two spherical particles," *Physics of Fluids*, Vol. 23, No. 1, 013305 (9 pages) (2011).

73. Marshall, J.S. and Sala, K., "A stochastic Lagrangian approach for simulating the effect of turbulent mixing on algae growth rate in photobioreactors," *Chemical Engineering Science*, Vol. 66, pp. 384-392 (2011).

72. Liu, G., Marshall, J.S., Li, S., and Yao, Q. "Discrete-element method for particle capture by a body in an electrostatic field," *International Journal for Numerical Methods in Engineering*, Vol. 84, No. 13, pp. 1589-1612 (2010).

71. Meunier, B.M., Watts, P.M., Marshall, J.S., Dechene, R.L., Du, W. and Newton, R.E.,"Vibration sensor for particle concentration measurement in pneumatic pipeline flows," *Measurement Science and Technology*, Vol. 21, 125401 (10 pages) (2010).

70. Hewitt, G.F. and Marshall, J.S., "Particle focusing in suspension flow through a corrugated tube," *Journal of Fluid Mechanics*, Vol. 660, pp. 258-281 (2010).

69. Liu, G. and Marshall, J.S., "Particle transport by standing waves on an electric curtain," *Journal of Electrostatics*, Vol. 68, pp. 289-298 (2010).

68. Marshall, J.S. and Huang, Y., "Simulation of light-limited algae growth in homogeneous turbulence," *Chemical Engineering Science*, Vol. 65, No. 12, pp. 3865-3875 (2010).

67. Chesnutt, J.K.W. and Marshall, J.S., "Structural analysis of red blood cell aggregates under shear flow," *Annals of Biomedical Engineering*, Vol. 38, No. 3, pp. 714-728 (2010).

66. Liu, G. and Marshall, J.S., "Effect of particle adhesion and interactions on motion by traveling waves on an electric curtain," *Journal of Electrostatics*, Vol. 68, pp. 179-189 (2010).

65. Mousel, J. and Marshall, J.S., "Aggregate growth and breakup in particulate suspension flow through a micro-nozzle," *Microfluidics and Nanofluidics*, Vol. 8, No. 2, pp. 171-186 (2010).

64. Yergey, B.A., Beninati, M.L., and Marshall, J.S., "Sensitivity of incipient particle motion to fluid flow penetration depth within a packed bed," *Sedimentology*, Vol. 57, pp. 418-428 (2010).

63. Chesnutt, J.K.W. and Marshall, J.S., "Effect of particle collisions and aggregation on red blood cell passage through a bifurcation," *Microvascular Research*, Vol. 78, pp. 301-313 (2009).

62. Chesnutt, J.K.W. and Marshall, J.S., "Blood cell transport and aggregation using discrete ellipsoidal particles," *Computers & Fluids*, Vol. 38, pp. 1782-1794 (2009).

61. Marshall, J.S., "Particle clustering in periodically-forced straining flows," *Journal of Fluid Mechanics*, Vol. 624, pp. 69-100 (2009).

60. Marshall, J.S., "Discrete-element modeling of particulate aerosol flows," *Journal of Computational Physics*, Vol. 228, pp. 1541-1561 (2009).

59. AlMomani, T., Udaykumar, H.S., Marshall, J.S. and Chandran, K.B., "Micro-scale dynamic simulation of erythrocyte-platelet interaction in blood flow," *Annals of Biomedical Engineering*, Vol. 36, No. 6, pp. 905-920 (2008).

58. Zhao, X.-L., Li, S., Liu, G., Yao, Q., and Marshall, J.S., "DEM simulation of the particle dynamics in two-dimensional spouted beds," *Powder Technology*, Vol. 184, No. 2, pp. 205-213 (2008).

57. Zhao, Y. and Marshall, J.S., "Spin coating of a colloidal suspension," *Physics of Fluids* , Vol 20, No. 4, 043302 (15 pages) (2008). (Also published in *Virtual Journal of Nanoscale Science & Technology*, Vol. 17, No. 16, April 2008.)

56. Li, S.Q. and Marshall, J.S., "Discrete-element simulation of micro-particle deposition on a cylindrical fiber in an array," *Journal of Aerosol Science*, Vol. 38, pp. 1031-1046 (2007).

55. Marshall, J.S., "Particle aggregation and capture by walls in a particulate aerosol channel flow," *Journal of Aerosol Science*, Vol. 38, pp. 333-351 (2007).

54. Liu, X. and Marshall, J.S., "Amplification of three-dimensional perturbations during parallel vortex-cylinder interaction," *Journal of Fluid Mechanics*, Vol. 573, pp. 457-478 (2007).

53. Li, S., Marshall, J.S., Ratner, A., Yao, Q., "Molecular dynamics simulation of particle deposition and agglomeration in two-phase dilute flow," *Journal of Engineering Thermophysics*, Vol. 28, No. 6, pp. 1035-1038 (2007).

52. Krishnan, S., Udaykumar, H.S. , Marshall, J.S. and Chandran, K.B., "Dynamic study of platelet activation during mechanical heart valve operation," *Annals of Biomedical Engineering*, Vol. 34, pp. 1519-1534 (2006).

51. Marshall, J.S., "Effect of particle collisions on the expulsion of heavy particles from a vortex core," *Physics of Fluids*, Vol.18, No.11, 113301 (12 pages) (2006).

50. Zhao, Y. and Marshall, J.S., "Dynamics of driven liquid films on heterogeneous surfaces," *Journal of Fluid Mechanics*, Vol. 559, pp. 355-378 (2006).

49. Grant, J.R. and Marshall, J.S., "On the diffusion velocity for a three-dimensional vorticity field," *Theoretical and Computational Fluid Dynamics*, Vol. 19, No. 6, pp. 377-390 (2005).

48. Marshall, J.S. and Beninati, M.L., "External turbulence interaction with a columnar vortex," *Journal of Fluid Mechanics*, Vol. 540, pp. 221-245 (2005).

47. McAlister, G., Ettema, R. and Marshall, J.S., "Wind-driven rivulet break-off and droplet flows in microgravity and terrestrial gravity conditions," *ASME Journal of Fluids Engineering*, Vol. 127, pp. 257-266 (2005).

46. Marshall, J.S. and Wang, S., "Contact-line fingering and rivulet formation in the presence of surface contamination," *Computers & Fluids*, Vol. 34, No. 6, pp. 664-683 (2005).

45. Marshall, J.S., "Particle dispersion in a turbulent vortex core," *Physics of Fluids*, Vol. 17, No. 2, 025104 (15 pages) (2005).

44. Beninati, M.L. and Marshall, J.S., "An experimental study of the effect of free-stream turbulence on a trailing vortex," *Experiments in Fluids*, Vol. 38, No. 2, pp. 244-257 (2005).

43. Coton, F.N., Marshall, J.S., McD. Galbraith, R.A., and Green, R.B., "Helicopter tail rotor orthogonal blade-vortex interaction," *Progress in Aerospace Sciences* , Vol. 40, No. 7, pp. 453-486 (2004).

42. Thakur, A., Liu, X. and Marshall, J.S., "Wake flow of single and multiple yawed cylinders," *ASME Journal of Fluids Engineering*, Vol. 126, No. 5, pp. 861-870 (2004).

41. Liu, X. and Marshall, J.S., "Blade penetration into a vortex core with and without axial core flow," *Journal of Fluid Mechanics*, Vol. 519, pp. 81-103 (2004).

40. Marshall, J.S. and Beninati, M.L., "Analysis of subgrid-scale torque for large-eddy simulation of turbulence," *AIAA Journal*, Vol. 41, No. 10, pp. 1875-1881 (2003).

39. Marshall, J.S., “Wake dynamics of a yawed cylinder,” *ASME Journal of Fluids Engineering*, Vol. 125, pp. 97-103 (2003).

38. Marshall, J.S., “Cross-stream vorticity field induced by streamwise vortices in unbounded and wall-bounded shear flows,” *Theoretical and Computational Fluid Dynamics*, Vol. 16, pp. 231-247 (2003).

37. Marshall, J.S., “Models of secondary vorticity evolution during normal vortex-cylinder interaction,” *AIAA Journal*, Vol 40, No. 1, pp. 170-172 (2002).

36. Marshall, J.S., Brancher, P. and Giovannini, A., "Interaction of unequal anti-parallel vortex tubes," *Journal of Fluid Mechanics*, Vol. 446, pp. 229-252 (2001).

35. Gossler, A.A. and Marshall, J.S., “Simulation of normal vortex-cylinder interaction in a viscous fluid,” *Journal of Fluid Mechanics*, Vol. 431, pp. 371-405 (2001).

34. Sun, M. and Marshall, J.S., "A flow visualization study of vortex interaction with the wake of a sphere," *ASME Journal of Fluids Engineering*, Vol. 122, pp. 560-568 (2000).

33. Marshall, J.S., Grant, J.R., Gossler, A.A. and Huyer, S.A., “Vorticity transport on a Lagrangian tetrahedral mesh,” *Journal of Computational Physics*, Vol. 161, pp. 85-113 (2000).

32. Krishnamoorthy, S., Gossler, A.A. and Marshall, J.S., “Normal vortex interaction with a circular cylinder,” *AIAA Journal*, Vol. 37, No. 1, pp. 50-57 (1999).

31. Chen, H. and Marshall, J.S., "A Lagrangian vorticity method for two-phase particulate flows with two-way phase coupling," *Journal of Computational Physics*, Vol. 148, pp. 169-198 (1999).

30. Marshall, J.S., “Response of a columnar vortex to a wrapped vortex loop,” *European Series in Applied and Industrial Mathematics: Proceedings*, Vol. 7, pp. 280-291 (1999).

29. Grant, J.R. and Marshall, J.S., “Inviscid interaction of vortex rings: approach to singularity?,” *European Series in Applied and Industrial Mathematics: Proceedings*, Vol. 7, pp. 183-194 (1999).

28. Marshall, J.S., "A model of heavy particle dispersion by organized vortex structures wrapped around a columnar vortex core," *Physics of Fluids*, Vol. 10, No. 12, pp. 3236-3238 (1998).

