

**PRASHANTA DUTTA, Ph.D., FASME**

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**RESEARCH AREAS**

Interface Resolved Numerical Methods for Particle Transport  
Transport Modeling in Micro and Nano-Scales  
Multiscale Modeling of Cancer Microenvironment  
Microfluidic Sensor for Cardiac Disease Detection  
Drug Delivery through Blood-Brain Barrier  
Thermal Analysis of Microscale Liquid Flow  
Lithium-Air and Lithium-Sulfur Batteries for Power Storage

**EDUCATION**

- Ph.D.**      **Texas A&M University, College Station, TX, USA, August 2001**  
*Major:* Mechanical Engineering  
*Dissertation:* Numerical Modeling of Electroosmotically Driven Flows in Complex Micro-Geometries
- M.S.**      **University of South Carolina, Columbia, SC, USA, December 1997**  
*Major:* Mechanical Engineering  
*Masters Thesis:* Innovative Heat Transfer Enhancement with Inclined Solid and Perforated Baffles
- M.S.M.E.**      **Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, January 1996**  
*Major:* Mechanical Engineering,  
*Masters Thesis:* Stability and Stress Analysis of Toroidal Pipe Reducers
- B.S.M.E.**      **Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, October 1993**  
*Major:* Mechanical Engineering,

**APPOINTMENTS**

**Associate Director**, Mechanical and Materials Eng, Washington State Univ    Aug 17 - Date

<b>Deputy Editor</b> , Electrophoresis	Jan 18 -- Date
<b>Chair</b> , Graduate Studies Committee, MME, Washington State University	Aug 17 -- Date
<b>Professor</b> , MME, Washington State University, Pullman, WA 99164	Aug 13 -- Date
<b>Guest Editor</b> , Electrophoresis (Fundamentals of Electrophoresis)	Feb 16-- Date
<b>Associate Editor</b> , ASME J of Fluids Engineering, Washington, DC	Jun 12--Dec 15
<b>AFOSR Summer Faculty Fellow</b> , WP Air Force Research lab, Dayton, OH	Jun 12- Aug 12
<b>Associate Professor</b> , MME, Washington State University, Pullman, WA	Aug 07 -- Aug 13
<b>Visiting Professor</b> , Aerospace Engineering, Konkuk University, Seoul, Korea	Sep 09 -- Aug 10
<b>Consultant</b> , Emerging Technology Dept, MITRE, Washington, DC	Apr 09 -- Dec 10
<b>Consultant</b> , Spectral Energies, Dayton, OH	May 12 - May 13
<b>Assistant Professor</b> , MME, Washington State University, Pullman, WA	Aug.01- Aug 07
<b>Graduate Assistant</b> , ME, Texas A&M University, College Station, TX	Jan 98-Jul 01
<b>AGTSR Summer Intern</b> , Westinghouse Electric Corporation, Orlando, FL	Jun 97-Aug 97
<b>Research Assistant</b> , ME, University of South Carolina, Columbia, SC 29208	Aug.'96-Dec.'97
<b>Lecturer</b> , Mechanical Engineering, BUET, Dhaka 1000, Bangladesh	Mar.' 94-Jul.'96

## **AFFILIATIONS**

### **Member (Past and Present):**

- American Society of Mechanical Engineers (ASME)
- American Association for the Advancement of Science (AAAS)
- American Society of Thermal and Fluids Engineers (ASTFE)
- American Society for Engineering Education (ASEE)
- American Physical Society (APS)
- American Chemical Society (ACS)
- U.S. Association for Computational Mechanics (USACM)
- International Association for Computational Mechanics (IACM)
- Tau Beta Pi

## **HONORS AND AWARDS**

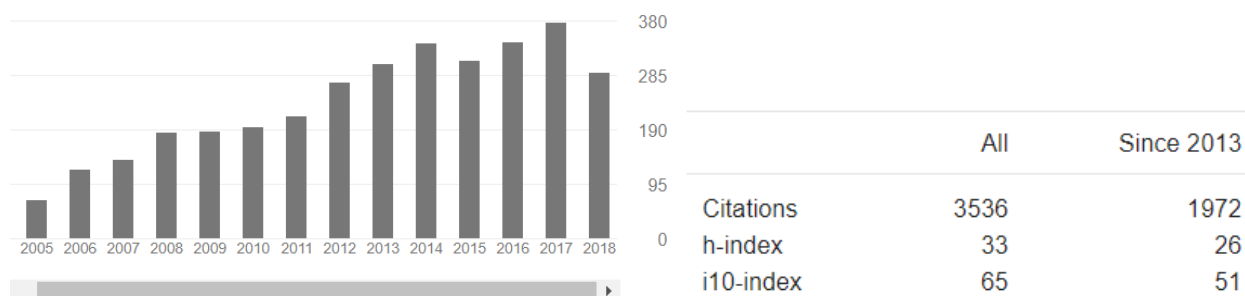
- 2016 J William Fulbright Scholar Award

- 2015 GPSA Excellence Award for Academic Advising
- 2014 ASME Heat Transfer Division Recognition
- Fellow, American Society of Mechanical Engineers (ASME) 2013
- 2012 Air Force Office of Scientific Research (AFOSR) Summer Faculty Fellowship
- Hot Article Award, 2011, Lab on a Chip, Royal Society of Chemistry, England
- 2010 Taiwan National Science Council Fellowship
- 2009 ASME IMECE Best Paper Award
- 2009 Konkuk University Brain Pool Fellow
- NSF Fellowship for 2007 Nanomechanics and Nanomaterials Workshop
- Hot Article Award, 2006, Lab on a Chip, Royal Society of Chemistry, England
- Outstanding Teaching Faculty Member in Mechanical Engineering, 2004
- Young Investigator (Fellowship) Award of US Computational Mechanics, 2003
- One of the best WTC projects selected for the State Legislative Hearing, 2003
- Tau Beta Phi, 2000
- Advanced Gas Turbine System Research (AGTSR) Summer Fellow, 1997

#### **DEVELOPMENT OF RESEARCH FACILITIES**

- Deformation of Flexible Particles in Flow and Electric Field
- Development of Electrochemical Models for Lithium-Air and Lithium-Ion Batteries
- Modeling and Simulation of Dielectrophoresis for Cell Manipulation
- Design and Optimization of Active Micropumps using Transporter Proteins
- Design and Fabrication of Liquid Phase Ion Mobility Spectrometer
- Development of Nonlinear Transport Model for Isoelectric Focusing
- Development of Nonlinear Transport Model for Isotachophoresis
- Integrated Micro-fluidic Devices for Bio-separation and Pre-concentration
- Development of Electrochemical Model for Laminar Flow Fuel Cell
- Unsteady Flow Measurement in Micro and Nano-fluidic Devices
- Thermal Transport Characteristics in Microfluidic Devices
- Heat Transfer Analysis in Radio Frequency and Microwave Heating

#### **CITATIONS**



Source: Scholar.google.com

## **PUBLICATIONS**

### **Journal Articles (Since 1997)**

1. Khan, A.I., Lu, Q., Du, D., Lin, Y., and Dutta, P., 2018, "Quantification of Kinetic Rate Constants for Transcytosis of Polymeric Nanoparticle through Blood-Brain Barrier" *Biochimica et Biophysica Acta (BBA)- General Subjects*, Vol. 1862(12), 2779--2787.
2. Darvish, A., Lee, J.S., Saharia, J., Sundaram, R.V.K., Goyal, G., Bandara, N., Ahn, C.W., Kim, J., Dutta, P., Chaiken, I., and Kim, M.J., 2018, "Mechanical Characterization of HIV-1 with a Solid State Nanopore Sensor", in Press *Electrophoresis*.
3. Lu, Q., Cai, X., Zhang, X., Li, S., Song, Y., Du, D., Dutta, P., Lin, Y., 2018, "Synthetic Polymer Nanoparticles Functionalized with Different Ligands for Receptor-mediated Transcytosis across Blood-Brain Barrier" in Press *ACS Applied Bio Materials*.
4. Morshed, A., Dutta, P., Hossan, M.R., and Dillon, R., 2018, "Electrodeformation of Vesicles Suspended in a Liquid Medium" in Press, *Physical review Fluids*.
5. Majee, P.S., Bhattacharyya, S., Dutta, P., 2018, "On Electrophoresis of a pH-regulated Nanogel with Ion Partitioning Effects", in Press *Electrophoresis*.
6. Deng, H., Dutta, P., and Liu, J., 2018, "Stochastic Simulations of Nanoparticle Internalization through Transferrin Receptor Dependent Clathrin-mediated Endocytosis" *Biochimica et Biophysica Acta (BBA)- General Subjects*, Vol. 1862(9), 2104-2111.
7. Hossan, M.R., Dutta, D., Islam, N., and Dutta, P., 2018, "Review: Electric Field Driven Pumping in Microfluidic Device" *Electrophoresis*, Vol. 39(5-6), 702-731.
8. Khan, A.I., Liu, J., and Dutta, P., 2018, "Iron Transport Kinetics through Blood-Brain Endothelial Cells" *Biochimica et Biophysica Acta (BBA)- General Subjects*, Vol. 1862(5), 1168-1179.
9. Morshed, A., Dutta, P., and Dillon, R., 2018, "Mathematical Modeling and Numerical Simulation of the TGFβ/Smad Signaling Pathway in Tumor Microenvironments" *Applied Numerical Mathematics*, Vol. 133, 41-51.

