PRASHANTA DUTTA, Ph.D.
Associate Professor, Mechanical and Materials Engineering (MME)
Washington State University, Pullman, Washington 99164-2920
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RESEARCH AREAS

Micro Scale Flow Visualization and Measurement
Microfluidic Device for Cardiac Biomarkers
Liquid Phase Ion Mobility Spectrometry
Thermal Analysis of Microscale Liquid Flow
On-chip Electrophoresis for Proteins and DNA
Bio and Organic Fuel Cell for Micro/Portable Power
Transport Modeling in Micro and Nano-Scales
Modeling and Simulation of Non-linear Electrophoresis

EDUCATION

Ph.D. Texas A&M University, College Station, TX, USA, 2001
Major: Mechanical Engineering
Dissertation: Numerical Modeling of Electroosmotically Driven Flows in Complex Micro-Geometries
Advisor: Prof. Ali Beskok

M.S. University of South Carolina, Columbia, SC, USA, 1997
Major: Mechanical Engineering
Masters Thesis: Experimental Evaluation of Innovative Heat Transfer Enhancement with Inclined baffles in a Rectangular Channel
Advisor: Prof. Sandip Dutta

M.S.M.E. Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, 1996
Major: Mechanical Engineering,
Masters Thesis: Stability and Stress Analysis of Toroidal Pipe Reducers
Advisor: Prof. Wahhaj Uddin.

B.S.M.E. Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, 1994
Major: Mechanical Engineering,
Rank: 3rd out of 120 Graduates.

APPOINTMENTS

- Associate Professor, MME, Washington State University, Pullman, WA 99164 Aug 07 - Date

- Assistant Professor, MME, Washington State University, Pullman, WA 99164 Aug.'01- Aug 07
- Graduate Assistant, ME, Texas A&M University, College Station, TX 77843 Jan'. 98-Jul.'01
- AGTSR Summer Intern, Westinghouse Electric Corporation, Orlando, FL Jun.'97-Aug.'97
- Research Assistant, ME, University of South Carolina, Columbia, SC 29208 Aug.'96-Dec.'97
- Lecturer, Mechanical Engineering, BUET, Dhaka 1000, Bangladesh Mar.' 94-Jul.'96

AFFILIATIONS

Member:

- American Society of Mechanical Engineers (ASME)
- American Society for Engineering Education (ASEE)
- American Chemical Society (ACS)
- U.S. Association for Computational Mechanics (USACM)
- International Association for Computational Mechanics (IACM)
- Tau Beta Pi

HONORS AND AWARDS

- NSF Fellowship for 2007 Nanomechanics and Nanomaterials Workshop
- Guest Editor, International Journal for Multiscale Computational Engineering, 2007/2008
- 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
- Who's Who in Engineering Education, 2002
- Tau Beta Phi, 2000
- Advanced Gas Turbine System Research (AGTSR) Summer Fellow, 1997

DEVELOPMENT OF RESEARCH FACILITIES

- 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 Microscale Particle Image Velocimetry
- Development of UV detector System for Non-fluorescent nano particles

- Unsteady Flow Measurement in Micro and Nano-fluidic Devices
- Thermal Transport Characteristics in Microfluidic Devices
- Development of Molecular Dynamics Algorithm for Biological Flow

PUBLICATIONS

Journal Articles (8 Other Manuscripts are in Review or Preparation)

1. Shim, J. and Dutta, P., and Ivory, C. F., 2007, "Effects of Dissociation Constants on protein Separation in on-Chip Isoelectric Focusing," In Press *Journal of Nanoscience and Nanotechnology*.

2. Wang, Y., Zhe, J., Chung, B., and Dutta, P., 2007, Numerical Modeling of a Magnetic Particle Micromixer," In Press *Microfluidics and Nanofluidics.*

3. Shim, J. and Dutta, P., and Ivory, C. F., 2007, "Modeling and Simulation of Isotachophoresis in Two-Dimensional Microchannel," *Numerical Heat Transfer, Part A: Applications,* Vol. 52(5), pp 441-461.

4. 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.

5. 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.

6. Zhe, J., Jagtiani, A., Dutta, P., Hu, J., and Carletta, J., 2007, "A Micromachined High Throughput Coulter Counter for Pollen Detection And Counting," *Journal of Micromechanics and Microengineering,* Vol. 17, pp. 304-313.

7. Shim, J., Dutta, P., and Ivory, C. F., 2007, "Modeling and Simulation of Isoelectric Focusing in Two-Dimensional Microgeometries," *Electrophoresis*, Vol. 28, pp. 572-586.