27. Krishnamoorthy, S. and Marshall, J.S., "Three-dimensional blade-vortex interaction in the strong-vortex regime," *Physics of Fluids*, Vol. 10, No. 11, pp. 2828-2845 (1998).

26. Marshall, J.S. and Grant, J.R., "A Lagrangian vorticity collocation method for viscous, axisymmetric flows with and without swirl," *Journal of Computational Physics*, Vol. 138, pp. 302-330 (1997).

25. Marshall, J.S. and Krishnamoorthy, S., "On the instantaneous cutting of a columnar vortex with non-zero axial flow," *Journal of Fluid Mechanics*, Vol. 351, pp. 41-74 (1997).

24. Marshall, J.S., "The flow induced by periodic vortex rings wrapped around a columnar vortex core," *Journal of Fluid Mechanics*, Vol. 345, pp. 1-30 (1997).

23. Marshall, J.S. and Chen, H., "Stability of a counter-rotating vortex pair immersed in a cross-stream shear flow," *AIAA Journal*, Vol. 35, No. 2, pp. 295-305 (1997).

22. Marshall, J.S. and Grant, J.R., "A method for determining the velocity induced by highly anisotropic vorticity blobs," *Journal of Computational Physics*, Vol. 126, No. 2, pp. 286-298 (1996).

21. Marshall, J.S. and Grant, J.R., "Penetration of a blade into a vortex core: vorticity response and unsteady blade forces," *Journal of Fluid Mechanics*, Vol. 306, pp. 83-109 (1996).

20. Dexter, F., Hindman, B.J. and Marshall, J.S., "Estimate of the maximum absorption rate of microscopic arterial air emboli after entry into the arterial circulation during cardiac surgery," *Perfusion*, Vol. 11, pp. 445-450 (1996).

19. Marshall, J.S., "Chaotic oscillations and breakup of quasi-geostrophic vortices in the N-layer approximation," *Physics of Fluids*, Vol. 7, No. 5, pp. 983-992 (1995).

18. Krishnamoorthy, S. and Marshall, J.S., "An experimental investigation of 'vortex shocks'," *Physics of Fluids*, Vol. 6, No. 11, pp. 3737-3741 (1994).

17. Marshall, J.S., "Vortex cutting by a blade. Part I. General theory and a simple solution," *AIAA Journal*, Vol. 32, No. 6, pp. 1145-1150 (1994).

16. Marshall, J.S., and Yalamanchili, R., "Vortex cutting by a blade. Part II. Computations of vortex response," *AIAA Journal*, Vol. 32, No. 7, pp. 1428-1436 (1994).

15. Marshall, J.S., and Grant, J.R., "Evolution and break-up of vortex rings in straining and shearing flows," *Journal of Fluid Mechanics*, Vol. 273, pp. 285-312 (1994).

14. Marshall, J.S., "The effect of axial pressure gradient on axisymmetrical and helical vortex waves," *Physics of Fluids A*, Vol. 5, pp. 588-599 (1993).

13. Marshall, J.S., and Parthasarathy, B., "Tearing of an aligned vortex by a current in two-layer quasi-geostropic flow," *Journal of Fluid Mechanics*, Vol. 255, pp. 157-182 (1993).

12. Marshall, J.S., "Buckling of a columnar vortex," *Physics of Fluids A*, Vol. 4, pp. 2620-2627 (1992).

11. Marshall, J.S., "The effect of axial stretching on three-dimensional stability of a vortex pair," *Journal of Fluid Mechanics*, Vol. 241, pp. 403-419 (1992).

10. Marshall, J.S., "A general theory of curved vortices with circular cross-section and variable core area," *Journal of Fluid Mechanics*, Vol. 229, pp. 311-338 (1991).

9. Marshall, J.S., "A criterion for vortex street breakdown," *Physics of Fluids A*, Vol. 3, pp. 588-594 (1991).

8. Marshall, J.S., "Downstream development of viscous fluid wakes behind rod-like bodies," *ASME Journal of Applied Mechanics*, Vol. 58, pp. 825-833 (1991).

7. Marshall, J.S., Naghdi, P.M. and Srinivasa, A.R., "A macroscopic theory of microcrack growth in brittle materials," *Philosophical Transactions of the Royal Society of London A*, Vol. 335, pp. 455-485 (1991).

6. Marshall, J.S. and Naghdi, P.M., "Consequences of the Second Law for a turbulent fluid flow," *Continuum Mechanics and Thermodynamics*, Vol. 3, pp. 65-77 (1991).

5. Marshall, J.S. and Naghdi, P.M., "Wave reflection and transmission by steps and rectangular obstacles in channels of finite depth," *Theoretical and Computational Fluid Dynamics*, Vol. 1, pp. 287-301 (1990).

4. Marshall, J.S. and Naghdi, P.M., "A thermodynamical theory of turbulence. Part I. Basic developments," *Philosophical Transactions of the Royal Society of London A*, Vol. 327, pp. 415-448 (1989).

3. Marshall, J.S. and Naghdi, P.M., "A thermodynamical theory of turbulence. Part II. Determination of constitutive coefficients and illustrative examples," *Philosophical Transactions of the Royal Society of London A*, Vol. 327, pp. 449-475 (1989).

2. Marshall, J.S., and Dhir, V.K., "On the prediction of porosity of beds composed of mixtures of spherical particles," *Chemical Engineering Communications*, Vol. 48, pp. 261-285 (1987).

1. Marshall, J.S., and Dhir, V.K., "Effect of overlying liquid layer on dryout heat flux measurements," *Nuclear Science and Engineering*, Vol. 91, pp. 109-113 (1985).

F. Conference Papers And Presentations (students underlined)

99. Jabarifar, M. and Marshall, J.S., "A streamlined computational framework for predicting particle capture in heterogeneous filters," FiltCon25 - American Filtration and Separations Society, Louisville, KY, April 1-3 (2025). (abstract)

98. Marshall, J.S., "Transport of nanoparticles in hydrogels," *Computation* Webinar: *Advances for Computational Methods for Fluid Flow*, Dec 16 (2024). (plenary speaker)

97. Ahmadinejad, M. and Marshall, J.S., "Dynamics of nanoparticle-filled hydrogels under oscillating magnetic fields," APS Fluid Dynamics Division Annual Meeting, Salt Lake City, Utah, Nov 21-23 (2024). (abstract)

96. Jin, X. and Marshall, J.S., "Influence of cell interaction forces on growth of bacterial biofilms," UK-China International Particle Technology Forum VIII, Yunnan, China, July 9-13 (2021) (winner of excellent poster award).

95. Seksinsky, D., and Marshall, J.S., "Modeling of Volcanic Ash Impingement in Gas Turbine Engines," 72nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Seattle, WA, Nov. 23-26 (2019).

94. Marshall, J.S., Ma, D., and Wu, J.R., " Oscillating Diffusion - A New Diffusion Mechanism for Nanoparticles Exposed to Ultrasound in a Hydrogel," 72nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Seattle, WA, Nov. 23-26 (2019).

93. Jin, X., Marshall, J.S., and Wargo, M.J., "Four-phase hybrid model of bacterial biofilm growth," 72nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Seattle, WA, Nov. 23-26 (2019).

92. Chen, S., Li, S. and Marshall, J.S., "Exponential scaling in early stage agglomeration of adhesive particles in turbulence," 71st Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Atlanta, Nov. 18-20 (2018).

91. Jin, X. and Marshall, J.S., "Contact electrification of suspended particles in a turbulent fluid," 70th Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Denver, Nov. 19-21 (2017).

90. Dizaji, F.F., Marshall, J.S., Grant, J.R. and Jin, X., "Anisotropic stochastic vortex structure method for simulating particle collision in turbulent shear flows," 70th Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Denver, Nov. 19-21 (2017).

89. Jin, X., and Marshall, J.S., "Contact electrification of suspended particles in a turbulent fluid," Proceedings of the Annual Meeting of the Electrostatics Society of America, Ottawa, Canada, June 13-15 (2017).

88. Saunders, D.C. and Marshall, J.S., "Transient lift on a blade during orthogonal vortex cutting," Proceedings of the 2017 Fluids Engineering Division Summer Meeting (FEDSM2017-69158), Waikoloa, Hawaii, July 30-Aug 3 (2017).

87. Marshall, J.S., and Fuhrmann, A., "Improving electric distribution system performance with dynamic ampacity: a study of environmental influence on underground cables,"

International Symposium on Energy Challenges and Mechanics, Inverness, Scotland, Aug. 14-18 (2016).

86. Saunders, D.C., Marshall, J.S., "Analysis of vortex line cutting and reconnection by a blade," 68th Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Boston, Nov. 22-24 (2015).

85. Green, A., Ma, D., Marshall, J.S., Wu, J.R., " Acoustic streaming and thermal instability of flow generated by ultrasound in a cylindrical container," 68th Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Boston, Nov. 22-24 (2015).

84. Marshall, J.S., Sala, K.D., Dizaji, F.F., "Accelerated stochastic vortex structure method for transport of interacting particles in turbulent flow," 68th Annual Meeting of the Fluid Dynamics Division of the American Physical Society, Boston, Nov. 22-24 (2015).

83. Marshall, J.S., Sala, K.D., Dizaji, F.F., "Stochastic vortex structure method for simulation of interacting particles in turbulent flows," 13th U.S. National Congress in Computational Mechanics, San Diego, CA, July 26-30 (2015).

82. Marshall, J.S., "Capillary torque on a rolling particle in the presence of a thin liquid film," AIChE Frontiers in Particle Science & Technology, Chicago, April 29 – May 1 (2014) (invited speaker).

81. Myers, O.M., Wu, J.R., Marshall, J.S., "Computational and experimental studies of charged particles in a scalable 1D spatial and temporal periodic potential created with twin periodic electrode curtains," Bulletin of the American Physical Society, March 5 (2014).

80. Yang, M., Li, S., Marshall, J.S., "Effects of hydrodynamic interaction in aerosol particle settling: mesoscopic full-dynamic particle-level simulations," 67th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 59, No. 20, 2014), San Francisco, CA, Nov. 23-25 (2014).