10. Morshed, A. and Dutta, P., 2018, "Mathematical Model for Tissue-Level Hypoxic Response in Microfluidic Environment" *ASME Journal of Biomechanical Engineering*, Vol. 140, 011009.
11. Dutta, P., 2018, "Editorial – Fundamentals of Electrophoresis 2018" *Electrophoresis*, Vol. 39(5-6), 689.
12. Yoo, K., Banerjee, S., Kim, J., and Dutta, P., 2017, "A Review of Lithium-Air Battery Modeling Studies" *Energies*, Vol. 10(11), 1748.
13. Gannarapu, A., Dutta, P., and Gozen B. A., 2017, "Prediction of Steady State Freeze Front Position during 3D Printing of Microstructures" *International Journal of Heat and Mass Transfer*, Vol. 115, 743-753.
14. Song, Y., Du, D., Li, L., Dutta, P., Xu, J. and Lin, Y., 2017 "In Vitro Study of Receptor-mediated Silica Nanoparticles Delivery across Blood-Brain Barrier" *ACS Applied Materials and Interfaces*, Vol. 9(24), 20410-20416.
15. Jewel, Y., Liu, J., and Dutta, P., 2017, "Coarse-grained Simulations of Conformational Changes in Multidrug Efflux Transporter AcrB" *Molecular Biosystems*, Vol. 13(10), 2006-2014.
16. Dutta, P., 2017, "Editorial – Fundamentals of Electrophoresis" *Electrophoresis*, Vol. 38(5), 561-562.
17. Cho, M., Dutta, P. and Shim, J., 2017, "A Non-sampling Mixing Index for Multicomponent Mixtures", *Powder Technology*, Vol. 319, 434-444.
18. Jewel, Y., Dutta, P., and Liu, J., 2017, "Exploration of Conformational Changes in Lactose Permease upon Sugar Binding and Proton Transfer through Coarse-grained Simulations" *Proteins*, Vol. 85, 1856-1865.
19. Morshed, A. and Dutta, P., 2017, "Hypoxic Behavior in Cells under Controlled Microfluidic Environment" *Biochimica et Biophysica Acta (BBA)– General Subjects*, Vol. 1861(4), 759-771.
20. Shim, J., Yoo, K. and Dutta, P., 2017, "Steady-state Protein Focusing in Carrier Ampholyte-based Isoelectric Focusing: Part I–Analytical Solution" *Electrophoresis*, Vol. 38, 659-666.
21. Shim, J., Yoo, K. and Dutta, P., 2017, "Steady-state Protein Focusing in Carrier Ampholyte-based Isoelectric Focusing: Part II–Validation and Case Studies" *Electrophoresis*, Vol. 38, 667-676.
22. Hossan, M.R., Gopmandal, P. P., Dillon, R., and Dutta, P., 2016 "A Comprehensive Numerical Investigation of DC Electrophoretic Particle-Particle Interactions and Assembly" *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, Vol. 506, pp 127-137.

23. Yoo, K., Song, M. K., Cairns, E. J., and Dutta, P., 2016, "Numerical and Experimental Investigation of Performance Characteristics of Lithium/Sulfur Batteries" *Electrochimica Acta*, Vol. 213, pp 174-185.
24. Jewel, Y., Dutta, P., and Liu, J., 2016, "Coarse-grained Simulations of Proton-dependent Conformational Changes in Lactose Permease" *Proteins*, Vol. 84(8), pp 1067-1074.
25. Rezanoor, W. and Dutta, P., 2016, "Combined AC Electroosmosis and Dielectrophoresis for Controlled Rotation of Microparticles" *Biomicrofluidics*, Vol. 10(2), pp 024101.
26. Jewel, Y., Yoo, K., Liu, J. and Dutta, P., 2016, "Self-Assembled Peptides for Coating of Active Sulfur Nanoparticles in Lithium-Sulfur Battery" *Journal of Nanoparticle Research*, Vol. 18:54.
27. Yoo, K., Dive, A., Kazemiabnavi, S., Banerjee, S., and Dutta, P., 2016, "Effects of Operating Temperature on the Electrical performance of a Li-Air Battery Operated with Ionic Liquid Electrolyte" *Electrochimica Acta*, Vol. 194, pp 317-329.
28. Sze, T.J., Liu, J. and Dutta, P., 2015, "Design and Modeling of a Light Powered Biomimicry Micropump" *Journal of Micromechanics and Microengineering*, Vol. 25, pp 065009.
29. Yoo, K., Deshpande, A., Banerjee, S., and Dutta, P., 2015, "Electrochemical Model for Ionic Liquid Electrolytes in Lithium Batteries" *Electrochimica Acta*, Vol. 176, pp 301-310.
30. S. Kazemiabnavi, P. Dutta and S. Banerjee, 2015, "A Density Functional Theory Based Study of the Electron Transfer Reaction at the Cathode-Electrolyte Interface in Lithium-Air Battery", *Phys. Chem. Chem. Phys.*, Vol. 17, pp 11740-11751.
31. Hossan, M.R., Gopmandal, P. P., Dillon, R., and Dutta, P., 2015, "Bipolar Janus Particle Assembly in Microdevice" *Electrophoresis*, Vol. 36(5), pp 722-730.
32. Yoo, K., Shim, J. and Dutta, P., 2014, "Joule Heating Effects in Isoelectric Focusing" *Biomicrofluidics* Vol. 8(6), pp 064125.
33. Kazemiabnavi, S., Dutta, P., Banerjee, S., 2014, "Density Functional Theory Based Study of the Electron Transfer Reaction at the Lithium Metal Anode in Lithium-Air Battery with Ionic Liquid Electrolytes" *Journal of Physical Chemistry C*, Vol. 118(47), pp 27183-27192.
34. Yoo, K., Shim, J., Lin, J., and Dutta, P., 2014, "Mathematical and Numerical Model to Study Two Dimensional Free Flow Isoelectric Focusing" *Biomicrofluidics*, Vol. 8(3), pp 034111.
35. Yoo, K., Banerjee, S., and Dutta, P., 2014, "Modeling of Volume Change Phenomena in a Li-Air Battery" *Journal of Power Sources*, Vol. 258, pp 340-350.
36. Jubery, T.Z., Srivastava, S.K., and Dutta, P., 2014, "Dielectrophoretic Separation of bioparticles in Microdevices: A Review" *Electrophoresis*, Vol. 35, pp 691-713.

37. Sze, T.J., Liu, J. and Dutta, P., 2014, "Numerical Modeling of Flow through Phloem Considering Active Loading" *ASME Journal of Fluids Engineering*, Vol. 136, pp 021206.
38. Yoo, K., Shim, J., Liu, J. and Dutta, P., 2014, "Efficient Algorithm for Simulation of Isoelectric Focusing" *Electrophoresis*, Vol. 35, pp 638-645.
39. Hossan, M.R., Dillon, R., and Dutta, P., 2014, "Hybrid Immersed Interface-Immersed Boundary Methods for AC Dielectrophoresis" *Journal of Computational Physics*, Vol. 270, pp 640-659.
40. Sze, T.J., and Dutta, P., and Liu, J., 2014, "Study of Protein Facilitated Water and Nutrient Transport in Plant Phloem" *ASME Journal of Nanotechnology in Engineering and Medicine*, Vol. 4, pp. 031005.
41. Deshpande, A., Kariyawasam, L., Dutta, P., Banerjee, S., 2013, "Enhancement of Lithium Ion Mobility in Ionic Liquid Electrolytes in Presence of Additives" *Journal of Physical Chemistry C*, Vol. 117(48), pp. 25343-25351.
42. Jubery, T.Z. and Dutta, P., 2013, "A Fast Algorithm to Predict Cell Trajectories in Microdevices using Dielectrophoresis" *Journal of Numerical Heat Transfer, Part - A*, Vol. 64, pp. 107-131.
43. Hossan, M.R., Dillon, R., Roy, A. K., and Dutta, P., 2013, "Modeling and Simulation of Dielectrophoretic Particle-Particle Interaction and Assembly" *Journal of Colloids and Interface Sciences*, Vol. 394, pp. 619-629.
44. Sprague, I. B. and Dutta, P., 2013, "Improved Kinetics from Ion Advection through Overlapping Electric Double Layers in Nano-Porous Electrodes," *Electrochimica Acta*, Vol. 91, pp. 20-29.
45. Jubery, T.Z. and Dutta, P., 2013, "A New Design for Efficient Dielectrophoretic Separation of Cells in a Microdevice" *Electrophoresis*, Vol. 34, pp. 643-650.
46. Mani, K.B., Hossan, M.R. and Dutta, P., 2013, "Thermal Analysis of Microwave Assisted Bonding of Poly(methyl methacrylate) Substrates in Microfluidic Devices" *International Journal of Heat and Mass Transfer*, Vol. 58, pp. 229-239.
47. Sprague, I. B. and Dutta, P., 2012, "Performance Improvement of Micro-Fuel Cell by Manipulating the Charged Diffuse layer," *Applied Physics Letters*, Vol. 101, 113903.
48. Shim, J. and Dutta, P., 2012, "Joule Heating Effect in Constant Voltage Mode Isotachophoresis in a Microchannel" *International Journal of Nonlinear Sciences and Numerical Simulation*, Vol. 13(5), pp. 333-344.
49. Sprague, I. B., and Dutta, P., 2012, "Depth Averaged Analytical Solution for a Laminar Flow Fuel Cell with Electric Double Layer Effects," *SIAM Journal on Applied Mathematics*, Vol. 72, pp. 1149-1168.