8. Horiuchi, K. Dutta, P., and Richards, C. D., 2007, "Experiment and Simulation of Mixed Flows in Trapezoidal Microchannels," *Microfluidics and Nanofluidics,* Vol.3, pp. 347-358.

9. Cui, H., Dutta, P., and Ivory, C. F., 2007 "Isotachophoresis of Proteins in a Networked Microfluidic Chip: Experiment and Simulations," *Electrophoresis,* Vol. 28, pp. 1138-1145.

10. 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.

11. Horiuchi, K. and Dutta, P., 2006, "Heat Transfer Characteristics in Mixed Electroosmotic and Pressure Driven Flows," *JSME International Journal Series B (Fluids and Thermal Engineering),* Vol. 49, pp. 812-819.

12. Mamun, N. and Dutta, P., 2006, "Patterning of Platinum Microelectrodes in Polymeric Microfluidic Chips," *Journal of Microlithography, Microfabrication and Microsystems,* Vol. 5(3), pp. 039701-6.

13. Dutta, P., Horiuchi, K., and Yin, H. M. 2006, "Thermal Characteristics of Mixed Electroosmotic and Pressure Driven Flows," *Computers and Mathematics with Applications,* Vol. 52(5), pp. 651-670.

14. Horiuchi, K. and Dutta, P., 2006, "Electrokinetic Flow Control in Microfluidic Chip Using A Field-Effect Transistor," *Lab On a Chip,* Vol. 6, pp. 714-723.

15. 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.

16. 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.

17. Cui, H., Horiuchi, K., Dutta, P., and Ivory, C. F., 2005 "Multistage Isoelectric Focusing in Polymeric Microchips," *Analytical Chemistry,* Vol. 77, pp. 7878-7886.

18. Hossain, A., Alam, M., Yonge, D. R., and Dutta, P., 2005, "Finite Element Modeling of Cr(VI) Reduction by MR-1 Employing the Duel Enzyme Kinetic Model," *Computers and Geosciences,* Vol. 31, pp. 1286-1292.

19. Cui, H., Horiuchi, K., Dutta, P., Ivory, C. F., 2005 "Isoelectric Focusing in a Poly-di-methyl-siloxane Microfluidic Chips," *Analytical Chemistry,* Vol. 77, pp. 1303-1309.

20. Hossain, A., Alam, M., Yonge, D. R., and Dutta, P., 2005, "Efficiency and Flow Regime of a Highway Storm Water Detention Pond in Washington, USA," *Water, Air, and Soil Pollution,* Vol. 164, pp. 79-89.

21. Cheng, G. J., Pirzada, D., and Dutta, P., 2005, "Design and Fabrication of Hybrid Nanofluidic Channel," *Journal of Microlithography, Microfabrication and Microsystems,* Vol. 4(1), pp. 013009.

22. Dutta, P. and Hossain, A., 2005, "Internal Cooling Augmentation in Rectangular Channel using Two Inclined Baffles," *International Journal of Heat and Fluid Flow*, Vol. 26(2), pp. 223-232.

23. Horiuchi, K. and Dutta, P., 2004, "Joule Heating Effects in Electroosmotically Driven Micro-Channel Flows," *International Journal of Heat and Mass Transfer, Vol. 47, pp. 3085-3095*.

24. Dutta, P., Beskok, A., and Warburton, T. C., 2002, "Numerical Simulation of Mixed Electroosmotic/Pressure Driven Micro Flows," *Numerical Heat Transfer, Part A,* Vol. 41, pp. 131-148.

25. Dutta, P., Beskok, A., and Warburton, T. C., 2002, "Electroosmotic Flow Control in Complex micro Geometries," ASME & IEEE *Journal of Micro Electro Mechanical Systems (JMEMS),* Vol. 11(1), pp. 36-44.

26. Dutta, P. and Beskok, A., 2001, "Analytical Solution of Time Periodic Electroosmotic Flows: Analogies to Stokes Second Problem," *Analytical Chemistry,* Vol. 73, pp. 5097-5102.

27. Dutta, P. and Beskok, A., 2001, "Analytical Solution of Mixed Electroosmotic /Pressure Driven Flows in Two Dimensional Straight Channels: Finite Double Layer Effects," *Analytical Chemistry,* Vol. 73, pp. 1979-1986.

28. Dutta, S., Dutta, P., Jones, R.E., and Khan, J.A., 1998, "Heat Transfer Coefficient Enhancement with Perforated Baffles," ASME *Journal of Heat Transfer*, Vol. 120(3), pp 795-797.