79. Udaykumar, H.S., Marshall, J.S., Vigmostad, S., Chandran, K.B., "Multi-scale modeling of blood flow in cardiovascular prosthetic devices," Multiscale Modeling (MSM) Consortium Meeting, Bethesda, Maryland, October 22-23 (2012).

78. Chesnutt, J.K.W. and Marshall, J.S., "Simulation of particle separation on an inclined electric curtain with a discrete element method," Proceedings of the Electrostatics Society of America, Toronto, June 12-14 (2012).

77. Myers, O., Wu, J.R. and Marshall, J.S., "Dust removal using the electric curtain technology relevant to the NASA space exploration project," Proceedings of the Electrostatics Society of America, Toronto, June 12-14 (2012).

76. Pellon, M.B., Eppstein, M.J, Besaw, L.E., Grover, D.K., Rizzo, D.M. and Marshall, J.S., "An agent-based model for estimating consumer adoption of PHEV technology,"

Transportation Research Board (TRB) 10-3303, 89th Annual Meeting, Washington, DC, Jan 10-14 (2010).

75. Besaw, L.E., Rizzo, D.M., Pellon, M.B., Grover, D.K., Eppstein, M.J. and Marshall, J.S., "Up-scaling agent-based discrete-choice transportation models using artificial neural networks," Transportation Research Board (TRB) 10-3130, 89th Annual Meeting, Washington, DC, Jan 10-14 (2010).

74. Liu, G. and Marshall, J.S., "Dancing on an electric curtain," 7th International Conference on Multiphase Flow, University of Florida, Gainesville, FL, May 30-June 4 (2010).

73. Hewitt, G.F. and Marshall, J.S., "Particle focusing in a corrugated tube," 7th International Conference on Multiphase Flow, University of Florida, Gainesville, FL, May 30-June 4 (2010).

72. Chesnutt, J.K.W. and Marshall, J.S., "Red blood cell aggregation and its role in blood passage through a bifurcation," 7th International Conference on Multiphase Flow, University of Florida, Gainesville, FL, May 30-June 4 (2010).

71. Porter, D., Marshall, J.S., Dewoolkar, M., Rizzo, D., "Colloquium on the development of curricula in heritage preservation engineering," Association for Preservation Technology International, Annual Conference, Denver, October 6-9 (2010).

70. Marshall, J.S. and Renjitham, S., "Overset grid method for simulation of flow past bodies using the integral vorticity-velocity formulation," 5th International Conference on Vortex Flows and Vortex Methods, Caserta, Italy, Nov. 7-10 (2010).

69. Liu, G., Li, S.Q., Marshall, J.S., and Yao, Q., "Investigation on deposition of polarized particles on a fiber with discrete element method," 6th World Congress on Particle Technology, Nuremberg, Germany, April 26-29 (2010).

68. Marshall, J.S. and Huang, Y., "Simulation of light-limited algae growth in homogeneous turbulence," Algae and Energy in the Northeast, Burlington, Vermont, March 17-18 (2010). (poster)

67. Marshall, J.S. and Huang, Y., "Simulation of light-limited algae growth in homogeneous turbulence," Vermont EPSCoR Annual Conference, Burlington, Vermont, March 11 (2010). (poster)

66. Eppstein, M.J., Grover, D.K., Rizzo, D.M. and Marshall, J.S., "An agent-based model for estimating consumer adoption of PHEV technology," Transportation Research Center Exposition, May (2010). (Winner, Best Poster Award)

65. Eppstein, M.J., Grover, D.K., Marshall, J.S., and Rizzo, D.M. "An agent-based model to study market penetration of plug-in hybrid electric vehicles", 2nd Annual Complexity in Business Conference, University of Maryland, Washington, D.C., Nov 12 (2010).

64. Liu, G., Li, S.-Q., Marshall, J.S. and Yao, Q., "Discrete element simulation of charged particle packing," 2nd UK-China Particle Technology Forum, Guiyang, China, Sept 1-3 (2009) (plenary lecture).

63. Zhao, Y., Ratner, A. and Marshall, J.S., "Numerical study of liquid film microstructure during spin coating of Ag colloidal suspension," ASME Conference Proceedings FEDSM2009 (2009).

62. Marshall, J.S., "Particle segregation in oscillating straining flows," IMA Conference on Dense Granular Flows, Isaac Newton Institute, University of Cambridge, Cambridge, UK, Jan 5-9 (2009).

61. Li, S.Q., and Marshall, J.S., "Modeling and experiments of wet granular flows in rotating drums," IMA Conference on Dense Granular Flows, Isaac Newton Institute, University of Cambridge, Cambridge, UK, Jan 5-9 (2009).

60. Hewitt, G. and Marshall, J.S., "Particle focusing and dispersion in suspension flow through a corrugated tube," 62nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 54, No. 19, 2009), Minneapolis, MN, Nov. 22-24 (2009).

59. Renjitham, S. and Marshall, J.S., "Vortex-body interaction using a level-set based overset grid method," 62nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 54, No. 19, 2009), Minneapolis, MN, Nov. 22-24 (2009).

58. Marshall, J.S. and Liu, G., "Discrete element modeling of particle transport by an electric curtain," 62nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 54, No. 19, 2009), Minneapolis, MN, Nov. 22-24 (2009).

57. Liu, G., Li, S.Q., and Marshall, J.S., "Particle capture by a conducting cylinder in an electrostatic field using a discrete element method," 62nd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 54, No. 19, 2009), Minneapolis, MN, Nov. 22-24 (2009).

56. Barrett, T., Holmén, B.A. and Marshall, J.S., "Characterization of a portable nanoparticle sizing instrument featuring a microfabricated corona ionizer and differential mobility analyzer," American Association for Aerosol Research Annual Conference, October 26-30 (2009). (poster)

55. Chesnutt, J.K.W. and Marshall, J.S., "Mesoscale model for blood cell adhesion and transport using ellipsoidal particles," 61st Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 53, No. 15, p. 153, 2008), San Antonio, Texas, Nov. 23-25 (2008).

54. Marshall, J.S., "Particle segregation in the presence of oscillating straining flows," 61st Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 53, No. 15, p. 82, 2008), San Antonio, Texas, Nov. 23-25 (2008).

53. Marshall, J.S., "Discrete-element modeling of adhesive particle flows," IBM-BECAT Workshop on High Performance Computing, University of Connecticut, Storrs, Dec. 17 (2008).

52. AlMomani, T., Udaykumar, H.S., Marshall, J.S. and Chandran, K.B., "Red blood cells / platelet interaction in arterioles," Proceedings of the ASME 2007 Summer Bioengineering Conference, Keystone Resort & Conference Center, Keystone, Colorado, June 20-24 (2007).

51. AlMomani, T., Udaykumar, H.S., Marshall, J.S. and Chandran, K.B., "Micro-scale dynamic simulation of erythrocyte-platelet interaction in blood flow," BMES Annual Meeting, Los Angeles, September 28 (2007) (poster).

50. AlMomani, T., Udaykumar, H.S., Marshall, J.S. and Chandran, K.B., "Micro-scale RBC/platelet dynamics in the hinge region of a mechanical heart," BMES Annual Meeting, Los Angeles, September 28 (2007) (poster).

49. Yergey, B., Beninati, M.-L., Marshall, J.S. and Mousel, J., "Computational analysis of sediment entrainment in three-dimensional channel flow," 60th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 52, No. 12, 2007), Salt Lake City, Nov. 18-20 (2007).

48. Li, S.Q., Marshall, J.S., Ratner, A. and Yao, Q., "Granular dynamics simulation of particle deposition and coagulation in two-phase dilute flow," 12th Conference of Engineering Thermophysics of China, Division of Combustion Institute, Wuhan, China, Nov. (2006).

47. Liu, X. and Marshall, J.S., "Transient growth of three-dimensional vortex perturbations during near-parallel collision with a circular cylinder," ASME Joint U.S.-European Fluids Engineering Division Summer Meeting, Miami, Florida, July 17-20 (2006) (FEDSM2006-98116).

46. Marshall, J.S., "Particulate aggregate formation and wall adhesion in microchannel flows," ASME Joint U.S.-European Fluids Engineering Division Summer Meeting, Miami, Florida, July 17-20 (2006) (FEDSM2006-98117).

45. AlMomani, T., Marshall, J.S. and Chandran, K.B., "Effect of red blood cells on shear-induced platelet activation: A micro-scale computational simulation," 5th World Congress of Biomechanics, Munich, Germany, July 29-Aug. 4 (2006) (*Journal of Biomechanics*, Volume 39, Supplement 1, 2006, p. S296, abstract).

44. Udaykumar, H.S., Krishman, S., Dillard, S., Marshall, J.S. and Schulze, K., "Computation of peristaltic transport and mixing in the small intestine," 5th World Congress of Biomechanics, Munich, Germany, July 29-Aug. 4 (2006) (*Journal of Biomechanics*, Volume 39, Supplement 1, 2006, pp. S442-S443, abstract).

43. Chesnutt, J.K.W. and Marshall, J.S., "A discrete-particle method for simulation of adhesion of blood cells," Iowa Academy of Science Annual Meeting, Buena Vista University, Iowa, April 21-22 (2006).

42. AlMomani, T., Marshall, J.S. and Chandran, K.B., "Influence of red blood cells on shear-induced platelet activation in flow through mechanical heart valves," Iowa Academy of Science Annual Meeting, Buena Vista University, Iowa, April 21-22 (2006).

41. Zhao, Y. and Marshall, J.S., "Spin coating of a colloidal suspension," 59th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 51, No. 9, 2006), Tampa, Nov. 26-28 (2006).

40. Chesnutt, J.K.W. and Marshall, J.S., "A discrete-element approach for blood cell adhesion," 59th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 51, No. 9, 2006), Tampa, Nov. 26-28 (2006).

39. Mousel, J. and Marshall, J.S., "Particle aggregation and deposition in a micro-nozzle flow," 59th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 51, No. 9, 2006), Tampa, Nov. 26-28 (2006).

38. Liu, X. and Marshall, J.S., "Interaction of a pump impeller and an intake vortex," Iowa Academy of Science Annual Meeting, Mt. Vernon, Iowa, April 29-30 (2005).