50. Hossan, M.R. and Dutta, P., 2012, "Effects of Temperature Dependent Properties in Electromagnetic Heating" *International Journal of Heat and Mass Transfer*, Vol. 55, pp. 3412-3422.
51. Jubery, T. Z., Hossan, M.R., Bottenus, D., Ivory, C.F., Dong, W., and Dutta, P., 2012, "A New Fabrication Technique to Form Complex PMMA Microchannel for Bioseparation" *Biomicrofluidics*, Vol. 6, pp. 016503.
52. Jubery, T, Prabhu, A., Kim, M.J., and Dutta, P., 2012, "Modeling and Simulation of Nanoparticle Separation through a Solid State Nanopore," *Electrophoresis*, Vol. 33, pp. 325-333.
53. Jang, W., Shim, J., Lee, D.Y., Dutta, P., and Cho, K.H., 2011 "Rapid Detection of Dysfunctional High-Density Lipoproteins using Isoelectric Focusing Based Microfluidic Device to Diagnose Senescence related Disease," *Electrophoresis*, Vol. 32, pp. 3415-3423.
54. Bottenus, D., Hossan, M.R., Ouyang, Y., Dong, W., Dutta, P., and Ivory, C.F., 2011, "Preconcentration and Detection of the Phosphorylated forms of Cardiac Troponin I in a Cascade Microchip by Cationic isotachopheresis" *Lab on a Chip*, Vol. 11, 3793-3801.
55. Qiao, Y., Tang, H., Munske, G. R., Dutta, P., Ivory, C.F., and Dong, W., 2011, "Enhanced Fluorescence Anisotropy Assay for Human Cardiac Troponin I and T Detection," *Journal of Fluorescence*, Vol. 21(6), pp. 2101-2110.
56. Sprague, I. B., and Dutta, P., 2011, "Role of Diffuse layer in Acidic and Alkaline Fuel Cells," *Electrochimica Acta*, Vol. 56, pp 4518-4525.
57. Bottenus, D., Jubery, T.Z., Dong, W., Ouyang, Y., Dutta, P., and Ivory, C.F., 2011, "10,000-Fold Concentration Increase of the Biomarker Cardiac Troponin I in a Reducing Union Microfluidic Chip using Cationic Isotachopheresis," *Lab on a Chip*, Vol. 11, pp 890-898.
58. Shim, J, Cho, M., Dutta, P., 2011, "A Method to Determine Quasi Steady State in Constant Voltage Mode Isotachopheresis" *Electrophoresis*, Vol. 32, pp 988-995.
59. Sprague, I. B., and Dutta, P., 2011, "Modeling of Diffuse Charge Effects in a Microfluidic Based Laminar Flow Fuel Cell," *Numerical Heat Transfer: Part A*, Vol. 59, pp 1-27.
60. Bottenus, D., Jubery, T.Z., Dutta, P., and Ivory, C.F., 2011, "10,000 Fold Concentration Increase in Proteins in a Cascade Microchip using Anionic ITP by a 3D Numerical Simulation with Experimental results," *Electrophoresis*, Vol. 32, pp 550-562.
61. Sprague, I., Byun, D., and Dutta, P., 2010, "Effects of Reactant Crossover and Electrode Dimensions on the Performance of a Microfluidic Based Laminar Flow Fuel Cell," *Electrochimica Acta*, Vol. 55(28), pp 8579-8589.



62. Hossan, M.R., Byun, D., and Dutta, P., 2010, "Analysis of Microwave Heating for Cylindrical Shaped Objects," *International Journal of Heat and Mass Transfer*, Vol. 53(23-24), pp 5129-5138.
63. Prabhu, A. S., Jubery, T. Z, Freedman, K, Mulero, R., Dutta, P., Kim, M., 2010, "Chemically Modified Solid State Nanopores for High Throughput Nanoparticle Separation" *Journal of Physics- Condensed Matter*, Vol. 22(45), 454107.
64. Byun, D., Nguyen, V.D., Dutta, P., and, Park, H.C., 2010, "A Hybrid Inkjet Printer utilizing Electrohydrodynamic Jetting and Piezoelectric Actuation" *Japanese Journal of Applied Physics*, Vol. 49, 060217.
65. Sprague, I., Dutta, P., and Ha, S., 2010, "Flow Rate Effect on Methanol Electro-oxidation in a Microfluidic Laminar Flow System," *Journal of New Materials for Electrochemical Systems*, Vol. 13(4), 305-313.
66. Yudistira, H.T., Nguyen, V.D., Dutta, P., and Byun, D., 2010, "Flight Behavior of Charged Droplets in Electrohydrodynamic Inkjet Printing" *Applied Physics Letters*, Vol. 96, 023503.
67. Schwarzkopf, J., Penoncello, S.G., and Dutta, P., 2009, "Enhanced Boiling Heat Transfer in Mesochannels" *International Journal of Heat and Mass Transfer*, Vol. 52, pp. 5802-5813.
68. Schwarzkopf, J., Crowe, C.T., and Dutta, P., 2009, "Application of Volume Averaged K- $\epsilon$  Model to Particle Laden Turbulent Channel Flow" *Journal of Fluids Engineering*, Vol.131, pp. 101301.
69. Schwarzkopf, J., Crowe, C.T., and Dutta, P., 2009, "Direct Numerical Simulation of Stationary Particles in Homogeneous Turbulent Decay: Application of the K- $\epsilon$  Model" *International Journal of Multiphase Flow*, Vol. 35, pp. 411-416.
70. Chein, R., and Dutta, P., 2009, "Effect of Charged Membrane on the Particle Motion through a Nanopore," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, Vol. 341, pp 1-12.
71. Shim, J., Dutta, P., and Ivory, C. F., 2009, "Parallel Implementation of Finite Volume Schemes for Isoelectric Focusing," *Journal of Mechanical Science and Technology*, Vol. 23(12), pp. 3169-3178.
72. Shim, J., Dutta, P., and Ivory, C. F., 2009, "Dispersion of Protein Bands in a Horse Shoe Microchannel during Isoelectric Focusing," *Electrophoresis*, Vol. 30, pp 723-731.
73. Sprague, I., Dutta, P., and Ha, S., 2009, "Characterization of a Membraneless Direct-Methanol Micro Fuel Cell," *Proc. IMechE, Part A: J. Power and Energy*, Vol. 223 (7), pp. 799-808.

74. Schwarzkopf, J., Crowe, C. T., and Dutta, P., 2009, "A Turbulence Dissipation Model for Particle Laden Flow" *AIChE Journal*, Vol. 55(6), pp 1416-1425.
75. Schwarzkopf, J., Crowe, C. T., and Dutta, P., Li, B.Q., 2009, "Atomized Non-equilibrium Two-phase Flow in Mesochannels: Momentum Analysis," *International Journal of Heat and Fluid Flow*, Vol. 30, pp. 99-107.
76. Dutta, P. and Morse, J.S. 2008, "A Review of Recent Patents in Nanofluidics," *Recent Patents on Nanotechnology*, Vol. 2(3), pp 150-159.
77. Shim, J., Dutta, P., and Ivory, C. F., 2008, "A pK Determination Method for Proteins from Titration Curves Using Principal Component Analysis," *AIChE Journal*, Vol. 54(9), pp. 2238-2249.
78. Shim, J., Dutta, P., and Ivory, C. F., 2008, "Effects of Ampholyte Concentration on Protein Behavior in on-chip Isoelectric Focusing," *Electrophoresis*, Vol. 29(5), pp 1026-1035.
79. Shim, J., Dutta, P., and Ivory, C. F., 2008, "Effects of Ampholyte Dissociation Constants on Protein Separation in on-Chip Isoelectric Focusing," *Journal of Nanoscience and Nanotechnology*, Vol. 8, pp 3719-3728.
80. Wang, Y., Zhe, J., Chung, B., and Dutta, P., 2008, A Rapid Magnetic Particle Driven Micromixer," *Microfluidics and Nanofluidics*, Vol. 4(5), pp. 375-389.
81. Shim, J., Dutta, P., and Ivory, C. F., 2007, "Finite Volume Methods for Isotachophoretic Separation in Microchannels," *Numerical Heat Transfer, Part A: Applications*, Vol. 52(5), pp 441-461.
82. Horiuchi, K., Dutta, P., Ivory, C. F., 2007 "Electroosmosis with Step Changes in Zeta Potential in Microchannels," *AIChE Journal*, Vol. 53(10), pp 2521-2533.
83. Cui, H., Dutta, P., and Ivory, C. F., 2007, "Automated Electric Valve for Electrokinetic Separation in a Networked Microfluidic Chip," *Analytical Chemistry*, Vol. 79(4), pp. 1456-1465.
84. Zhe, J., Jagtiani, A., Dutta, P., Hu, J., and Carletta, J., 2007, "A Micromachined High Throughput Coulter Counter for Bioparticle Detection and Counting," *Journal of Micromechanics and Microengineering*, Vol. 17, pp. 304-313.
85. Shim, J., Dutta, P., and Ivory, C. F., 2007, "Modeling and Simulation of Isoelectric Focusing (IEF) in Two-Dimensional (2-D) Microgeometries," *Electrophoresis*, Vol. 28, pp. 572-586.
86. Horiuchi, K. Dutta, P., and Richards, C. D., 2007, "Experiment and Simulation of Mixed Flows in a Trapezoidal Microchannel," *Microfluidics and Nanofluidics*, Vol.3, pp. 347-358.