29. Dutta, P., Khan, R.U., Salam, A., and Uddin, M.W., 1997, "Stability Analysis of Toroidal Pipe Reducers Under Uniform External Pressure," *Int. Journal of Pressure Vessels and Pipings,* Vol. 72, pp 203-218.

30. Dutta, P. and Dutta, S., 1997, "Effect of Baffle Size and Orientation in Internal Cooling Heat Transfer Enhancement," *International Journal of Heat and Mass Transfer*, Vol. 41(19), pp 3005-3013.

31. Dutta, P. and Islam, S.M.N., 1994, "Performance of UNICEF Tara Pump used for Agriculture," *Journal of Agricultural Mechanisation in Asia, Africa, and Latin America*, Japan, Vol. 28(4), pp. 35-38.

Book Chapters (Invited):

Dutta, P. and Horiuchi, K., Talukder, Z., "Microfluidic Circuits," Ed. D.Q. Li, Encyclopedia of Microfluidics and Nanofluidics, Springer, Germany, 2007.

Tam, M., Dutta, P., and Hill, H.H., "Miniaturized Ion Mobility Spectrometer," Ed. D.Q. Li, Encyclopedia of Microfluidics and Nanofluidics, Springer, Germany, 2007.

Beskok, A., Hahm, J., and Dutta, P., "Electrokinetic Transport Phenomena in Micro-Fluidics", V.M. Harik and L.-S. Luo (eds), Micromechanics and Nanoscale Effects, Kluwer Academic Publishers, The Netherlands, 2004.

Conference Articles

1. Cui, H, Dutta, P., and Ivory, C.F., 2007, "An Automated Non-mechanical Valve for Dispersion Control in On-chip Electrophoresis," Accepted for publication in the Proceedings of 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA.

2. Wang, Y, Zhe, J, Chung, B. T.F., and Dutta, P., 2007, "Magnetic Particle Driven Micromixer," Accepted for publication in the Proceedings of 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA.

3. Schwarzkopf, J, Crowe, C.T., and Dutta, P., 2007, "Modeling of Multiphase Flow Boiling in Meso and Microchannel," Accepted for publication in the Proceedings of 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA.

4. Shim, J., Dutta, P., and Ivory, C.F., 2007, "Modeling and Simulation of Isotachophoresis in Microchips," Accepted for publication in the Proceedings of 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA.

5. Zhe, J., Jagtiani, A., Dutta, P., Hu, J., and Carletta, J., " A High Throughput Microfluidic Bioparticle Sensor," Proceedings of 14th International Conference on Solid State Sensors, Actuators, and Microsystems, Lyon, France, June 10-14, 2007

6. Dutta, P. and Horiuchi, K., 2006, "Field Effect Flow Control in Complex Microgeometries," Proceeding of the 10th Annual European Conference on Micro and Nanoscale Technologies for the Biosciences, Montreux, Switzerland, November 14-16.

7. Horiuchi, K., and Dutta, P., 2006, "Local Flow Control using Field Effect Transistors," Proceedings of 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

8. Huda, N. and Dutta, P., 2006, "Platinum Microelectrodes in Polymeric Microfluidic Chips: A New Fabrication Approach," Proceedings of 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

9. Dutta, P. and Salgado, J.D., 2006, "A Conductivity Based Microfluidic Flow Sensor," Proceedings of 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

10. Jagtiani, A., Zhe, J., Dutta, P., Hu, J., and Carletta, J., 2006, "A Microfluidic Based High Throughput Resistive Pulse Sensor," Proceedings of 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

11. Dutta, P., Horiuchi, K., Cui, H., and Ivory, C.F., 2005, "Multistage Isoelectric Focusing: A Novel On-chip Bioseparation Technique," Proceedings of 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

12. Horiuchi, K. and Dutta, P., 2005, "Heat Transfer Characteristics of Mixed Electroosmotic and Pressure Driven Flows Under Constant Heat Flux," Proceedings of 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

13. Wang, Y., Zhe, J., Dutta, P., and Cheng, G.C., 2005, "A Hybrid Rapid Microfluidic Mixer Utilizing Electrokinetic Relay and Asymmetric Flow Geometries for Lab-on-a-Chip Applications," Proceedings of 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

14. Horiuchi, K. and Dutta, P., 2005, “Thermal Analysis of Electrokinetic Flows in Planar Microchannel," Proceedings of 2005 JSME Mechanical Engineering Congress (MECJ-05), Chohu city, Tokyo, September 19-22.