37. Zhao, Y. and Marshall, J.S., "Modeling effect of surface heterogeneity on thin films using a disjoining-pressure precursor-film approach," Iowa Academy of Science Annual Meeting, Mt. Vernon, Iowa, April 29-30 (2005).

36. Zhao, Y. and Marshall, J.S., "Liquid film dynamics in the presence of surface heterogeneity," 55th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 50, No. 9, 2005), Chicago, Nov. 25-27 (2005).

35. Liu, X. and Marshall, J.S., "Amplification of three-dimensional perturbations during nominally parallel vortex-cylinder interaction," 55th Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 50, No. 9, 2005), Chicago, Nov. 25-27 (2005).

34. Chesnutt, J.K.W. and Marshall, J.S., "Simulation of cell adhesion using a particle transport method," 55th Annual Meeting of the Fluid Dynamics Division of the American Physical

Society (*Bulletin of the American Physical Society*, Vol. 50, No. 9, 2005), Chicago, Nov. 25-27 (2005).

33. Ettema, R., Marshall, J.S. and McAlister, G., "Wind-driven rivulet break-off in conditions ranging from 0g to 1g," Workshop on Strategic Research to Enable NASA's Exploration Missions, Cleveland, Ohio, June 22-23 (2004).

32. Krishnan, S., Udaykumar, H.S., Marshall, J.S., and Schulze, K., "Peristaltic transport and mixing of particles in the duodenum," BMES Annual Fall Meeting, Philadelphia, Oct. 13-16 (2004).

31. Marshall, J.S., "Toward an arbitrary Lagrangian-Eulerian vorticity transport method," Second MIT Conference on Computational Fluid and Solid Mechanics, Cambridge, Mass., June 17-20 (2003).

30. Marshall, J.S. and Beninati, M.L., "LES subgrid-scale force and torque in vortex-dominated flows," 53rd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 48, 2003), New York, Nov. 23-25 (2003).

29. Beninati, M.L. and Marshall, J.S., "External turbulence interaction with a columnar vortex," 53rd Annual Meeting of the Fluid Dynamics Division of the American Physical Society (*Bulletin of the American Physical Society*, Vol. 48, 2003), New York, Nov. 23-25 (2003).

28. Marshall, J.S., "Vorticity dynamics in the wake of a yawed cylinder," Joint ASME-European Fluids Engineering Summer Conference, Montreal, July 14-18 (2002).

27. Wang, S. and Marshall, J.S., "Effect of normal body force on fingering instability of a liquid sheet driven by shear stress or gravity," Joint ASME-European Fluids Engineering Summer Conference, Montreal, July 14-18 (2002).

26. Wang, S., McAlister, G., Marshall, J.S. and Ettema, R., "Rivulet dynamics with variable gravity and wind shear," Fifth Microgravity Fluid Physics and Transport Phenomena Conference, Cleveland, Ohio, August 13-16 (2002).

25. Marshall, J.S., "Deconvolution large-eddy simulation of turbulent flows," US National Congress on Computational Mechanics, Dearborn, Michigan, Aug. 1-4 (2001).

24. Marshall, J.S. and Gossler, A.A., "Simulation of secondary vorticity ejection and evolution during three-dimensional vortex-cylinder interaction," ASME Fluids Engineering Division Meeting, Boston, Mass., June 11-15 (2000).

23. Marshall, J.S. and Gossler, A.A., "Computation of vortex–body interaction using a tetrahedral vorticity element method," European Congress on Computational Methods in Applied Sciences and Engineering, Barcelona, Spain, Sept. 11-14 (2000). (Invited Lecture)

22. Grant, J.R. and Marshall, J.S., "Evolution of the magnitude and geometry of vorticity during inviscid interaction of vortex rings," Proceedings of the American Mathematical Society Meeting, Boston, Mass., April 1-2 (2000).

21. Marshall, J.S. and Ettema, R., "Rivulet dynamics with variable gravity and wind shear," Fifth Microgravity Fluid Physics and Transport Phenomena Conference, Cleveland, Ohio, August 9-11 (2000).

20. Marshall, J.S. and Chen, H., "A Lagrangian vorticity method for two-phase flows with two-way coupling," *Bulletin of the American Physical Society*, Vol. 43, No. 9, pp. 1991-1992 (1998).

19. Gossler, A.A., Marshall, J.S. and Grant, J.R., "Vorticity-based simulation of vortex-body interaction," *Bulletin of the American Physical Society*, Vol. 43, No. 9, p. 1992 (1998).

18. Krishnamoorthy, S. and Marshall, J.S., "Three-dimensional vortex-body interaction in a viscous fluid," ASME Fluids Engineering Division Summer Meeting, Vancouver, Canada, June 22-26 (1997), ASME Paper FEDSM97-3313.

17. Marshall, J.S. and Grant, J.R., "A Lagrangian collocation method for vorticity transport in viscous fluid flows," Proceedings of the Forum on the Applications of Vortex Methods to Engineering Problems, Albuquerque, New Mexico, Feb. 22-24 (1995).

16. Marshall, J.S. and Grant, J.R., "Computation and modeling of blade penetration into a vortex in an inviscid fluid," 26th AIAA Fluid Dynamics Conference, San Diego, June (1995), AIAA Paper 95-2239.

15. Marshall, J.S., "Vortex dynamics in N-layer quasi-geostrophic flow," Proceedings of the 12th U.S. National Congress of Applied Mechanics, Seattle, Wash., June 27-July 1 (1994).

14. Marshall, J.S. and Grant, J.R., "Penetration of a blade into a vortex core," *Bulletin of the American Physical Society*, Vol. 37, No. 10, pp. 1961-1962 (1994).

13. Marshall, J.S., "Normal blade-vortex interaction," 3rd ARO Workshop on Interactional Aerodynamics, Atlanta, GA, March 23-24 (1994).

12. Grant, J.R., Marshall, J.S., Huyer, S.A. and Uhlman, J.S., "Algorithms for integration and differentiation on irregularly spaced points," *Bulletin of the American Physical Society*, Vol. 37, No. 10, p. 1875 (1994).

11. Marshall, J.S., "Vortex cutting by a blade," *Bulletin of the American Physical Society*, Vol. 38, No. 10, pp. 2297-2298 (1993).

10. Uhlman, J.S., Marshall, J.S., Grant, J.R. and Huyer, S.A., "A note on the calculation of boundary forces by vortex methods," *Bulletin of the American Physical Society*, Vol. 38, No. 10, p. 2271 (1993).

9. Marshall, J.S., "Vortex buckling," *Bulletin of the American Physical Society*, Vol. 37, No. 10, p. 1780 (1992).

8. Marshall, J.S., "Application of vortex buckling to turbulent vortex structures," *ASME Fluids Engineering Conf.*, Los Angeles, June 21-23, pp. 27-28 (1992).

7. Marshall, J.S., "Three-dimensional instability of a vortex core in the presence of axial stretching," *Bulletin of the American Physical Society*, Vol. 36, No. 10, p. 2669 (1991).

6. Marshall, J.S., "Axisymmetric solitary waves on vortex cores," *Bulletin of the American Physical Society*, Vol. 35, No. 10, pp. 226-227 (1990).

5. Marshall, J.S., "Downstream development and breakdown of vortex street wakes," Proceedings of the International Symposium on Nonsteady Fluid Dynamics, Toronto, Canada, pp. 427-432, June 3-6 (1990).

4. Marshall, J.S. and Naghdi, P.M., "Wave reflection and transmission in channels of finite depth," Proceedings of the 17th International Congress of Theoretical and Applied Mechanics, Grenoble, France, Aug. (1988).

3. Marshall, J.S. and Morris, S., "The motion induced by impulsive bottom heating of a fluid half-space with strongly temperature-dependent viscosity," *Transactions of the American Geophysical Union*, Vol. 66, No. 46, p. 1070 (1985).

2. Chu, W., Dhir, V.K. and Marshall, J.S., "Study of pressure drop, void fraction and relative permeabilities of two phase flow through porous media," Proceedings of the 21st National Heat Transfer Conference, Seattle, July 24-27 (1983).

1. Marshall, J.S. and Dhir, V.K., "On the counter-current flow limitations in porous media," Proceedings of the International Meeting on Light Water Reactor Severe Accident Evaluation, Vol. 2, pp. 18.5-1 - 18.5-7 (1983).

F. Other Publications / Publicity

10. Saunders, C. and Marshall, J.S., "Investigating how wind farm power variability can be reduced through predictive control," *Science Trends* (December 2017). [Article about our paper "The effect of time scales on wind farm power variability with nonlinear model predictive control," published in *Wind Energy*]

9. Crawford, Tom, "Understanding vortex reconnection," *Cambridge Core Blog* (July 2017). [Article about our paper "Transient lift force on a blade during cutting of a vortex with non-zero axial flow," published in *Journal of Fluid Mechanics*]

8. Marshall, J.S., **"**Ultrasound can help small particles penetrate into biofilms using a new *oscillatory diffusion* mechanism," *Atlas of Science* (February 2017). [Article about our paper "A model of ultrasound-enhanced diffusion in a biofilm," published in *Journal of the Acoustical Society of America*]

7. Marshall, J.S., Mousel, J., and Li, S.Q., "Simulation method for particle adhesion in vehicle cooling systems," IIHR Technical Report, January (2007).

6. Marshall, J.S. and Ettema, R., "Rivulet dynamics with variable gravity and wind shear," IIHR Technical Report No. 440, November (2004).

5. Marshall, J.S., "Three-dimensional vortex-body interaction in a viscous fluid," IIHR Technical Report No. 405, Aug. (1999).

4. Marshall, J.S., "Review of the book *Fluid Vortices* by S.I. Green," *J. Hydraulic Engineering*, p. 423, July (1996).

3. Marshall, J.S., "The fluid mechanics of vortex cutting by a blade," IIHR Technical Report No. 363, Sept. (1993).

2. Marshall, J.S., "Some theoretical developments and predictions for viscous fluid wakes," Ph.D. dissertation, Univ. Calif., Berkeley (1987).

1. Marshall, J.S., "Hydrodynamics of counter-current two phase flow through porous media," M.S. thesis, Univ. Calif., Los Angeles, also Tech. Rep. NUREG/CR-3995 (1984) (with V.K. Dhir).