87. Cui, H., Dutta, P., and Ivory, C. F., 2007 "Isotachophoresis of Proteins in a Networked Microfluidic Chip: Experiment and 2-D Simulation," *Electrophoresis*, Vol. 28, pp. 1138-1145.
88. Wang, Y., Zhe, J., Dutta, P., and Chung, B., 2007, "A Microfluidic Mixer Utilizing Electrokinetic Relay Switching and Asymmetric Flow Geometries," *ASME Journal of Fluids Engineering*, Vol. 129, pp. 395-403.
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91. Dutta, P., Horiuchi, K., and Yin, H. M. 2006, "Thermal Characteristics of Mixed Electroosmotic and Pressure Driven Microflows," *Computers and Mathematics with Applications*, Vol. 52(5), pp. 651-670.
92. Horiuchi, K. and Dutta, P., 2006, "Electrokinetic Flow Control in Microfluidic Chips using a Field-Effect Transistor," *Lab On a Chip*, Vol. 6, pp. 714-723.
93. Salgado, J. D., Horiuchi, K. and Dutta, P., 2006, "A Conductivity Based Interface Tracking Method for Microfluidic Applications," *Journal of Micromechanics and Microengineering*, Vol. 16, pp. 920-928.
94. Horiuchi, K., Dutta, P., and Hossain, A., 2006, "Joule Heating Effects in Mixed Electroosmotic and Pressure Driven Microflows under Constant Wall Heat Flux," *Journal of Engineering Mathematics*, Vol. 54, pp. 159-180.
95. Cui, H., Horiuchi, K., Dutta, P., and Ivory, C. F., 2005 "Multistage Isoelectric Focusing in a Polymeric Microfluidic Chip," *Analytical Chemistry*, Vol. 77, pp. 7878-7886.
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98. Hossain, A., Alam, M., Yonge, D. R., and Dutta, P., 2005, "Efficiency and Flow Regime of a Highway Stormwater Detention Pond in Washington, USA," *Water, Air, and Soil Pollution*, Vol. 164, pp. 79-89.

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2. Hossan, M., Dutta, P., Dillon, R., and Gopmandal, P. P. "Dielectrophoretic Interactions and Chaining of Ellipsoidal particles in a Microchannel," 2016 ASME International Mechanical Engineering Congress and Exposition, Phoenix, Arizona, November 12-18, 2016.
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### **Other Publications**

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#### **PRESENTATION AT NATIONAL AND INTERNATIONAL CONFERENCE**

1. Jewel, Y., Dutta, P. and Liu, J. "Coarse-grained Simulations of Substrate Export through Multidrug Efflux Transporter AcrB" 70<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.
2. Dutta, P., Morshed, A. and Hossan, M. "Study of Dynamic Membrane Behavior in Applied DC Electric Field" 70<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.
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41. Sprague, I.B. and Dutta, P., "Diffuse effects in Microfluidic Fuel Cell," ASME International Mechanical Engineering Congress and Exposition (IMECE), Vancouver, British Columbia, Canada, November 12-18, 2010.
42. Jubery, Z.N., Dutta, P., Prabhu, A, Kim, M, "Modeling and Simulation of Translocation Phenomena in a Solid State Nanopore for nanoparticle Separation, ASME International Mechanical Engineering Congress and Exposition (IMECE), Vancouver, British Columbia, Canada, November 12-18, 2010.
43. Shim, J, Dutta, P., and Ivory, C.F., "Modeling and Simulation of pH Dependent Isotachopheresis in 2D Microchips," ASME International Mechanical Engineering Congress and Exposition (IMECE), Lake Buena Vista, FL, November 13-19, 2009.
44. Prabhu, A, Mulero, R., Kim, M.J., Jubery, Z.N., and Dutta, P., "High Throughput Nanofluidic Architectures for Nanoparticle Separation," ASME International Mechanical Engineering Congress and Exposition (IMECE), Lake Buena Vista, FL, November 13-19, 2009.
45. Jubery, Z.N., Dutta, P., Bottenus, D., and Ivory, C.F., "Preconcentration of Cardiac Proteins in a Microfluidic Device," ASME International Mechanical Engineering Congress and Exposition (IMECE), Lake Buena Vista, FL, November 13-19, 2009.
46. Schwarzkopf, J, Crowe, C.T., and Dutta, P., "A k-epsilon model for Particle Laden Turbulent Flow," ASME Fluids Engineering Division Summer Meeting, Vail, Co, August 2- 6, 2009.
47. Crowe, C.T., Schwarzkopf, J.D., and Dutta, P., "Turbulence Dissipation Equation for Particle Laden Flow," 61st Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Antonio, TX, Nov. 23-25, 2008.
48. Dutta, P. Shim, J., and Ivory, C.F., "Band Dispersion during Isoelectric Focusing in a Microchip," 61st Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Antonio, TX, Nov. 23-25, 2008.
49. Schwarzkopf, J.D., Crowe, C.T., Riley, J., and Dutta, P., "The Effect of Particles on the Dissipation of Dissipation Coefficient in the k-epsilon Model," 61st Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Antonio, TX, Nov. 23-25, 2008.
50. Schwarzkopf, J, Crowe, C.T., and Dutta, P., "A Turbulence Dissipation Model for Multiphase Flows," ASME International Mechanical Engineering Congress and Exposition (IMECE), Boston, MA, October 31-November 6, 2008.
51. Shim, J, Dutta, P., and Ivory, C.F., "Isoelectric Focusing of Proteins in a Horseshoe Microchannel," ASME International Mechanical Engineering Congress and Exposition (IMECE), Boston, MA, October 31-November 6, 2008.

52. Sprague, I and Dutta, P., "Design, Fabrication and Characterization of a Membraneless Micro Fuel Cell," ASME International Mechanical Engineering Congress and Exposition (IMECE), Boston, MA, October 31-November 6, 2008.
53. Cui, H, Dutta, P., and Ivory, C.F., "An Automated Non-mechanical Valve for Dispersion Control in On-chip Electrophoresis," ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA, November 11-15, 2007.
54. Wang, Y, Zhe, J, Chung, B. T.F., and Dutta, P., "Numerical Analysis of Rapid Micromixers Utilizing Magnetic Particles," ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA, November 11-15, 2007.
55. Schwarzkopf, J, Crowe, C.T., and Dutta, P., "Modeling of Multiphase Flow Boiling in Meso and Microchannel," 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA, November 11-15, 2007.
56. Shim, J., Dutta, P., and Ivory, C.F., "Modeling and Simulation of Isotachophoresis for Chemical Separation of Charged Species," ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA, November 11-15, 2007.
57. Sprague, I., Dutta, P., and Ha, S., "Performance Characteristics of a Laminar Flow Micro Fuel Cell," 2007 AIChE Annual Meeting, Salt Lake City, UT, November 4-9, 2007.
58. Cui, H., Jubery, T. Z., Dutta, P., and Ivory, C.F., "Protein Separation by Isoelectric Focusing Coupled with Isotachophoresis in a Microfluidic Device," AIChE Annual Meeting, Salt Lake City, UT, November 4-9, 2007.
59. Shim, J., Dutta, P., and Ivory, C.F., "Modeling and Simulation of Isoelectric Focusing in Contraction-Expansion Microchannels," AIChE Annual Meeting, Salt Lake City, UT, November 4-9, 2007.
60. Cui, H, Huang, Z, Dutta, P., and Ivory, C.F., "A Self-Contained Solid-State Micro-Valve for Electrokinetic Separations in a Networked Microfluidic Chip," Annual Meeting of the American Electrophoreses Society, San Francisco, CA, November 12-17, 2006.
61. Cui, H, Dutta, P., and Ivory, C.F., "Two Dimensional Simulation of Nonlinear Electrophoresis of Proteins and Experimental Demonstration in a Microfluidic Chip," Annual Meeting of the American Electrophoreses Society, San Francisco, CA, November 12-17, 2006.
62. Dutta, P. and Horiuchi, K., "Local Flow Control using Field Effect Transistors," ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10, 2006.
63. Dutta, P. and Salgado, J.D., "A Conductivity Based Microfluidic Flow Sensor," ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10, 2006.