15. Horiuchi, K. and Dutta, P. 2005 “Flow Diagnosis in a Trapezoidal Microchannel,” Proceedings of *Annual Meeting of Japan Society of Fluid Mechanics,* paper# AM05-07-002, September 5-7.

16. Horiuchi, K., Dutta, P., Cui, H., and Ivory, C.F., 2004, “Band Deformation at a T-Junction While Electrofocusing in a Dog-Leg Microchannel,” Proceedings of 2004 *International Mechanical Engineering Congress and Exposition (IMECE),* Anaheim, CA, Nov. 13-19.

17. Horiuchi, K. and Dutta, P., 2004, “Thermal Analysis of Mixed Electroosmotic and Pressure Driven Flows in Two Dimensional Straight Microchannels,” Proceedings of 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15.

18. Salgado, J.D., Horiuchi, K., and Dutta, P., 2004, “Development of a Microfluidic Flow Sensor in Polymeric Microchip,” Proceedings of 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15.

19. Cui, H., Ivory, C.F., Horiuchi, K., and Dutta, P., 2004, “Isoelectric Focusing in a Polymeric Micro-fluidic Chip,” Proceedings of 227th American Chemical Society National Meeting, Anaheim, CA, March 28-April 1.

20. Horiuchi, K., Dutta, P., Cui, H., and Ivory, C.F., 2003, “High Resolution Separation of Proteins in Polymeric Micro-fluidic Chip,” Proceedings of 2003 *International Mechanical Engineering Congress and Exposition (IMECE),* Washington, DC, Nov. 15-21.

21. Horiuchi, K. and Dutta, P., 2003, “Heat Transfer Characteristics of Steady Electroosmotic Flows in Two Dimensional Straight Microchannels,” Proceedings of 2003 ASME Summer Heat Transfer Conference, Las Vegas, NV, July 20-23.

22. Dutta, P. and Beskok, A., 2001, “Analysis of Time Periodic Electroosmotic Flows,” Proceedings of 2001 *International Mechanical Engineering Congress and Exposition (IMECE),* New York, NY, Nov. 11-16.

23. Dutta, P., Kim, M.J., Kihm, K.D., and Beskok, A., 2001, “Electroosmotic Flow in a Grooved Micro-Channel Configuration: A Comparative Study of Micro-PIV Measurements and Numerical Simulations,” Proceedings of 2001 *International Mechanical Engineering Congress and Exposition (IMECE),* New York, NY, Nov. 11-16.

24. Dutta, P. and Beskok, A., 2000, “Electroosmotic Flow Control in Complex Micro Geometries,” Proceedings of 2000 *International Mechanical Engineering Congress and Exposition (IMECE),* Orlando, FL, Nov. 5-12.

25. Dutta, P., Warburton, T. C., and Beskok, A., 1999, “Numerical Modeling of Electroosmotically Driven Micro Flows,” Proceedings of 1999 *International Mechanical Engineering Congress and Exposition (IMECE),* Nashville, TN, Nov. 16-21.

26. Dutta, P., Dutta, S., and Khan, J.A.,1998, "Internal Cooling Heat Transfer Enhancement by using Periodic Baffles in the Flow Path," Proceedings of *1998 International Gas Turbine Institute Congress and Exposition,* Stockhom, Sweden, Jun 2-4.

27. Dutta, S., Dutta, P., Jones, R.E., and Khan, J.A., 1997, "Experimental Study of Heat Transfer Coefficient Enhancement with Solid and Perforated Baffles," Proceedings of 1997 *International Mechanical Engineering Congress and Exposition (IMECE),* Dallas, TX, Nov. 16-21.

Other Publications

1. Dutta, P., 2005, "Development of Electrokinetic Micropump for Insect Traps," Final Report, Sterling International Inc, Spokane Valley, WA.

2. Dutta, P., 2005, "A Non-mechanical Micropump for Insect Trap," Final Report, Washington Technology Center, Seattle, WA

3. Dutta, P., 2004, "Design, Fabrication and Characterization of Micropump," Final Report, Washington State University Office of Research, Pullman, WA

4. Dutta, P., 2001, "Numerical Modeling of Electroosmotically Driven Flows in Complex Micro-Geometries," Ph.D. Dissertation, Texas A&M University, College Station, TX.

5. Dutta, P., 1997, "Experimental Evaluation of Innovative Heat Transfer Enhancement with Inclined baffles in a Rectangular Channel," M.Sc. Engineering Thesis, USC, Columbia, SC.

6. Dutta, P., 1997, "Cooling Opportunity in Advanced Turbine Systems (ATS) Row One Vane," Report submitted to the *Department of Energy* on Advanced Gas Turbine Systems Research (AGTSR) Summer Internship.