SPONSORED RESEARCH

Current

Marshall, J.S. (PI), Almassalkhi, M., Erickson, J., Rowangould, G., "Enabling place-based renewable power generation using community energyshed design," Department of Energy (DE-EE0010407), $4,290,092, 5/1/2023 - 4/30/2026.

Almassakhi, M. (PI), Marshall, J.S. (co-PI), White, M., Ossareh, H., "Hybrid solar testing platform for cold weather climates," Department of Energy (DE-EE0010147), $4,000,000, 6/1/2023 - 5/31/2027.

Bomblies, A. (PI), Whimple, B., O'Neil-Dunne, J., Marshall, J.S., et al., "Cold weather summit-to-shore observation network," U.S. Army Engineering Research & Development Center (W913E522C0003), $4,583,680, 1/1/2022 – 12/31/2024.

Cole, B. (Managing PI), Badireddy, A.R. (Science PI), Doiron, A., Marshall, J.S., Wargo, M., "Diagnostics and mitigation of life support system biofilms using magnetic nanoparticles," NASA EPSCoR (80NSSC21M0325), $750,000, 12/1/2021 - 11/30/2024.

Past

Marshall, J.S. (PI), et al., "Army visual and tactical arctic reconnaissance (AVATAR)," U.S. Army Engineering Research & Development Center (W913E521C0003), $3,800,000, 12/9/2020 – 9/14/2024.

Marshall, J.S. (PI) and Wu, J.R., "Oscillatory diffusion - a new diffusion mechanism for particulates in porous media," National Science Foundation (CBET-1926197), $309,391, 9/1/2019 – 8/31/2023. [Supplement (summer 2021), $7700] Total funding = $317,091.

Hitt, D.L. (Managing PI), Wargo, M. (Science PI), Marshall, J.S., Wu, J.R., "Characterization and modeling of biofilm development and properties by a model multi-species ISS bacterial community," NASA EPSCoR (NNX16AQ96A), $750,000, 9/1/2016 – 8/30/2020.

Uhlman, J.S. (PI), Marshall, J.S., and Grant, J.R., "Multiscale modeling approach to predict and reduce agglomeration of explosively disseminated aerosol powders," Army SBIR Phase I, $100,000, 2/7/2020 – 8/6/2020 (with New England Research & Development, LLC).

Marshall, J.S. (PI), "Space Grant Opportunities in NASA STEM – Vermont Space Grant Consortium," NASA Space Grant, $2,755,000, 7/1/2020 – 6/30/2024. (Transferred to Bernard Cole, VT Space Grant Director, on 11/1/2019)

Marshall, J.S. (PI), Eppstein, M., Higgins, S., Hines, P., Koliba, C., "IGERT: Smart grids – technology, human behavior and policy," National Science Foundation (DGE-1144388), $3,027,802, 8/1/2012 – 7/31/2019.

Marshall, J.S. (PI), "Modeling of melted volcanic ash and sand particle impingement on gas turbine engine surfaces," NASA EPSCoR, $25,000, 9/1/2018 – 8/31/2019.

Dunlop, M. (PI) et al., "Program of research and scholarly excellence (PRSE) in biomedical and bioengineering," UVM College of Engineering and Mathematical Sciences, $75,000, 9/1/2016 – 8/30/2019.

Ulhman, J.S., Grant, J.R., and Marshall, J.S., "A discrete-element method for reactive particle transport and adhesion in a gas turbine engine," Dept. of Navy, Phase I SBIR, $125,000, 6/7/2017 – 12/6/2017 (with New England Research & Development, LLC)

Marshall, J.S. (PI), "Stochastic vortex structure model for adhesive particles in turbulent flows," National Science Foundation (CBET-1332472), $285,000, 9/1/2013 – 8/30/2017.

Hitt, D.A. (Managing PI), Wu, J.R. (Science PI), Marshall, J.S., Wargo, M., "Biofilm mitigation by ultrasound-enhanced targeted liposome treatment," NASA (NNX13AD40A), $750,000, 12/26/2012 – 12/25/2016.

Marshall, J.S. (Senior Personnel), "MRI: Acquisition of a high energy X-ray microtomography scanner," National Science Foundation, $276,793 (NSF), $118,625 (University of Vermont match), 09/01/14 – 08/31/15.

Marshall, J.S. (PI), "Aeroacoustic cleaning codevelopment with 89 North", UVM Ventures Pre-Seed Fund, $40,250, 6/1/14 – 5/30/15.

Marshall, J.S., Lee, T. (CUNY), "Modeling of particle hydrodynamic interaction in discrete element methods," NASA (NNX12AI15A), $107,000, 9/1/2012 – 8/30/2015. [This is a part of a larger project: "Proposal to the 2011 Minority-Serving Institution Faculty Engagement Competition", D. Hitt (PI).]

Hines, P. (PI), Marshall, J.S., Frolik, J., "Electric vehicles and their impact on the electric power delivery system," University of Vermont Transportation Research Center, $136,876, 6/1/2012 – 5/31/2014.

Marshall, J.S. (PI), Porter, D., "Energy efficiency performance assessment for historic buildings," National Park Service (P11AC71049), $50,000, 8/5/2011 – 9/30/2013.

Marshall, J.S. (PI), "Facility to test novel methods for algae growth rate enhancement by fluid mixing," Vermont Sustainable Jobs Fund, $44,828 ($68,538 with cost share), 8/2011 – 12/2012.

Marshall, J.S. (PI), "Optimizing turbulent mixing for microalgae growth," NASA, $27,500 ($66,495 with cost share), 9/1/2011 – 8/30/2012.

Marshall, J.S. (PI), "Collaboration on workforce development for modern electrical power systems," Sandia National Laboratories, $342,720, 4/1/2011 – 11/30/2011.

Marshall, J.S. (PI), "Supplement to DoE Power Systems Fellowship Program", Sandia National Laboratories, $10,866, 7/19/2011 – 7/25/2011.

Marshall, J.S., "UVM senior experience in engineering design (SEED) 2009 implementation," IBM Faculty Fellowship, $20,000, 9/2009-8/2010 (nominated by IBM Burlington).

Marshall, J.S., "UVM senior experience in engineering design (SEED) 2008 implementation," IBM Faculty Fellowship, $20,000, 9/2008-8/2009 (nominated by IBM Burlington).

Lakin, W. (Managing PI), Marshall, J.S. (Science PI), Frolik, J., Hitt, D., and Wu, J.R., "Active surface technologies for dust mitigation in Martian and lunar environments," NASA (NNX08AZ07A), $750,000 ($1,500,000 with cost share), 9/2008 – 8/2012.

Marshall, J.S. (PI), "Role of parametric contractions on particle clustering, aggregation and mixing in the human colon," Vermont EPSCoR (EPS-0701410), $25,000, 7/2008-6/2009.

Marshall, J.S., "UVM senior experience in engineering design (SEED): course development and initial implementation," IBM Faculty Fellowship, $25,000, 9/2007-8/2008.

Eppstein, M. (PI), Marshall, J.S., Rizzo, D. and Dworkin, M., "Regulatory control prediction for transportation alternative energy usage via a multiscale agent-based model," UVM Transportation Research Center, $501,600 ($1,003,200 with cost share), 7/2008-6/2012.

Marshall, J.S. (PI), "A discretely-conservative vorticity transport method for vorticity-dominated flows," Army Research Office (W911NF-07-1-0483), $257,357, 10/2007-7/2011.

Marshall, J.S. (PI), Porter, D., Dewoolkar, M., and Rizzo, D., "Curriculum development in historic preservation engineering," National Center for Preservation Technology and Training (MI-2210-07-NC-06), $56,888, 4/2007-6/2010 (co-sponsored by the Getty Conservation Institute).

Grasso, D. (PI) and Marshall, J.S., "Biofuel and hydrogen related research," U.S. Department of Transportation (DTOS59-06-G-00048), $700,000, 1/2007-9/2010.

Sub-Award: Marshall, J.S., "Modeling of distributed biowaste electrical power generation for hybrid vehicles using a multiscale agent-based approach," $157,968, U.S. Department of Transportation, 4/2007-12/2009.

Sub-Award: Marshall, J.S., "Stochastic Lagrangian approach for algae growth under turbulent mixing – proof of concept," $60,000, U.S. Department of Transportation, 4/2010-9/2010.

Hitt, D., Dubief, Y., Marshall, J.S., Fletcher, D., Rizzo, D. and Hill, J., "Micro particle image velocimetry system," University of Vermont, $84,000 (direct cost), 3/2007-12/2007.

Marshall, J.S. (PI), "Simulation method for particle adhesion in vehicle cooling systems," Caterpillar Corporation, $24,000, 1/2006-12/2006.

Ratner, A. (PI) and Marshall, J.S., "Computational fluid dynamics analysis of biomass combustion in a converted stoker unit," University of Iowa Facilities Management, $211,132 (direct cost), 4/2005-3/2008.

Patel, V.C. (PI) and Marshall, J.S., "Assessment of scale effects for scaling of forces in mooring test results," Bechtel Inc., $11,786, 4/2003-5/2003.

Marshall, J.S. (PI), "Investigation of vortex-impeller interaction in a pump intake," Hitachi Industries Corp., $132,000, 4/2002-3/2005.

Marshall, J.S. (PI), "Single- and multi-line cable flow dynamics in the presence of combined axial and perpendicular translation," Office of Naval Research (N00014-01-1-0015), $244,330, 10/2000-10/2004.

Marshall, J.S. (PI) and Ettema, R., "Rivulet dynamics with variable gravity and wind shear," NASA (NAG3-2368), $309,823, 5/2000-12/2004.

Marshall, J.S. (PI), "Three-dimensional vortex-body interaction in a viscous fluid," Army Research Office (DAAH04-96-1-0081), $222,802, 7/1996-6/1999.

Marshall, J.S. (PI), "Simulation of the passage of a blade through a vortex in a viscous fluid," Army Research Office (AASERT Award), $103,751, 9/1994-8/1997.

Marshall, J.S. (PI) and Patel, V.C., "Engineering research equipment: Particle image velocimetry system," National Science Foundation (CTS-9410075), $130,000 (50/50 matching from UI), 9/1994-8/1995.