64. Jagtiani, A., Zhe, J., Dutta, P., Hu, J., and Carletta, J., "A Microfluidic Based High Throughput Resistive Pulse Sensor," ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10, 2006.
65. Dutta, P., Shim, J., and Ivory, C.F., "Modeling and Simulation of Isoelectric Focusing in Two-Dimensional Microgeometries," 7<sup>th</sup> World Congress on Computational Mechanics, Los Angeles, CA, July 16-22, 2006.
66. Dutta, P., Horiuchi, K., Cui, H., and Ivory, C.F., "Multistage Isoelectric Focusing: A Novel On-chip Bioseparation Technique," ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11, 2005.
67. Horiuchi, K. and Dutta, P., "Heat Transfer Characteristics of Mixed Electroosmotic and Pressure Driven Flows Under Constant Heat Flux," ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11, 2005.
68. Wang, Y., Zhe, J., Dutta, P., and Cheng, G.C., "A Hybrid Rapid Microfluidic Mixer Utilizing Electrokinetic Relay and Asymmetric Flow Geometries for Lab-on-a-Chip Applications," ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11, 2005.
69. Horiuchi, K. and Dutta, P., "Thermal Analysis of Electrokinetic Flows in Planar Microchannel," JSME Mechanical Engineering Congress (MECJ-05), Chohu city, Tokyo, Japan, September 19-22, 2005.
70. Dutta, P., Horiuchi, K., Cui, H., and Ivory, C. F., "On-chip Isoelectric Focusing with Staging," 3<sup>rd</sup> Gordon Conference on Physics and Chemistry of Microfluidics, Oxford University, Oxford, UK, August 21-26, 2005.
71. Horiuchi, K. and Dutta, P. 2005, "Flow Diagnosis in a Trapezoidal Microchannel," *JSME conference on Fluid Mechanics*, paper# AM05-07-002.
72. Cui, H., Horiuchi, K., Dutta, P., Ivory, C. F., "Multistage Isoelectric Focusing in a Networked PDMS chip," 28th International Symposium on Capillary Chromatography and Electrophoresis- Las Vegas, NV May 22-25, 2005.
73. Cui, H., Ivory, C.F., Horiuchi, K., and Dutta, P., "Multistage Isoelectric Focusing in a Polymeric Micro-fluidic Chip," 229th American Chemical Society National Meeting, San Diego, CA, March 13-17, 2005.
74. Horiuchi, K., Cui, H., Dutta, P., and Ivory, C.F., "Electrofocusing in Microfluidic Chips for Separation of Proteins," 57th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, WA, Nov. 21-23, 2004.

75. Horiuchi, K., Dutta, P., Cui, H., and Ivory, C.F., "Band Deformation at a T-Junction While Electrofocusing in a Dog-Leg Microchannel," 2004 *International Mechanical Engineering Congress and Exposition (IMECE)*, Anaheim, CA, Nov. 13-19, 2004.
76. Cheng, J.C. and Dutta, P., 2004, "Microfabrication of a Hybrid Nanofluidic Channel," Micro Nano Breakthrough Conference, Portland, OR, July 28-29, 2004.
77. Salgado, J.D., Horiuchi, K., and Dutta, P., "Development of a Microfluidic Flow Sensor in Polymeric Microchip," ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15, 2004.
78. Horiuchi, K. and Dutta, P., "Thermal Analysis of Mixed Electroosmotic and Pressure Driven Flows in Two Dimensional Straight Microchannels," ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15, 2004.
79. Cui, H., Ivory, C.F., Horiuchi, K., and Dutta, P., "Isoelectric Focusing in a Polymeric Microfluidic Chip," 227th American Chemical Society National Meeting, Anaheim, CA, March 28-April 1, 2004.
80. Horiuchi, K., Dutta, P., Huanchun, C., and Ivory, C.F., "High Resolution Separation of Proteins in Polymeric Micro-fluidic Chip," International Mechanical Engineering Congress and Exposition (IMECE), Washington, DC, Nov. 15-21, 2003.
81. Horiuchi, K. and Dutta, P., "Heat Transfer Characteristics of Steady Electroosmotic Flows in Two Dimensional Straight Microchannels," 2003 ASME Summer Heat Transfer Conference, Las Vegas, NV, July 20-23, 2003.
82. Salgado, D. J., Horiuchi, K., and Dutta, P., "Flow Measurements in Microfluidic Channels," 2003, ASME Region VIII GSTC, Portland, OR, April 4-6, 2003.
83. Dutta, P., Kim, M.J., Kihm, K.D., and Beskok, A., "Electroosmotic Flow in a Grooved Micro-Channel Configuration: A Comparative Study of Micro-PIV Measurements and Numerical Simulations," 2001 International Mechanical Engineering Congress and Exposition (IMECE), New York, NY, Nov. 11-16, 2001.
84. Dutta, P. and Beskok, A., 2001, "Analysis of Time Periodic Electroosmotic Flows," 2001 International Mechanical Engineering Congress and Exposition (IMECE), New York, NY, Nov. 11-16.
85. Dutta, P. and Beskok, A., 2001, "Electrokinetic Effects in Microscale Liquid Flows," TexMEMS III, University of Texas, Dallas, Texas.
86. Dutta, P. and Beskok, A., "Electroosmotic Flow Control in Complex Micro Geometries," 2000 International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, Nov. 5-12, 2000.

87. Dutta, P. and Beskok, A., "Electroosmotically Driven Liquid Flows in Complex Micro Geometries," International Conference on Integrated Nano/Microtechnology for Space Applications (NanoSpace 2000), NASA Johnson Space Center, Houston, TX, Jan. 23-28, 2000.
88. Dutta, P., 2000, "Electrokinetic Effects in Micro-Scale Transport," Mechanical Engineering Graduate Student Organization (MEGSO) Seminar, College Station, TX.
89. Beskok, A. and Dutta, P., 2000, "Electroosmotic Flow Control in Complex Micro Geometries," TexMEMS II, Southern Methodist University, Dallas, Texas.
90. Dutta, P. and Beskok, A., "Numerical Simulation of Electroosmotically Driven Liquid Flows," 52nd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, New Orleans, LA, Nov. 21-23, 1999.
91. Dutta, P., Warburton, T. C., and Beskok, A., 1999, "Numerical Modeling of Electroosmotically Driven Micro Flows," 1999 International Mechanical Engineering Congress and Exposition (IMECE), Nashville, TN, Nov. 16-21.
92. Beskok, A. and Dutta, P., "Research at Texas A&M Micro-Fluidics Lab," TexMEMS I, Texas A&M University, College Station, Texas, August 23, 1999.
93. Dutta, P., Dutta, S., and Khan, J.A., "Internal Cooling Heat Transfer Enhancement by using Periodic Baffles in the Flow Path," International Gas Turbine Institute Congress and Exposition, Stockholm, Sweden, June 2-4, 1998.
94. Dutta, S., Dutta, P., Jones, R.E., and Khan, J.A., "Experimental Study of Heat Transfer Coefficient Enhancement with Solid and Perforated Baffles," International Mechanical Engineering Congress and Exposition (IMECE), Dallas, TX, Nov. 16-21, 1997.
95. Dutta, P., 1997, "Challenges in Gas Turbine Blade Cooling at very High Temperature," Mechanical Engineering Graduate Student Seminar, Columbia, SC.
96. Dutta, P., 1997, "Design of Effective Cooling Circuit for Advanced Turbine System (ATS) Vane," AGTSR Annual Report, Orlando, FL.

### **Invited Talks (Except Job Interviews)**

- 1) "Microscale Bioseparation – Modeling and Experiments" Institute for Infectious Diseases, University of Bern, Switzerland, July 11, 2017.
- 2) "Steady State Solution of Isoelectric Focusing for Protein Separation" Kohlrausch Seminar, Prague, Czech Republic, June 17, 2017.
- 3) "Controlled Rotation of Microparticles in Electric Field" Physics Department, University of Gottingen, Germany, May 31, 2017.

- 4) "Electric Field Driven Particle Manipulation in Microdevice" Nano Micro Fluidics Research Group, Technical University of Darmstadt, Darmstadt, Germany, May 3, 2017.
- 5) "Studying Hypoxia in a Microfluidic Environment" MathBio Seminar Series, Washington State University, Pullman, WA, March 21, 2017.
- 6) "Microfluidic Driven Particle Rotation" Mechanical Engineering Department, Southern Methodist University, Dallas, TX, February 22, 2017.
- 7) "Modeling and Simulation of Hypoxia in a Microfluidic Cell Culture Environment", Mathematics Colloquium, University of Idaho, Moscow, ID, Jan 26, 2017.
- 8) "Electric Field Driven Particle Rotation," 23rd International Symposium on Electro- and Liquid-Phase Separation Techniques, Minneapolis, MN, Sept 18-21, 2016.
- 9) "Electric Field Driven Particle Manipulation" September 9, 2016, Lehigh University, Bethlehem, PA.
- 10) "Bioseparation in Microfluidic Devices: Experiments and Simulation" March 17, 2016, Tsinghua University, Beijing China.
- 11) "Electric Field Driven Particle Manipulation" March 16, 2016, Minzu University, Beijing, China.
- 12) "Modeling and Simulation of Cancer Microenvironments" March 15, 2016, Minzu University, Beijing, China.
- 13) "Separation and Concentration of protein in Microfluidic Device" March 14, 2016, Minzu University, Beijing, China.
- 14) "Biofluidic Chip Design for Free Flow Isoelectric Focusing" March 14, 2016, Minzu University, Beijing, China.
- 15) "Electrorotation of Microparticles in Nonaqueous Media" 2015 ASME International Mechanical Engineering Congress and Exposition, Houston, Texas, November 13-19, 2015.
- 16) "Interface Resolved Numerical Method to Study Electrokinetic Particle Assembly in Microdevice", SIAM Conference on Computational Science and Engineering, Salt Lake City, UT, March 17, 2015.
- 17) "Dielectrophoretic Self Assembly of Cells in Microdevices" Pittcon 2015, New Orleans, LA, March 12, 2015.
- 18) "Bioseparation in Microfluidic Devices" School of Mechanical Engineering, Pusan National University, Busan, South Korea, February 13, 2015