7. Dutta, P., 1996, "Stability and Stress Analysis of Toroidal Pipe Reducers," *M Sc Engg. Thesis*, Mech. Eng. Dept., Bangladesh Univ. of Eng. & Tech., Bangladesh.

8. Dutta, P., Sarkar, P.P., and Iqbal, S.M.,1993, "Study and Performance Test of (a) Tara Pump (b) Rower Pump and (c) Hand Tube Well No-6.," *B.Sc Engineering Thesis*, Mechanical Engineering, Bangladesh Univ. of Eng. & Tech., Dhaka, Bangladesh.

PRESENTATION AT NATIONAL AND INTERNATIONAL CONFERENCE

1. Cui, H, Huang, Z, Dutta, P., and Ivory, C.F., 2006, "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.

2. Cui, H, Dutta, P., and Ivory, C.F., 2006, "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.

3. Dutta, P. and Horiuchi, K., 2006, “Local Flow Control using Field Effect Transistors,” 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

4. Dutta, P. and Salgado, J.D., 2006, “A Conductivity Based Microfluidic Flow Sensor,” 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

5. Jagtiani, A., Zhe, J., Dutta, P., Hu, J., and Carletta, J., 2006, “A Microfluidic Based High Throughput Resistive Pulse Sensor,” 2006 ASME International Mechanical Engineering Congress and Exposition (IMECE), Chicago, IL, November 5-10.

6. Dutta, P., Shim, J., and Ivory, C.F., 2006, “Modeling and Simulation of Isoelectric Focusing in Two-Dimensional Microgeometries,” 7th World Congress on Computational Mechanics, Los Angeles, CA, July 16-22, 2006.

7. Dutta, P., Horiuchi, K., Cui, H., and Ivory, C.F., 2005, “Multistage Isoelectric Focusing: A Novel On-chip Bioseparation Technique,” 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

8. Horiuchi, K. and Dutta, P., 2005, “Heat Transfer Characteristics of Mixed Electroosmotic and Pressure Driven Flows Under Constant Heat Flux,” 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

9. Wang, Y., Zhe, J., Dutta, P., and Cheng, G.C., 2005, “A Hybrid Rapid Microfluidic Mixer Utilizing Electrokinetic Relay and Asymmetric Flow Geometries for Lab-on-a-Chip Applications,” 2005 ASME International Mechanical Engineering Congress and Exposition (IMECE), Orlando, FL, November 5-11.

10. Horiuchi. K. and Dutta, P., 2005, “Thermal Analysis of Electrokinetic Flows in Planar Microchannel," 2005 JSME Mechanical Engineering Congress (MECJ-05), Chohu city, Tokyo, Japan, September 19-22.

11. Dutta, P., Horiuchi, K, Cui, H., and Ivory, C. F., 2005, “On-chip Isoelectric Focusing with Staging,” 3rd Gordon Conference on Physics and Chemistry of Microfluidics, Oxford University, Oxford, UK, August 21-26.

12. Keisuke, H. and Dutta, P. 2005, “Flow Diagnosis in a Trapezoidal Microchannel,” *JSME conference on Fluid Mechanics,* paper# AM05-07-002.

13. Cui, H., Horiuchi, K., Dutta, P., Ivory, C. F., 2005, “Multistage Isoelectric Focusing in a Networked PDMS chip,” 28th International Symposium on Capillary Chromatography and Electrophoresis- Las Vegas, NV May 22-25, 2005.

14. Cui, H., Ivory, C.F., Horiuchi, K., and Dutta, P., 2005, “Multistage Isoelectric Focusing in a Polymeric Micro-fluidic Chip,” 229th American Chemical Society National Meeting, San Diego, CA, March 13-17.

15. Horiuchi, K., Cui, H., Dutta, P., and Ivory, C.F., 2004, "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.

16. Horiuchi, K., Dutta, P., Cui, H., and Ivory, C.F., 2004, "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.

17. Cheng, J.C. and Dutta, P., 2004, "Microfabrication of a Hybrid Nanofluidic Channel," 2004 Micro Nano Breakthrough Conference, Portland, OR, July 28-29.

18. Salgado, J.D., Horiuchi, K., and Dutta, P., 2004, "Development of a Microfluidic Flow Sensor in Polymeric Microchip," 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15.

19. Horiuchi, K. and Dutta, P., 2004, "Thermal Analysis of Mixed Electroosmotic and Pressure Driven Flows in Two Dimensional Straight Microchannels," 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference, Charlotte, NC, July 11-15.