Marshall, J.S. (PI), "The fluid mechanics of vortex cutting by a blade," Army Research Office (DAAH04-94-G-0378), $145,118, 8/1992-7/1995, Army Research Office (Young Investigator Program).

Glegg, S.A.L. (PI) and Marshall, J.S., "A prediction method for broadband noise from advanced ducted prop fans," NASA, $139,252, 1/1992-12/1994.

PROJECT MANAGEMENT (VT Space Grant & NASA EPSCoR; transferred to Chip Cole on 11/1/2019)(* wrote proposal)

Marshall, J.S. (PI), "Vermont NASA EPSCoR Research Infrastructure Development (RID) Phase VI," NASA EPSCoR (80NSSC19M0067P00001), $375,000, 10/01/2019 – 9/30/2022.*

Marshall, J.S. (PI), "National Space Grant College and Fellowship Program (SPACE Grant) Training Grant 2015-2018," NASA EPSCoR (NNX15AP86H), $2,721,400, 7/6/2015 – 6/05/2021.*

Marshall, J.S. (PI), "Vermont NASA EPSCoR Research Infrastructure Development (RID) Phase V," NASA EPSCoR (NNX15AK55A), $375,000, 10/01/2015 – 9/30/2019.

Marshall, J.S. (Managing PI), Kotov, V. (Science PI), Bigelow, N., Clougherty, D., Del Maestro, A., Goodsell, A., Lakoba, T., Vanegas, J., Novel quantum materials as laboratories for fundamental physics in microgravity," NASA EPSCoR (80NSSC19M0143), $750,000, 7/1/2019 – 6/30/2022.

Marshall, J.S. (Managing PI), Myers, J. (Science PI), Dubief, Y., Del Maestro, A., Fletcher, D., "Critical gas-surface interaction problems for atmospheric entry," NASA EPSCoR (80NSSC18M0031P00001), $750,000, 11/20/2017 – 11/19/2020.

Marshall, J.S. (Managing PI), Wargo, M. (Science PI), Marshall, J.S., Wu, J.R., "Characterization and modeling of biofilm development and properties by a model multi-species ISS bacterial community," NASA EPSCoR (NNX16AQ96A), $750,000, 9/1/2016 – 8/30/2020.

COURSES TAUGHT (number of times taught)

Undergraduate
Freshman Design (1)
Fluid Mechanics (9)
Thermodynamics I (12)
Mathematical Methods in Engineering (4)
Introduction to Physical Oceanography (1)
Ocean Wave Mechanics (4)
Intermediate Fluid Mechanics (5)
Computer-Aided Engineering (2)
Mechanical Engineering Design Projects (1)
Intro. Engr. Mechanics (1)
Renewable Energy Systems (3)

Graduate
Advanced Continuum Mechanics (3)
Inviscid Flow (15)
Viscous Flow (7)
Vortex Dynamics (5)
Analytical Methods in Fluid and Thermal Sciences (4)
Numerical Calculations (3)
Advanced Engr. Analysis (7)
Advanced Fluid Dynamics (3)
Continuum Mechanics (5)

STUDENT ADVISING

Honors Theses

PAST

Andrew Fuhrmann, Acoustic enhancement of dust mitigation from a surface. The University of Vermont, May 2012.

Sean Candon, Deformation, capture and entrainment of a vortex ring by a columnar vortex. The University of Vermont, May 2012.

Auston Maynard, Discrete element modeling of particle entrainment by a wall-bounded vortex. The University of Vermont, May 2010.

Brent Meunier, Nanoparticle focusing and deposition via dielectrophoretic force. The University of Vermont, May 2010.

Joint Training Activities (joint advising of graduate students from other universities):

PAST

Tooran Tavangar, Discrete element modeling of particle segregation during concrete pumping. PhD student, Sherbrooke University, Canada, Aug 2021-Jan 2022 (joint training with Prof. Ammar Yahia)

Ran Tao, The application of multi-scale DEM-MFIX to turbulent-driven particulate flow and the development of Oseen dynamics, PhD student, Tsinghua University, P.R. China, 7/2016-1/2017 (joint training with Prof. Shuiqing Li)

Mengmeng Yang, Simulation of particle hydrodynamic interaction in discrete element method via Oseen dynamics, PhD student, Tsinghua University, P.R. China, 8/1/2012-9/1/2012 (joint training with Prof. Shuiqing Li)

Guanqing Liu, Discrete-element method with eletrostatic interaction between fine particulates, PhD student, Tsinghua University, P.R. China, 11/2008-12/2009 (joint training with Prof. Shuiqing Li and Prof. Q. Yao)

Ben Yergey, Simulation of sediment transport using a discrete-element method, MS student, Bucknell University, 6/2006-8/2008 (joint training with Prof. M.L. Beninati)

Post-Doctoral Advisees:

PAST

Yun Huang, Algae biofuel modeling and experiments on dust mitigation from a surface. University of Vermont, July 2009 – August 2010.

Jennifer Chesnutt, Discrete-element modeling of suspensions of ellipsoidal particles and fibers. University of Vermont, May 2009 – August 2010.

Yongli Zhao, Biofuel combustion modeling. University of Iowa, December 2006 – August 2007 (co-advise with Al Ratner).

Maria-Laura Beninati, Turbulence evolution in vortex-dominated flows, University of Iowa, May 2004 – August 2005.

Visiting Faculty:

Runru Zhu, Assoc Prof., Inst Process Engr, Chinese Academy of Sciences, Feb 2021 – Jan 2022

Shuiqing Li, Assoc Prof., Thermal Engr, Tsinghua University, November 2009.

Shuiqing Li, Assoc Prof., Thermal Engr, Tsinghua University, August 2008.

Shuiqing Li, Assoc Prof., Thermal Engr, Tsinghua University, May – July 2006.

Maria-Laura Beninati, Asst Prof., Mechanical Engr, Bucknell University, May – July 2006.

***Ph.D. Students*:**

CURRENT

Zahra Khadem, Modeling snow and ice mitigation on a tilted solar panel. University of Vermont, Ph.D. dissertation, expected May 2028.

Siavash Kasaeipour, Particle mitigation on a solar panel. University of Vermont, Ph.D. dissertation, expected May 2028.

Alireza Kashani Lotfabadi, Enabling place-based renewable power generation using community energyshed design. University of Vermont, Ph.D. dissertation, expected May 2027.

Mehrdad Ahmadinejad, Nanoparticle penetration into a biofilm in an oscillating magnetic field. University of Vermont, Ph.D. dissertation, expected May 2026.

Mohammad Jabarifar, Numerical modeling of snow resuspension by the wind. University of Vermont, Ph.D. dissertation, expected May 2026.

PAST

Alina Karki, Medical applications of ultrasound – T-cell drug delivery, osteoporosis diagnosis, and biofilm mitigation. University of Vermont, Ph.D. dissertation, January 2022 (co-advise with Dr. Junru Wu).

Xing Jin, Three-phase hybrid model of bacterial biofilm growth. University of Vermont, Ph.D. dissertation, October 2020. (Second Place Student Paper Award, Electrostatics Society of America Annual Meeting, Ottawa, Canada, June 2017; Outstanding Mechanical Engineering GRA award, Mech Engr Dept, Univ. of Vermont, 2020; Excellent Poster Award, UK-China International Particle Technology Forum, 2021)

Farzad Farzadizaji, Stochastic vortex structure method for turbulence modeling with particle collision and agglomeration. University of Vermont, Ph.D. dissertation, May 2018. (Outstanding Mechanical Engineering GRA award, Mech Engr Dept, Univ. of Vermont, 2017)

Daniel Curtis Saunders, Wind turbine wake interactions – characterization of unsteady blade forces and the role of wake interactions in power variability control. Ph.D. dissertation, University of Vermont, May 2017. (NSF IGERT Fellow; Ph.D. Dissertation of the Year Award, Mech Engr Dept, Univ. of Vermont, 2018) [Applied Physics Lab, Johns Hopkins Univ]

Adam Green, Structure and dynamics of two flow fields used for particle deposition onto and removal from a substrate. Ph.D. dissertation, University of Vermont, May 2016.

Owen Myers, Chaotic dynamics of dust transport by an electric curtain. Ph.D. dissertation, University of Vermont (Materials Science Program), May 2015. (co-advise with Dr. Jun-ru Wu) (First Place Student Paper Award, Electrostatics Society of America Annual Meeting, Toronto, Canada, June 14, 2012)

Simtha Renjitham, An overset grid vorticity transport method for flow past fixed and moving bodies. Ph.D. dissertation, University of Vermont, October 2012.

Jennifer Chesnutt, Discrete-element model of red blood cell aggregation in blood flow. Ph.D. dissertation, University of Iowa, May 2009 (Iowa Presidential Fellow). [NIH Postdoctoral Fellowship, U Texas San Antonio; Univ. Florida Postdoctoral Research]

Thakir AlMomani, Micro-scale dynamic simulation of erythrocyte-platelet interaction. Ph.D. dissertation, University of Iowa, May, 2007 (co-advise with K.B. Chandran). [Asst. Research Engr, Iowa Institute of Hydraulic Research & Asst. Prof., Dept. of Biomedical Engineering, Hashemite University, Zarqa, Jordan]

Yongli Zhao, Contact-line motion of a thin liquid film: heterogeneous surfaces and particle transport. Ph.D. dissertation, University of Iowa, December, 2006 (Amelia Earhart Fellow, Zontas International). [Asst. Prof. St. Cloud University, Minnesota]

Xiongbin Liu, Three-dimensional numerical simulation of orthogonal and parallel vortex interaction with a rigid body. Ph.D. dissertation, University of Iowa, May, 2006.