- 19) “Dielectrophoretic Assembly of Microparticles” School of Mechanical Engineering, Yeungnam University, Gyeongsangbuk, South Korea, February 12, 2015
- 20) “Electric Field Driven Separation in Microdevices” Department of Bioscience, Yeungnam University, Gyeongsangbuk, South Korea, February 11, 2015
- 21) “Microfluidic Biosensor”, 2014 NSF-REU Site Program Seminar, Washington State University, Pullman, WA 99164, July 8, 2014.
- 22) “Modeling of Tumor Microenvironment for Breast Cancer”, Summer workshop on Dynamics of Dispersed System, Ufa, Russia, June 27, 2014
- 23) “Janus Particle Dynamics”, Summer workshop on Dynamics of Dispersed System, Ufa, Russia, June 26, 2014
- 24) “Numerical Methods for Dielectrophoretic Particle Manipulation in Microdevices”, Summer workshop on Dynamics of Dispersed System, Ufa, Russia, June 24, 2014
- 25) “Numerical Methods for Dielectrophoretic Separation”, Summer workshop on Dynamics of Dispersed System, Ufa, Russia, June 24, 2014
- 26) “A Review of Dielectrophoresis and Electrophoresis for Separation of Bioparticles”, Summer workshop on Dynamics of Dispersed System, Ufa, Russia, June 23, 2014
- 27) “Interface Resolved Techniques for Electric Field Driven Particle Laden Flow,” PNNL Math Center of the Collaboratory on Mathematics for Mesoscopic Modeling of Materials (CM4), Richland, WA, May 8, 2014
- 28) “Modeling and Simulation of Particle Chaining using DC Dielectrophoresis” 19<sup>th</sup> International Symposium on Electro and Liquid Phase Separation techniques, October 2, 2012.
- 29) “Particle Manipulation and Separation in Microfluidic Devices using Dielectrophoresis” Mechanical and Materials Engineering, Washington State University, Pullman, WA, October 11, 2012.
- 30) “Dynamically Reconfigurable Microfluidic Antenna” Nanoelectronics Group, Materials and Manufacturing Directorate, Wright Patterson Air Force Base, Ohio, August 8, 2012.
- 31) “Electrokinetic Phenomena and Its Potential Applications in Reconfigurable Antennas” Metamaterials Group, Materials and Manufacturing Directorate, Wright Patterson Air Force Base, Ohio, July 11, 2012.
- 32) “Detection and Manipulation of Biomolecules in Lab-on-a-chip Devices” 2012 OSA Optics and Photonics Congress, San Diego, California, January 30, 2012

- 33) "Microfluidic Based Sensing and Manipulation" International Conference on Mechanical Engineering and Renewable Energy, Chittagong University of Engineering and Technology, Chittagong, Bangladesh, December 24, 2011.
- 34) "Microfluidic Based Laminar Flow Fuel Cell for Portable Power" International Conference on Mechanical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, December 16, 2011.
- 35) "Microfluidics Based Biosensing" Laser Diagnostics Group, Propulsion Directorate, Wright Patterson Air Force Base, Ohio, October 7, 2011.
- 36) "Microfluidics: A New Frontier for Chemical and Biological Research" University of Idaho, Moscow, ID, May 26, 2011.
- 37) "Elastic Matching Method for Determination of Quasi Steady State in pH Dependent ITP," 17<sup>th</sup> International Symposium on Electro- and Liquid-Phase Separation Techniques, Baltimore, Maryland, Sept 1, 2010.
- 38) "Microfluidic Technologies for Point of Care Applications," Mechanical Engineering Department, Seoul National University, Seoul, South Korea, July 15, 2010.
- 39) "Separation, Sensing and Valving in Micro/nanofluidic Devices," Mechanical Engineering Department, Sogang University, Seoul, South Korea, July 9, 2010.
- 40) "Advanced Microfluidic Technologies for Fundamental Research and Industrial Applications," Mechanical Engineering Research Lab, Hitachi Ltd, Hitachinaka, Ibaraki, Japan, June 17, 2010.
- 41) "Electrokinetic Based Sensing and Control in Micro/nanofluidic Devices," Micro/nano/Biofluidics Lab, Mechanical Engineering, Tokyo University, Tokyo, Japan, June 17, 2010.
- 42) "Manipulation of Flow and Species in Micro/nanofluidic Devices," Department of Mechanical Engineering, Pohang University of Science and Technology, Pohang, South Korea, June 4, 2010.
- 43) "Sensing and Valving in Micro/nano Devices," Department of Engineering Sciences, National Cheng Keng University, Tainan, Taiwan, April 29, 2010.
- 44) "Experiment, Modeling and Simulation of Isoelectric Focusing," Department of Mechanical Engineering, National Chung Hsing University, Taichung, Taiwan, April 28, 2010.
- 45) "Electrokinetic Based Microfluidics," Department of Mechanical Engineering, National Taiwan University, Taipei, Taiwan, April 26, 2010.

- 46) "Electrokinetic Based Sensing and Separation in Micro/nanofluidic Devices," The Korean Society of Visualization, Seoul National University of Technology, Seoul, South Korea, April 16, 2010.
- 47) "Electrokinetic Based Micro/nanofluidic Devices," Aerospace Engineering Department, Old Dominion University, Norfolk, Virginia, April 9, 2010.
- 48) "Modeling and Simulation of Isoelectric Focusing," Microbiofluidics Center Seminar Series, Old Dominion University, Norfolk, Virginia, April 8, 2010.
- 49) "Microfluidic System and Its Relevance to Ion Mobility Spectrometry," MITRE Mini Symposium on Ion Mobility Spectrometry, MITRE, Washington, DC, April 6, 2010.
- 50) "Electrokinetic Based Sensing and Separation in Microdevices," School of Mechanical Engineering, Dong-A University, Pusan, South Korea, November 6, 2009.
- 51) "Electrokinetic Based Flow and Sensing in Microdevices," School of Mechanical Engineering, Ulsan University, Ulsan, South Korea, October 8, 2009.
- 52) "Electrokinetic Based Microfluidic," School of Mechanical Engineering, Yeungnam University, Gyeongsan, South Korea, September 1, 2009.
- 53) "Microfluidic Based Sensor for Pathogen Detections," Key Technology Inc, Walla Walla, WA, Nov 12, 2007
- 54) "Microfluidic Flow Control," Hewlett Packard Research and Development, Corvallis, OR, Sept 25, 2007.
- 55) "Microfluidics- Tools for Biotechnology Research," 5<sup>th</sup> Annual Retreat, Center for Integrated Biotechnology, Washington State University, Pullman, WA, Sept 21, 2007
- 56) "Field Effect Flow Control in Complex Microgeometries," 10<sup>th</sup> Annual European Conference on Micro and Nanoscale Technologies for the Biosciences, Montreux, Switzerland, November 14-16, 2006.
- 57) "Electrokinetic Mobilization, Separation and Concentration in Microfluidic Devices," Pacific Northwest National Lab, Richland, WA, June 30, 2005.
- 58) "Microfluidic Technology in Bioanalytical System," Departmental Seminar in Mechanical Engineering, Chittagong University of Engineering and Technology, Chittagong, Bangladesh, January 5, 2005.
- 59) "Microfluidic Technology and MEMS," Departmental Seminar in Mechanical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, December 28, 2004.

- 60) "Transport Phenomena in Micro/nanofluidic Devices," Graduate Seminar in Chemical Engineering, WSU, Pullman, October 25, 2004.
- 61) "Microfluidic Chip for Proteomics," Guest Lecture in Perspectives in Biotechnology, Animal Sciences Department, WSU, Pullman, October 5, 2004.
- 62) "Microfluidic Technology in Bioanalytical Systems," Graduate Seminar in Manufacturing Engineering, WSU, Vancouver, March 1, 2004.
- 63) "Separation, Concentration, and Transportation of Sample in Microfluidic Devices," College of Engineering, Temple University, Philadelphia, PA, November 24, 2003.
- 64) "Development of Electrokinetic Micropump for Insect Traps," Washington Technology Center, Seattle, WA, November 13, 2003.
- 65) "Modeling of Electroosmotic Phenomenon for the Transport in Micro/nanofluidic Devices," Seventh U.S. National Congress on Computational Mechanics, Albuquerque, New Mexico, July 28, 2003
- 66) "Electrokinetic Phenomena in Microfluidic Devices", Chemistry Department, Washington State University, Pullman, WA, September 2002.
- 67) "Modeling and Analysis of Electrokinetic Flow", CFD Research Corporation, Huntsville, Alabama, March 2001.