20. Cui, H., Ivory, C.F., Horiuchi, K., and Dutta, P., 2004, "Isoelectric Focusing in a Polymeric Micro-fluidic Chip," 227th American Chemical Society National Meeting, Anaheim, CA, March 28-April 1.

21. Horiuchi, K., Dutta, P., Huanchun, C., and Ivory, C.F., 2003, "High Resolution Separation of Proteins in Polymeric Micro-fluidic Chip," 2003 *International Mechanical Engineering Congress and Exposition (IMECE),* Washington, DC, Nov. 15-21.

22. Horiuchi, K. and Dutta, P., 2003, "Heat Transfer Characteristics of Steady Electroosmotic Flows in Two Dimensional Straight Microchannels," 2003 ASME Summer Heat Transfer Conference, Las Vegas, NV, July 20-23.

23. Salgado, D. J, Horiuchi, K., and Dutta, P., 2003, "Flow Measurements in Microfluidic Channels," 2003, ASME Region VIII GSTC, Portland, OR, April 4-6.

24. Dutta, P., Kim, M.J., Kihm, K.D., and Beskok, A., 2001, "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.

25. 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.

26. Dutta, P. and Beskok, A., 2001, "Electrokinetic Effects in Microscale Liquid Flows," TexMEMS III, University of Texas, Dallas, Texas.

27. Dutta, P. and Beskok, A., 2000, "Electroosmotic Flow Control in Complex Micro Geometries," 2000 *International Mechanical Engineering Congress and Exposition (IMECE),* Orlando, FL, Nov. 5-12.

28. Dutta, P. and Beskok, A., 2000, "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.

29. Dutta, P., 2000, "Electrokinetic Effects in Micro-Scale Transport," Mechanical Engineering Graduate Student Organization (MEGSO) Seminar*,* College Station, TX.

30. Beskok, A. and Dutta, P., 2000, "Electroosmotic Flow Control in Complex Micro Geometries," TexMEMS II, Southern Methodist University, Dallas, Texas.

31. Dutta, P. and Beskok, A., 2000, "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.

32. Dutta, P. and Beskok, A., 1999, "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.

33. 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.

34. Beskok, A. and Dutta, P., 1999, "Research at Texas A&M Micro-Fluidics Lab," TexMEMS I, Texas A&M University, College Station, Texas, August 23.

35. Dutta, P., Dutta, S., and Khan, J.A., 1998, "Internal Cooling Heat Transfer Enhancement by using Periodic Baffles in the Flow Path," *1998 International Gas Turbine Institute Congress and Exposition,* Stockhom, Sweden, Jun 2-4.

36. Dutta, S., Dutta, P., Jones, R.E., and Khan, J.A., 1997, "Experimental Study of Heat Transfer Coefficient Enhancement with Solid and Perforated Baffles," 1997 *International Mechanical Engineering Congress and Exposition (IMECE),* Dallas, TX, Nov. 16-21.

37. Dutta, P., 1997, "Challenges in Gas turbine Blade Cooling at very High Temperature," Mechanical Engineering Graduate Student Seminar*,* Columbia, SC.

38. 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) "Microfluidic Flow Control," Hewlett Packard Research and Development, Corvalis, OR, Sept 25, 2007.

2) "Microfluidics- Tools for Biotechnology Research," 5th Annual Retreat, Center for Integrated Biotechnology, Washington State University, Pullman, WA, Sept 21, 2007

3) "Field Effect Flow Control in Complex Microgeometries," 10th Annual European Conference on Micro and Nanoscale Technologies for the Biosciences, Montreux, Switzerland, November 14-16, 2006.

4) "Electrokinetic Mobilization, Separation and Concentration in Microfluidic Devices," Pacific Northwest National Lab, Richland, WA, June 30, 2005.

5) "Microfluidic Technology in Bioanalytical System," Departmental Seminar in Mechanical Engineering, Chittagong University of Engineering and Technology, Chittagong, Bangladesh, January 5, 2005.

6) "Microfluidic Technology and MEMS," Departmental Seminar in Mechanical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, December 28, 2004.

7) "Transport Phenomena in Micro/nanofluidic Devices," Graduate Seminar in Chemical Engineering, WSU, Pullman, October 25, 2004.

8) "Microfluidic Chip for Proteomics," Guest Lecture in Perspectives in Biotechnology, Animal Sciences Department, WSU, Pullman, October 5, 2004.

9) "Microfluidic Technology in Bioanalytical Systems," Graduate Seminar in Manufacturing Engineering, WSU, Vancouver, March 1, 2004.