Maria-Laura Beninati, Turbulence evolution in vortex-dominated flows. Ph.D. dissertation, University of Iowa, May, 2004 (Iowa Presidential Fellow, AAUW Fellow). [Asst. Prof. Bucknell University]

Albert Gossler, A tetrahedral element Lagrangian vorticity method with application to vortex-cylinder interaction. Ph.D. dissertation, University of Iowa, May 1999. [Postdoc, Sandia Natl Lab; Asst. Prof. N. Arizona University]

Srikanth Krishnamoorthy, Normal vortex-body interaction in a three-dimensional viscous flow. Ph.D. dissertation, University of Iowa, December 1997

Hongbo Chen, Lagrangian vorticity method for simulation of two-phase flows with two-way phase coupling. Ph.D. dissertation, University of Iowa, May 1998 (Outstanding ME Dissertation Award) [Intel Corporation]

***M.S. Thesis Students*:**

CURRENT

Sophie Gessman, Islands and chains: particle agglomeration on a three-phase electric curtain. MS thesis, University of Vermont, May 2025.

Ben Desroberts, Effect of nozzle translation on a bounded vortex flow field and particle removal from a surface. MS thesis, University of Vermont, May 2025.

PAST

Nick Fitzgerald, Use of machine learning for characterization of falling snow from video images. MS thesis, University of Vermont, May 2024.

Randall Storm, Particle motion through a pore space in an oscillatory flow. MS thesis, University of Vermont, Aug 2023.

Thomas Chivers, Volumetric particle tracking velocimetry for determination of velocity and turbulence from falling snow. MS thesis, University of Vermont, May 2023.

Kelly Curran, Oscillatory diffusion of particles in a porous bed exposed to an oscillating flow. MS thesis, University of Vermont, Aug 2021.

Drue Seksinsky, Modeling volcanic ash particle impingement in the hot sections of a gas turbine engine. MS thesis, University of Vermont, August 2020.

Andrew Fuhrmann, Effect of rainfall on moisture and temperature field around underground cables. MS thesis, University of Vermont, January 2015.

Chris Ghazi, Measurement of fluid and particle transport through narrow passages. MS thesis, University of Vermont, October 2014.

Melissa Faletra, Segregation of particles of variable size and density in falling suspension droplets. MS thesis, University of Vermont, October 2014.

Kyle Sala, Analysis of stochastic methods for predicting particle dispersion. MS thesis, University of Vermont, December 2012. (Outstanding ME GRA award, 2014)

Dongmin Qian, Efficiency analysis of solar panel dust mitigation using an electric curtain. MS thesis, University of Vermont, October 2011. (co-advise with Jeff Frolik)

Auston Maynard, Dust mitigation in a bounded vortex flow. M.S. thesis, University of Vermont, May 2011.

Greg Hewitt, Particle focusing and dispersion in a corrugated tube. M.S. thesis, University of Vermont, December 2009.

John Mousel, Particle aggregation in micronozzle flows. M.S. thesis, University of Iowa, December 2006. (Kennedy Fellow, IIHR)

Geoff McAlister, The breakup of sheet flow to rivulets and rivulets to droplets. M.S. thesis, University of Iowa, August 2003. (co-advise with R. Ettema)

Amit Thakur, An experimental investigation of flow past a single cylinder and two parallel cylinders at an angle of yaw. M.S. thesis, University of Iowa, May 2003.

Shufang Wang, Contact line receptivity and rivulet initiation in the presence of droplets and surface contamination. M.S. thesis, University of Iowa, August 2002.

Zhijian Xiong, Analysis of errors in large-scale PIV systems. M.S. thesis, University of Iowa, August 2000. (co-advise with Marian Muste)

Meihong Sun, A study of vortex interaction with a sphere wake. M.S. thesis, University of Iowa, May 1998.

Ramakrishnan Yalamanchili, Computations of normal vortex interaction with blades and circular cylinders. M.S. thesis, Florida Atlantic University, December 1993.

Srikanth Krishnamoorthy, An experimental study of vortex response during cutting by a blade or cylinder. M.S. thesis, Florida Atlantic University, December 1993.

Balaji Parthasarathy, Tearing of an aligned vortex by a current in a two-layer quasi-geostrophic flow. M.S. thesis, Florida Atlantic University, May 1993.

Bram Leader, Vortex street wakes behind truncated and full cylinders in a rotating fluid. M.S. thesis, Florida Atlantic University, August 1992.

Hariharhan Viswanathan, Experimental investigation of an oscillating hydrofoil propulsion system. M.S. thesis, Florida Atlantic University, May 1991.

Undergraduate Student Assistants:

Michael Beske-Somers, University of Vermont (2023-present)

Ben Desroberts, University of Vermont (2023-present)

Sophie Gessman, University of Vermont (2022-2023)

MacKenzie Clark, University of Vermont (2021)

Tom Chivers, University of Vermont (2020-2021)

Randall Storm, University of Vermont (2020-2021)

Kelly Curran, University of Vermont (2019-2020)

Anthony Julian, University of Vermont (2017-2018)

Chloe Arnold, University of Vermont (2015-2016)
Michael Swartz, University of Vermont (2015-16)
Warren Rixon, Tufts University (summer 2013)
Christopher Ghazi, University of Vermont (2011-2012)
Alex Vizard, University of Vermont (2011-2012)
Melissa Faletra, University of Vermont (2011-2012)
Nate Palmer, University of Vermont (2011-2012)
David Zhang, University of Vermont (2011-2012)
Francesca Minervini, University of Vermont (2011-2012)
Andrew Fuhrmann, University of Vermont (2011-2012)
James Vohr, University of Vermont (2011)
Sean Candon, University of Vermont (2011-2012)
Phil Schade, University of Vermont (2010-2011)
Kyle Sala, University of Vermont (2010-2011)
Brent Meunier, University of Vermont (2009-2010)
Auston Maynard, University of Vermont (2009-2010)
Greg Hewitt, University of Vermont (2008-2009)
John Mousel, University of Iowa (2004-2005)
Bram Leader, Florida Atlantic University (1991-1992)

HONORS AND AWARDS

Fellow, American Society of Mechanical Engineers, 2004-present
Member, Vermont Academy of Science and Engineering, 2024-present
Fellow, Gund Institute for Environment, 2018-present
UVM Sustainability Faculty Fellow, 2017-18
Outstanding Faculty Performance Award, College of Engineering and Mathematical Sciences, University of Vermont, 2015
IBM Faculty Fellow, 2007-2010
Editorial Board Member, *Computation*, MDPI Publishers, 2012-present
Editorial Board Member, *The Open Mechanical Engineering Journal*, Bentham Science Publishers, 2007-2017
Associate Editor, *ASME Journal of Fluids Engineering*, 2001-2004
Invited Speaker, AIChE Frontiers in Particle Science & Technology Conference, Chicago, April 29-May 1, 2014
Keynote Speaker, Workshop on Multiscale Computing for Cloud Physics, University of Delaware, August 16-20, 2010.
Keynote Speaker, European Congress on Computational Methods in Applied Sciences and Engineering, Barcelona, Spain, Sept. 11-14, 2000
C.I.E.S. Fellowship, French Ministry of Education, Sept.-Dec. 1999
1992 Henry Hess Award, American Society of Mechanical Engineers
(This award is given to the outstanding paper by an investigator under 35 years old published in any ASME journal during the previous two years.)
Young Investigator Award, U.S. Army Research Office, 1992-1995
Old Gold Summer Research Fellowship, University of Iowa, 1994, 1995
Outstanding Achievement Award, Florida Atlantic University, 1991

SCIENTIFIC AND PROFESSIONAL SOCIETIES

American Society of Mechanical Engineers (Fellow)
American Physical Society (Member)
American Academy of Mechanics (Member)
Electrostatics Society of America (Member)
Tau Beta Pi (Member)

MAJOR SERVICE ACTIVITIES

University of Vermont

Major Service Assignments

Associate Dean for Research and Graduate Education (Oct 2019 - present)

Led development of graduate assessment programs (2020).
Led revision and update of CEMS website (2021).
Led College implementation of recommendations of Graduate Initiatives Committee (2021-present).
Led college preparation for Academic Program Reviews (2021-2022).
Led development of large center-type grant proposals (2019-present).

Interim Director, Vermont Space Grant and NASA EPSCoR (May – Oct, 2019)

I took over this service position upon the death of a colleague who formerly had the position. The Space Grant Director administers a variety of NASA grants/fellowships/internships to faculty and students at Vermont universities and colleges, and it supports a wide range of outreach activities in the state associated with space exploration.

Director, Smart Grid IGERT Program (2012-2019)

I served as the PI and director of the NSF-funded UVM Smart Grid IGERT program. This is the only IGERT program ever held within the state of Vermont. The program funded 23 PhD students, and involved with about 15 IGERT-affiliated faculty at UVM as well as research staff at Sandia and Los Alamos National Labs.

ABET Coordinator, School of Engineering, 2015 ABET Review (2014-2016)

I coordinated the overall accreditation visit preparation for the School of Engineering, including writing the institutional report, editing all four program reports, and managing collection of course and program assessment data. The final review report lists no difficiencies or weaknesses across the four engineering programs, and only two concerns.

Graduate College Ad Hoc Tuition-on-Grants Committee (Chair, 2011-2012)

The committee was charged with examining issues related to transitioning to direct charging of GRA tuition onto faculty grants, which was a highly controversial issue within the university. The proposed changes were implemented by the University in 2014.

Sandia – UVM Collaboration Core Group, UVM Technical Lead (2011-2012)

I coordinated a collaboration between UVM, Sandia National Laboratories, and several other Vermont organizations, which included organizing a seminar series, visits of 9 student interns and 8 faculty to Sandia over summer 2011, and holding a major workshop on smart grids. The collaboration resulted in formation of a statewide Center for Energy Transformation and Innovation, jointly operated by UVM, Vermont Utilities and Sandia,

and in award by the DoE of a Regional Testing Center in Solar PV to IBM Essex, with which UVM is a partner.

ABET Coordinator, School of Engineering, 2009 ABET Review (2007-2009)

I developed and implemented the ABET assessment system for the School of Engineering, wrote the ABET report for Mechanical Engineering, and coordinated collection of materials and visit details, including communications with the evaluation team. There were no difficiencies across the four SoE programs and one weakness, for insufficient faculty numbers in Civil Engr due to recent disability of two faculty in the structures area.

Bylaws Revision Committee, College of Engineering and Mathematical Sciences (2008)

I served as part of a three-person committee that redrafted the College bylaws. The revised bylaws passed the faculty in Spring 2008, and was subsequently approved by the Provost.