#### **PROFESSIONAL RESPONSIBILITIES/SERVICES**

- Track Chair, ASME 2016 International Conference on Nanochannels, Microchannels, and Minichannels, Washington DC.
- Reviewer, 2015 ASME International Mechanical Engineering Congress & Exposition, Houston, TX
- Track Chair, 2015 ASME-JSME-KSME Joint Fluids Engineering Conference, Seoul, South Korea
- Reviewer, 2014 International Mechanical Engineering Congress & Exposition, Montreal, Canada
- Member, ASME Honors and Awards Committee, 2014-2017,
- Track Chair, 2014 ASME Fluids Engineering Division Summer Meeting, Chicago, Illinois, USA
- Reviewer, 2013 ASME Micro/Nanoscale Heat and Mass Transfer International Conference
- Reviewer, 2013 International Mechanical Engineering Congress and Exposition
- Associate Editor, ASME Journal of Fluids Engineering, 2012-2015.
- Member, ASME IMECE Micro/Nano Poster Forum Organizing Committee, 2011-2013
- Track Chair, 2013 ASME Fluids Engineering Division Summer Meeting, Reno, Nevada, USA
- Track Chair, 2012 ASME Fluids Engineering Division Summer Meeting, Puerto Rico, USA



- Reviewer, 2012 ASME Micro/Nanoscale Heat and Mass Transfer International Conference
- Judge, 2012 ASME Micro/Nano Poster Forum
- Reviewer, 2012 IMECE, Microfluidics Symposium
- Chair, ASME Micro Nano Fluid Dynamics Technical Committee, 2010-2012
- Session Chair, Micro and Nano System, IMECE 2011
- Reviewer, 2011 IMECE, Microfluidics Symposium
- Member, Nanoengineering Council, American Society of Mechanical Engineers
- Session Organizer, 2012 ASME Micro/nano Scale Heat and Mass Transfer Conference
- Member, Asian Pacific International Symposium on Lab Chip Technical Committee
- Session Chair, Microfluidics, 2010 APS DFD Meeting
- Session Chair, Micro and Nano System, IMECE10
- Reviewer, 2009 IMECE, Microfluidics Symposium
- Co-Chair, ASME Micro Nano Fluid Dynamics Technical Committee, 2008-2010
- Session Chair, 2009 IMECE, Microfluidics Symposium
- Track Co-Organizer, Fluid Mechanics and Heat Transfer Track, 2009 IMECE
- Forum Co-organizer, ASME, Microfluidic Summer Forum, 2009
- Session Chair, 2008 IMECE, Microfluidics Symposium
- Reviewer, 2008 IMECE, ASME, Microfluidic Summer Forum
- Lead Topic Organizer, ASME (IMECE) Microfluidics Symposium, 2008
- Reviewer, 2007 IMECE, Microfluidics Symposium
- Session Chair, Micro and Nano System, Session 11-3-5, IMECE07
- Forum Co-organizer, ASME, Microfluidic Summer Forum, 2008
- Reviewer, 2007 IMECE, Microfluidics Symposium
- Symposium Co-organizer, ASME (IMECE) Microfluidics Symposium, 2007
- Session Chair, Fluid Engineering Division, 9A, IMECE06
- Reviewer, 2006 IMECE, Microfluidics Symposium
- Session Co-Chair, World Congress on Computational Mechanics, 2006
- Session Chair, Fluid Engineering Division, 9A, IMECE05
- Reviewer, 2005 IMECE, Microfluidics Symposium
- Judge, 3<sup>rd</sup> Gordon Conference on Physics and Chemistry of Microfluidics, 2005
- Reviewer, 2005 ASME Summer Heat Transfer Conference
- Reviewer, 2005 ASME Microchannel and Minichannel Conference
- Session Chair, Fluids Engineering Division, FE8B Session, IMECE04
- Reviewer, 2004 IMECE, Microfluidics Symposium
- Reviewer, 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference
- Session Chair, 7<sup>th</sup> US Congress on Computational Mechanics, 2003
- Session Chair, Fluids Engineering Division, IMECE03
- Reviewer, 2003 IMECE, Microfluidics Symposium
- Co-chair, MEMS Poster Session, IMECE02
- ASME Micro-fluidics Technical Committee

## **PAPER REVIEW**

- Analyst
- Analytical Chemistry (8)
- Applied Physics Letter (1)
- Atmospheric Environment (2)
- Biomechanics (4)
- Computer and Mathematics with Application
- Electrophoresis (15)
- Electrochimica Acta (1)
- Electrochemical Society Journal (1)
- Experiments in Fluids (3)
- International Journal of Heat and Fluid Flow (2)
- International Journal of Heat and Mass Transfer (5)
- International Journal of Thermal Sciences (2)
- Journal of Applied Physics
- Journal of Colloids and Interface Science (3)
- Journal of Computational Physics (2)
- Journal of Enhanced Heat Transfer (1)
- Journal of Fluids Engineering (9)
- Journal of Fluid Mechanics (2)
- Journal of Heat Transfer (4)
- Journal of Microelectromechanical Systems (2)
- Journal of Micromechanics and Microengineering (5)
- Physics of Fluids (5)
- Lab on a Chip (4)
- Langmuir (3)
- Metallurgical and Materials Transactions (1)
- Microfluidic and Nanofluidics (8)
- Sensors and Actuators (2)
- Separation Science and Technology (1)

## **PROPOSAL REVIEW**

Reviewed proposals for the following funding agencies

- 1) Technology Foundation STW Research (Netherlands)
- 2) Israel Science Foundation (mail-in review)
- 3) SMART: Science, Mathematics and Research for Transformation (panel)
- 4) US National Defense Science and Engineering (panel)
- 5) US National Science Foundation (Both panel and mail-in review)
- 6) California Energy Commission (mail-in review)
- 7) ACS Petroleum Funds (mail-in review)
- 8) India-Canada Centre for Innovative Multidisciplinary Partnerships to Accelerate

Community Transformation and Sustainability (mail-in review)

**RESEARCH COLLABORATORS**

Dr. Ali Beskok (ME, Southern Methodist University)  
Dr. Soumik Banerjee (MME, WSU)  
Dr. Robert Dillon (Mathematics, WSU)  
Dr. Annie Du (MME, WSU)  
Dr. Su Ha (ChEBE, WSU)  
Dr. Herbert H. Hill (Chemistry, WSU)  
Dr. Keisuke Horiuchi (Hitachi Ltd, Ibaraki, Japan)  
Dr. Cornelius F. Ivory (ChEBE, WSU)  
Dr. MinJun Kim (ME, Southern Methodist University)  
Dr. Lei Li (MME, WSU)  
Dr. Yuehe Lin (MSE, WSU)  
Dr. Jin Liu (ME, WSU)  
Dr. Cecilia D. Richards (MME, WSU)  
Dr. Ajit K Roy (WP Air Force Base, Dayton, OH)  
Dr. Sukesh Roy (WP Air Force Base, Dayton, OH)  
Dr. Jaesool Shim (ME, Yeungnam University)  
Dr. Frentisek Svec (Lawrence Berkeley National Lab, CA)  
Dr. Bernard J Van Wie (ChEBE, WSU)  
Dr. Timothy Warburton (Mathematics, Rice University)  
Dr. Hong Ming Yin (Mathematics, WSU)  
Dr. Jiang Zhe (ME, Univ of Akron, OH)

**COURSE INSTRUCTED**

ME 598: Graduate Seminar (Fall 2004, Spring 2005, Fall 2005, Fall 2007)  
ME 556: Numerical Methods in Fluids (Fall 2003, Fall 2007, Fall 2011, Fall 2013, Fall 2015)  
ME 521: Fundamentals of Fluids I (Fall 2001, Fall 2010, Fall 2016)  
ME 516: Conduction and Radiation (Spring 2009, Spring 2011, Spring 2015)  
ME 515: Convective Heat Transfer (Spring 2004, Spring 2006, Spring 2018)  
ME 406: Experimental Design (Spring 2002, Fall 2002, Spring 2003, Spring 2008(2), Summer 2009)  
ME 404: Heat Transfer (Summer 2002, Spring 2003, Spring 2004, Fall 2004, Spring 2005, Fall 2005, Fall 2012, Spring 2013, Fall 2014)  
ME 405 (402): Thermal Systems Design (Fall 2006, Spring 2007, Fall 2008, Spring 2009, Fall 2010, Spring 2011, Fall 2011, Spring 2012, Fall 2012, Fall 2013, Spring 2014; Spring 2016; Fall 2017)  
ME305 (306): Thermos-Fluid Lab (Fall 2014; Spring 2016)  
ME 303: Fluid Mechanics (Summer 2003, Spring 2006, Spring 2007)

**GRADUATE STUDENTS**

### **Current Graduate Students**

- Mr. Hyunsung Kim, MS Student
- Mr. Ahmad Jasim Hamza, PhD Student
- Mr. Dinh Van Quyen, PhD Student
- Mr. Aminul Islam, PhD Student
- Mr. Adnan Morshed, Ph.D. Student
- Mr. Jason Durfee, Ph.D. Student