10) "Separation, Concentration, and Transportation of Sample in Microfluidic Devices," College of Engineering, Temple University, Philadelphia, PA, November 24, 2003.

11) "Development of Electrokinetic Micropump for Insect Traps," Washington Technology Center, Seattle, WA, November 13, 2003.

12) "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

13) "Electrokinetic Phenomena in Microfluidic Devices", Chemistry Department, Washington State University, Pullman, WA, September 2002.

14) "Modeling and Analysis of Electrokinetic Flow", CFD Research Corporation, Huntsville, Alabama, March 2001.

PATENTS OR PATENTS PENDING

1. Conductivity Gradient Focusing in a Chromatographic Monolith with a Fixed, Spatial Charge Gradient Grafted into the Stationary Phase (Provisional Patent, 2005, Other PIs: Cornelius F. Ivory and Frentisek Svec)

2. Size Exclusion Electrofocusing in a Chromatographic Monolith with a Fixed Spatial SEC Gradient Parameter Grafted into the Stationary Phase (Provisional Patent, 2005, Other PIs: Cornelius F. Ivory and Frentisek Svec)

3. Two Dimensional, Simultaneous Electrofocusing in a Chromatographic Monolith with Biorthogonal Focusing Gradients Grafted into the Stationary Phase (Provisional Patent, 2005, Other PIs: Cornelius F. Ivory and Frentisek Svec)

4. Isoelectric Focusing in a Chromatographic Monolith with a Fixed Spatial pH Gradient Grafted into the Stationary Phase (Provisional Patent, 2005, Other PIs: Cornelius F. Ivory and Frentisek Svec)

5. A Four-dimensional Separation Platform with Highly Parallel Separation Dimensions in a Two-dimensional Spatial Configuration (Provisional Patent, 2005, Other PI: Cornelius F. Ivory).

PROFESSIONAL RESPONSIBILITIES/SERVICES

- Forum Co-organizer, ASME, Microfluidic Summer Forum, 2008
- Symposium Co-organizer, ASME (IMECE) Microfluidics Symposium, 2007
- Chair, Fluid Engineering Division, 9A, IMECE06
- Reviewer, 2006 IMECE, Microfluidics Symposium
- Co-Chair, World Congress on Computational Mechanics, 2006
- Chair, Fluid Engineering Division, 9A, IMECE05
- Reviewer, 2005 IMECE, Microfluidics Symposium
- Judge, 3rd Gordon Conference on Physics and Chemistry of Microfluidics, 2005
- Reviewer, 2005 ASME Summer Heat Transfer Conference
- Reviewer, 2005 ASME Microchannel and Minichannel Conference
- Chair, Fluids Engineering Division, FE8B Session, IMECE04
- Reviewer, 2004 IMECE, Microfluidics Symposium
- Reviewer, 2004 ASME Summer Heat Transfer/Fluid Mechanics Conference
- Chair, 7th US Congress on Computational Mechanics, 2003
- Chair, Fluids Engineering Division, IMECE03
- Reviewer, 2003 IMECE, Microfluidics Symposium
- Co-chair, MEMS Poster Session, IMECE02
- ASME Micro-fluidics Technical Committee

PAPER REVIEW

- Analytical Chemistry (4)
- Atmospheric Environment (1)
- Electrophoresis (5)
- Experiments in Fluids (1)
- International Journal of Heat and Fluid Flow (1)
- International Journal of Heat and Mass Transfer (1)
- International Journal of Thermal Sciences (2)
- Journal of Colloid and Interface Science (2)
- Journal of Enhanced Heat Transfer (1)
- Journal of Fluids Engineering (6)
- Journal of Fluid Mechanics (1)
- Journal of Heat Transfer (4)

- Journal of Microelectromechanical Systems (1)
- Journal of Micromechanics and Microengineering (3)
- Physics of Fluids (3)
- Lab on a Chip (1)
- Langmuir (1)
- Metallurgical and Materials Transactions (1)
- Microfluidic and Nanofluidics (3)
- Sensors and Actuators (2)

PROPOSAL REVIEW

Reviewed proposals for the following funding agencies

1) Technology Foundation STW Research (Netherlands)
2) National Defense Science and Engineering (panel)
3) National Science Foundation (Both panel and mail-in review)
4) California Energy Commission (mail-in review)
5) ACS Petroleum Funds