Curriculum 21 Committee and New Programs Committee (co-chair, 2006-2007)

These two committees developed a new core curriculum for the School of Engineering and two new multidisciplinary degree programs – a BA in Engineering and a BS in Engineering Science. The proposed curriculum was approved in spring 2007 by the School of Engineering, but only the new degree programs were ultimately implemented.

Founding Director, School of Engineering (2006-2007)

The School of Engineering formed in Fall 2006 by a merger of three previous departments. As founding director, I developed a school structure with a new web site, formed the SoE curriculum committee and faculty council, oversaw development and adoption of new RPT guidelines, oversaw formation of the Senior Experience in Engineering Design program, developed a school-wide Senior Design Night, developed and implemented a new ABET assessment method for the SoE programs, developed the SoE external advisory board, developed new accelerated MS programs for two SoE programs, and wrote a major program review report for the SoE.

Other Service

UVM Graduate Executive Committee (2023-2026)
OVPR Research Advisory Committee (2020-2023)
Ad hoc Course Buy-out Committee (2022-2023)
UVM Review Committee, NASA Graduate Fellow (2020-21, 2021-22)
UVM Review Committee, NSF EPSCoR Track II Proposal (2021-22)
CEMS Graduate Initiatives Committee (2020-2021)
Faculty Search Committee (2018-19)
UVM Professional Standards Committee (2018-19, 2020-21)
Faculty Adviser, NASA's BIG Idea Challenge Student Group (2018-19)
CEMS College Secretary (2016-17, 2017-18)
CEMS Faculty Council (2016-2019, Chair 2016-17 and 2018-19)
UVM Research, Scholarship & Creative Arts, Faculty Senate Committee (2015-18)
Ad Hoc University Research Misconduct Committee (2016-17)
UVM Global Engagement Task Force (2014)
Ad hoc CEMS Shop Committee (Chair, 2014)
Faculty Search Committee (2 positions) (Chair, 2013-14)
Faculty Standards Committee (2013-2016, Chair 2013-14)
College Facilities Committee (2012-15)
University Graduate Executive Council (2010-13)

University Research Advisory Discussion Group (2010-13)
SoE Faculty Secretary (Spring 2011)
College Faculty Council (2010-12)
Faculty Adviser, ASME student section (2009-11)
McNair Scholars Focus Group (2012)
University Marshal, graduation ceremony May 2011, 2012, 2015, 2017, 2018, 2019, 2024
Ad hoc committee for development of interdisciplinary elective tracks (2009-10)
Acting Program Head, Mechanical Engineering (2009-10)
Academic Quality Task Force, University *ad hoc* Committee (2009)
Research, Scholarship & Graduate Education, Faculty Senate Committee (2008-09)
Emergency Management Planning Working Group for Research (2007-09)

University of Iowa

Major Service Assignments

Founding Department Chair, Mechanical and Industrial Engineering (2001-2005)

The MIE department formed in 2001 from merger of the previous Mechanical Engr and Industrial Engr departments. As founding chair, I developed a mission and vision for the department, developed an ABET assessment process for both ME and IE programs, wrote the ME ABET assessment report for the 2002 review, developed the advisory board for the department, and implemented a new college-wide curriculum innitiative focusing on multidisciplinary education.

Coordinator, Program for Enhanced Design Experience (2003-2005)

I managed an enhanced design program focusing on multidisciplinary design teams composed of ME, IE, EE, anad ChemE students working on real-life industry-funded projects.

Engineering Faculty Council (Member 1996-99, Chair 1998-99)

As chair of the elected faculty council, I oversaw development and implementation of a new promotion & tenure guidelines and of the new multidisciplinary engineering curriculum initiative, under the theme of 'Engineering and Something More'. Both were overwhelmingly adopted by the College faculty.

Graduate Committee, Mechanical Engineering Dept. (Member 1993-1999, Chair 1994-1998)

As graduate committee chair, I developed and implemented a new accelerated MS program (the first of its kind within the university) and a new annual award for excellence in graduate theses and dissertations.

Other Service

Interim Department Chair, Mechanical Engineering (2000-2001)
Advisory Board, Applied Mathematics and Computational Sciences Program (2005-2006)
Ad Hoc Committee on the Manual of Procedure, College of Engineering (2004-2005)
Chair, Director Search Committee, Center for Computer Aided Design (2002)
Ad Hoc University Research Misconduct Committee (2001-2002)
University Research Council (2000-2003)
Engineering Administrative Council (2000-2005)
Engineering Dean Search Committee (1999)
Coordinator for Core Course (57:020 Fluid Mechanics) (1996-2006)
Faculty Adviser, ASME student section (1994-1998)

External

Co-editor, "Advances in Computational Methods for Fluid Flow," Special Issue of *Computation* (2025)
Paper Award Committee, *Computation*, Nov (2021)
NSF Particulate & Multiphase Flow Panel, Sept (2021)
Federal Demonstration Partnership, UVM Faculty Representative (2020-2023)
NSF Particulate & Multiphase Flow Panel, Sept (2020)
Renewable Energy Vermont Conference Organizing Committee (2020)
NSF Particulate & Multiphase Flow Panel, Nov (2019)
External reviewer, Ph.D. dissertation, Aalborg University, Dept. of Energy Tech. (2017)
Travel Award Committee, *Computation*, 2017, 2018, 2019
NSF NRT Program Panel, June 17-19 (2015)
NSF Fluid Dynamics Program Panel, May 6 (2014)
NSF IGERT Program Panel, October 25-26 (2012)
DoD SMART Scholarship Panel, January 4-6 (2012)
Editorial Board Member, *Computation*, MDPI Publishers (2012-present)
Steering Committee, "Powering the Future – The Vermont Smartgrid and Beyond", Burlington, Vermont, May 17-18 (2011).
National Defense Science and Engineering Graduate Fellowship Panel (2010)
NSF Graduate Fellowship Panel, Mechanical Engineering (2006, 2008, 2010)
NSF Review Panel, Fluid Dynamics Program, June 5 (2009)
Steering Committee, "Colloquium on the Development of Historical Preservation Engineering Curricula", Burlington, VT, June 22-23 (2009)
Norwich University Mechanical Engineering Department Task Force (2008-2009)
Editorial Board Member, *Open Journal of Mechanical Engineering* (2007-present)
Associate Editor, *ASME Journal of Fluids Engineering* (2001-2004)
Chair, Local Organizing Committee, ASME 2005 Student Leadership Training Symposium (SLTS), Division C, Iowa City, Iowa, September 23-24 (2005)
Chair-Elect, Engineering Section, Iowa Academy of Sciences (2005-2006)
Steering Committee, "Big 10+ Workshop on Redefining Mechanical Engineering," Tampa, Florida, Jan 26-27 (2002).
VIPAR Program Review Board, Sandia National Laboratory, March 29 (1999)
Executive Committee Member, ASME, N.E. Iowa Section (1995-1998)
Promotion and tenure reviews, average one per year
Various technical session chairmanships at conferences and workshops, average one per year

INVITED SEMINARS

Computation Webinar: Advances in Computational Methods for Fluid Flow, Dec 16, 2024
University of Vermont, Gund Institute, Feb 2, 2024
University of Vermont, Biomedical Research Series, Jan 17, 2024
University of Michigan, Department of Mechanical Engineering, June 17, 2020
University of Sherbrooke (CA), Department of Civil Engineering, Oct 10, 2019
University of Vermont, Department of Mechanical Engineering, April 19, 2019
Penn State University, Department of Mechanical Engineering, Feb. 28, 2019
University of Aalborg, Denmark, Department of Energy Technologies, Nov. 27, 2017

University of Massachusetts, Amherst, Dept. Mechanical and Industrial Engr, Feb 24, 2016
University of Virginia, Dept. Mechanical & Aerospace Engr., Sept. 26, 2013
Los Alamos National Laboratory, June 20, 2013
University of Pennsylvania, Philadelphia, Nov 28, 2012
Sandia National Laboratories, Albuquerque, New Mexico, June 30, 2011
NASA Kennedy Research Center, Electrostatics and Surface Physics Laboratory, Cape Canaveral, Florida, Oct. 26, 2010
University of Delaware, UD-NCAR Workshop on Multiscale Computing for Cloud Physics, Dover, DE, August, 2010 (keynote speaker)
Clarkson University, Dept. Mechanical Engineering, Potsdam, NY, Nov. 2009
City College of New York, Dept. Mechanical Engineering, New York, NY, Oct. 2009
University of Connecticutt, IBM-BECAT Workshop on High Performance Computing, Storrs CT, Dec 17, 2008
NASA Kennedy Research Center, Electrostatics and Surface Physics Laboratory, Cape Canaveral, Florida, Nov. 2, 2008
Worchester Polytechnic Institute, Dept. Mechanical Engineering, Worchester, NY, Nov. 2007
Tsinghua University, Dept. Thermal Engineering, Beijing, China, Nov. 2007
Caterpillar Technical Center, Peoria, IL, Nov. 2006 and August 2005
University of Massechusetts at Amherst, Dept. of Mechanical & Industrial Engr, Amherst, MA, March 2006
Emerson Process Management, Marshalltown, IA, August 2005
Iowa State University, Dept. Mechanical Engr, Ames, IA, Feb. 2005
University of Illinois, Urbana-Champaign, Dept. of Theoretical & Applied Mechanics, Urbana, IL, March 2004
DARPA Workshop on Helicopter Quieting, Washington, DC, Jan. 2004
Hitachi Technical Center, Tokyo, Japan, Sept. 2003
U.S. Army Soldier Center, Natick, MA, June 2000
European Congress on Computational Methods in Applied Sciences and Engineering, Barcelona, Spain, Sept. 11-14, 2000
Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, Oct. 1999
ENSEEINT, Fluids Engr. Dept., Toulouse, France, Oct. 1999
Institut de Mecanique des Fluides de Toulouse (IMFT), Toulouse, France, Oct. 1999
Wichita State University, Math. Dept. & Nat'l Inst. Aviation Research, Wichita KA, April 1998
Arizona State University, Mechanical Engr Dept., Tempe AZ, March, 1992
Washington State University, Mechanical Engr Dept., Pullman WA, February, 1992