### **Previous Graduates**

- Dr. Kisoo Yoo, (PhD in December 2015), Assistant Prof at Yeungnam University
- Dr. Walid Rezanoor, (PhD in July 2015), Engineer at Intel Inc., Hillsboro, OR
- Mr. Seyed Mahdi Mofidian, Moved to a Different program
- Mr. Kasi Mani, (MS in May 2014) Project Engineer,
- Dr. Tsun-Kay Jackie Sze, (PhD in December 2014) Staff Scientist, Naval Research Lab
- Dr. Md. Robiul Hossan, (PhD. in May 2013) Assistant Professor, Central Oklahoma University
- Dr. Talukder Zaki Jubery, (Ph.D. in July 2012) Post-Doc, Iowa State University)
- Mr. Abdulmunaem Shaneb, (MS in December 2011) Employed in Libya
- Dr. Isaac Sprague, (Ph.D. in July 2011) Micronics, Redmond, WA
- Dr. John Schwarzkopf, (Ph.D. in December 2009) Staff Scientist, Los Alamos National Lab
- Mr. Isaac Sprague, (MS in July 2008) Micronics, Redmond, WA
- Dr. Jae Sool Shim, (Ph.D. in December 2007) Associate Professor at Yeungnam University
- Ms. Helena Miao, (MS in June 2007) Technip Inc., Houston, TX
- Mr. Nazmul H. Mamun (MS in August 2006)
- Dr. Keisuke Horiuchi, (Ph.D. in December 2005) Research Engr, Hitachi Ltd, Japan
- Ms. Rani Rehnuma, (BS in August 2005) Engineer, Boeing, Seattle, WA
- Mr. Pavel Ledyan, (MS in August 2004) Design Engineer, Kennametal Inc., Arkansas
- Mr. Jester Putteman, (BS in May 2004) Graduate Student, Univ. of Washington
- Mr. Juan David Salgado, (MS in May 2004) US Army Corps of Engineer, Walla Walla, WA
- Mr. Keisuke Horiuchi, (MS in Aug 2003) Continued Doctoral degree at WSU

### **VISITING PROFESSORS**

- Prof. Jaesool Shim, Mechanical Engineering, Yeungnam University, South Korea
- Prof. Huiyng Chen, Life and Environmental Sciences, Minzu University, Beijing, China
- Prof. Cheol Ho Bai, Mechanical Engineering, Yeungnam University, South Korea
- Prof. Reiyu Chein, Mechanical Eng, National Chung Hsing University, Taichung, Taiwan
- Prof. Suijit Ghosal, Mechanical Engineering, Jadavpur University, West Bengal, India

### **RESEARCH ASSOCIATES**

- Pratha Pradip GopMandal

### **RESEARCH GRANTS to WSU (Excluding internal and travel grants)**

- “An Interdisciplinary Graduate Program to Recruit and Train Next Generation of Advanced Manufacturing Researchers,” \$895,500 (US Department of Education) and \$274,500 (Washington State University) October 1, 2018 to September 30, 2021.
- “Using Low Cost Desktop Learning Modules to Educate Diverse Undergraduate Communities in Engineering,” \$2,415,119, National Science Foundation, October 1, 2018 to September 30, 2023.
- “Multiscale Modeling of Transport through Blood Brain Barrier,” \$762,772, National Institutes of Health - NIGMS, September 1, 2016 to June 30, 2019.
- “Affordable Desktop Learning Modules (DLMs) to Facilitate Transformation of Undergraduate Engineering Classes,” \$834,706, National Science Foundation, September 1, 2014 to August 31, 2018.
- “Mathematical Models and Computational Methods for the Tumor Microenvironment,” \$380,938, National Science Foundation, August 1, 2013 to July 31, 2016.
- “Developing Affordable Desktop Learning Modules (DLMs) to Facilitate Transformation of Undergraduate Engineering Classes,” \$60,444, Norcliff Foundation, December 1, 2013 to August 31, 2015.
- “Design of Molecularly Tailored Electrolytes for High Performance Lithium Batteries”, \$69,278.75 The Joint Center for Aerospace Technology Innovation (JCATI), July 1, 2013-June 30, 2014.
- “Multiscale Modeling of Biomolecular Assembly on a Targeted Surface,” \$437,882, National Science Foundation, September 15, 2012 to September 14, 2016.
- “Chip Scale Ion Mobility Spectrometry,” \$339,108, MITRE Corporation, October 2010 to September 2014.
- “Multi-Disciplinary Project-Based Paradigm that Uses Hands-on Desktop Learning Modules and Modern Learning Pedagogies,” \$600,000 National Science Foundation, October 2010 to September 2013.
- “Multidimensional Electrofocusing in Gradient Monoliths,” \$558,294, National Institutes of Health, September 2009 to July 2011.
- “Rapid Fingerprinting of Cardiac Biomarker,” \$750,000, Life Sciences Discovery Fund, October 2007-Dece 2011.
- “A Four Dimensional (4D) Microchip for Proteomics,” \$200,000 (NSF) +\$30,000 (Matching fund from WSU), National Science Foundation, August 2006 – July 2009.

- “A Novel Biosensor Based Liquid Phase Ion Mobility Spectrometer,” \$233,536, NIBIB, National Institutes of Health (NIH), 07/1/2005 to 09/30/2009.
- “Integrated Multistage Iso-electric Focusing on a PDMS Microchip,” \$280,000 (NSF) + 39,252 (Matching fund from WSU), National Science Foundation, July 15, 2003 – June 2007.
- “REU Supplement: Integrated Multistage Iso-electric Focusing on a PDMS Microchip,” \$12,000, National Science Foundation, July 1, 2003 – June 30 2006.
- “Development of Micropump for Transporting Attractants in Insect Traps,” \$114,903, Washington Technology Center, RTD program, January 1, 2003 –December 31, 2004.
- “Development of Micropump for Transporting Attractants in Insect Traps,” \$32,615, Sterling International Incorporation, July 15, 2003 –December 31, 2004.

## **SERVICES AND OUTREACH ACTIVITIES**

### **1. Mechanical and Materials Engineering, Washington State University**

#### **(a) Faculty Advisor, Solar Splash (from August 2002 to August 2007)**

- Guided club activities
- Attended the annual competition
- Participated in fund drive for the student section
- Helped the team with technical challenges

#### **(b) Secretary, (from January 2002 to December 2002 and August 2005 to August 2006)** MME Faculty Meetings

#### **(c) Member, Thermo-Fluid Faculty Search Committee (2005-2006) and (2010-2011)**

#### **(d) Broad Search Committee Chair, Five Open Faculty Positions in ME and MSE (2013-2014)**

#### **(e) Broad Search II Committee Chair, Four Open Faculty Positions in ME and MSE (2014-2015)**

#### **(f) Search Committee Chair, ME Program Coordinator and Faculty Position for the WSU Everett Program (2011-2012)**

- Identified the key focus areas for the school and college
- Developed the job description for advertisement
- Identified the long list of candidates for phone interview

- Conducted phone interviews and selected candidates for campus visit
- Hosted candidates during on site visit

**(g) MME Seminar Coordinator**, *(from July 2004 to December 2005, May 2007 to December 2007)*

- Conducted the departmental weekly seminar
- Coordinated speakers for the MME symposium series
- Arranged MME poster sessions
- Published the MME annual proceedings

**(h) Faculty Advisor, American Society of Mechanical Engineers (ASME)** *(from August 2001 to August 2004)*

- Attracted students in mechanical engineering
- Guided the student section activities
- Arranged local/regional level competition
- Conducted plant tour and coordinate speaker visit
- Participated in the fund drive for the student section
- Motivated students for life long learning
- Represented WSU section in regional meeting

**(i) Member, Graduate Studies Committee** *(from January 2006 to August 2006, August 2008 to May 2012)*

- Evaluated annual reports of MME graduate students
- Selected the Outstanding (Graduate) Researchers in the MME
- Reviewed course contents of new graduate level classes
- Accessed the technical merits for admission in the MME Graduate program

**(j) Member, Undergraduate Studies Committee** *(from August 2006 to May 2008)*

- Work on curriculum updates and prerequisites
- Select outstanding students for awards and scholarships

**2. College of Engineering and Architectures, Washington State University**

**(a) Member, MME School Director Search Committee (2012-2013)**

**(b) College of Engineering Research Infrastructure Committee (2012)**

**(c) 7<sup>th</sup> Annual Native Youth Exploring Engineering Summer Camp (2005)**

- Organized two workshops on Microfluidic Technology

- Provided hands-on training to native high school students
- Prepared learning modules for high school students

**(d) Summer at WSU: Engineering Experiences for Teachers (SWEET) Program (2005, 2006, 2007, 2008 and 2009)**

- Conduct six-week long short course for High School Teachers on Engineering
- Develop learning modules that can be used in the High School Science classes
- Provide hands-on training to high school teachers

**(e) Review Classes for EIT Examination (2005, 2007, 2013)**

**3. Graduate School, Washington State University**

- Conduct final and preliminary exams
- Submit the outcome of the exam
- Evaluated Posters of Wiley Research Exposition (2005)

**4. ASME International**

- Organize and Chair/co-chair Sessions
- Review Manuscripts for the Presentations
- Evaluate the Quality of the Presentation
- Nominate Paper for Journal Publications
- Select Speaker for Awards and Distinctions

**5. US Society of Computational Mechanics**

- Organized and Chaired Session

**6. International Association for Computational Mechanics (IACM)**

- Organized and Chaired Session