RESEARCH COLLABORATORS

Dr. Salahuddin Ahmed (PNNL, Richland, WA)
Dr. Amit Bandyopadhyay (MME, WSU)
Dr. Ali Beskok (ME, Old Dominion University)
Dr. Su Ha (ChEBE, WSU)
Dr. Herbert H. Hill (Chemistry, WSU)
Dr. Keisuke Horiuchi (Hitachi Ltd, Ibaraki, Japan)
Dr. Akram Hossain (CEE, WSU Tri-cities)
Dr. Cornelius F. Ivory (ChEBE, WSU)
Dr. MinJun Kim (ME, Drexel University)
Dr. Cheng Lee (ChE, Univ. of Maryland, College Park)
Dr. M. Grant Norton (MME, WSU)
Dr. Mike Ramsey (Chemistry, Univ. of N. Carolina)
Dr. Cecilia D. Richards (MME, WSU)
Dr. Sukesh Roy (WP Air Force Base, Dayton, OH)
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)
ME 521: Fundamentals of Fluids I (Fall 2001)
ME 515: Convective Heat Transfer (Spring 2004, Spring 2006)

ME 406: Experimental Design (Spring 2002, Fall 2002, Spring 2003)
ME 404: Heat Transfer (Summer 2002, Spring 2003, Spring 2004, Fall 2004, Spring 2005, Fall 2005)
ME 402: Thermal Systems Design (Fall 2006, Spring 2007)
ME 303: Fluid Mechanics (Summer 2003, Spring 2006, Spring 2007)

GRADUATE STUDENTS

Current Graduate Students

- Mr. Jae Sool Shim, Ph.D. Student
- Mr. John Schwarzkopf, Ph.D. Student
- Mr. Talukder Zaki Jubery, Ph.D. Student
- Mr. Isaac Sprague, MS Student

Previous Graduates

- Ms. Helena Miao, MS (June 2007, Technip Inc., Houston, TX)
- Mr. Nazmul H. Mamun, MS (Aug. 2006)
- Mr. Keisuke Horiuchi, Ph.D. (Dec 2005, Reseach Engr, Hitachi Ltd, Japan)
- Ms. Rani Rehnuma, BS (Aug 2005, Engineer, Boeing, Seattle, WA)
- Mr. Pavel Ledyan, MS (Aug 2004, Design Engineer, Kennametal Inc., Arkansas)
- Mr. Jester Putteman, BS (May 2004, Graduate Student, Univ. of Washington)
- Mr. Juan David Salgado, MS (May 2004, US Army Crops of Engineer, Walla Walla, WA)
- Mr. Keisuke Horiuchi, MS (Aug 2003, Continued Doctoral degree)

VISITING PROFESSORS

- Prof. Reiyu Chein, Mechanical Eng, National Chung Hsing University, Taichung, Taiwan
- Prof. Suijit Ghosal, Mechanical Engineering, Jadavpur University, West Bengal, India

RESEARCH GRANTS

- "Rapid Fingerprinting of Cardiac Biomarker," $750,000, Life Sciences Discovery Fund, October 2007-Sept 2010 (PI: Prof. Cornelius F. Ivory).

- "A Four Dimensional (4D) Microchip for Proteomics," $200,000 (NSF) +$30,000 (Matching fund from WSU), National Science Foundation, August 2006 – July 2008. (PI: Prof. Cornelius F. Ivory)

- "A Novel Biosensor Based Liquid Phase Ion Mobility Spectrometer," $233,536, NIBIB, National Institutes of Health (NIH), 07/1/2005 to 09/30/2009. (PI: Prof. Herbert Hill, Chemistry, WSU)

- "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. (co-PI: C. F. Ivory)

- "REU Supplement: Integrated Multistage Iso-electric Focusing on a PDMS Microchip," $12,000, National Science Foundation, July 1, 2003 – June 30 2006. (co-PI: C. F. Ivory)

- "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.

- "Design, Fabrication and Characterization of Micropumps," WSU Office of Research, $7,662, May 16, 2002 – August 15, 2003.

SERVICES

1. Mechanical and Materials Engineering, Washington State University

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

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

(b) Member, MEMS Course Design Committee

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

(d) Thermo-Fluid Faculty Search Committee (2005-2006)

(e) MME Seminar Coordinator, *(from July 2004 to December 2005)*

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

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

- Involved students in the professional society
- 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

(g) Member, Graduate Studies Committee *(from January 2006 to August 2006)*

- 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

(h) Member, Undergraduate Studies Committee *(from August 2006 to present)*

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

2. College of Engineering and Architectures, Washington State University

(a) 7th 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

(b) Summer at WSU: Engineering Experiences for Teachers (SWEET) Program (2005, 2006)

- 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
- Visit two local high schools to disseminate the idea

(c) Review Classes for EIT Examination (2005, 2007)

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