**Muhammad K Akbar, PhD**

Assistant Professor

Mechanical and Manufacturing Engineering Department

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**EDUCATION**

* **Ph. D.** in Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia.

*Major*: Thermal and fluid sciences

*Minor*: Engineering Mathematics

*Ph.D. Dissertation Title*: “Transport Phenomena in Complex Two and Three-Phase Flow Systems*.*”

*Completed:* Dec 2004

*Advisor:* Dr. S. Mostafa Ghiaasiaan

*Studies Included*: Experimental study on pulp fiber-liquid-gas slurry flow, theoretical study on two-phase flow regime map in microchannels, theoretical study on stability of stratified gas-liquid flow in horizontal channels, modeling of micro-/nano-aerosol transport in rising bubbles, soot thermophoresis in laminar tube flow, mechanism of gas absorption in slurry droplet with reactive micro-particles, effect of thermocapillary force on micro-bubbles.

* **M.S.** in Engineering Science and Mechanics, The University of Alabama, Tuscaloosa, Alabama.

*Major*: Engineering Science and Mechanics

*M.S. Thesis Title*: “Turbulent Dispersed Particulate Flow in a Zigzag Channel*.*”

*Completed:* May 2001

*Advisor:* Dr. M.A.R. Sharif

*Studies Included*: Particle trajectory calculation in a turbulent flow through zigzag channel, effect of forces on a particle in straight channels.

* **M.Sc.** in Mechanical Engineering, Bangladesh University of Engineering &Technology, Bangladesh.

*Major*: Thermal Fluid Sciences

*M.Sc. Thesis Title*: “A Computational Study on the Structure of the Attached Eddies in a Turbulent Boundary Layer”

*Completed:* December 1998

*Advisor:* Dr. Mesbah Uddin

*Studies Included*: Modeling of a horse shoe vortex in a turbulent boundary layer.

* **B.Sc.** in Mechanical Engineering, Bangladesh University of Engineering & Technology, Bangladesh.

*Major*: Mechanical Engineering

*Completed:* April 1995.

*Studies Included*: Thermo-fluids, solid mechanics, dynamics, vibration, machine design.

# AWARDS & RECOGNITIONS

* Outstanding Teacher Award 2006, Georgia Institute of Technology Savannah, Georgia.
* Outstanding M.S. graduate research assistant of the year 2001, Aerospace Engineering and Mechanics Department, The University of Alabama, Tuscaloosa, Alabama.

# FUNDS RECEIVED or PROPOSAL UNDER REVIEW

1. RIA: Understanding the Evolution of Hurricane Storm Surge through Simulation Using Forecast and Best Track Wind Data

PI: **Muhammad Akbar**

Agency: National Science Foundation

Budget: $209,403 for 2 years

Status: Funded

1. MSI: Implicit Solver for ADCIRC Storm Surge Model

PI: **Muhammad Akbar**

Agency: Department of Homeland Security

Budget: $44,101 for 1 year

Status: Funded

1. Film Cooling Processes for Gas Turbine Blades Using Numerical Simulation Methods

Co-PI: **Muhammad Akbar**.

Agency: Air Force Research Laboratory.

Budget: $90,000 for one year

Status: Funded

# PROFESSIONAL EXPERIENCE

**SUMMARY TABLE**

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| --- | --- | --- |
| **Duration** | **Position** | **Job Description** |
| Sept. 2012 – Present | Assistant Professor  Mechanical and Manufacturing Engineering Department  Tennessee State University  Nashville, Tennessee 37209 | Teaching, research, course and laboratory development |
| Aug. 2008 – Aug. 2012 | Senior Research Associate  Northrop Grumman Center for High Performance Computing  Jackson State University, Jackson, Mississippi | Finite element and volume based CFD modeling; model integration for multi-scale problems; proposal writing; occasion teaching. |
| Jan. 2005 – Aug. 2008 | Visiting Assistant Professor  Georgia Institute of Technology, Savannah, Georgia | Teaching, research, course and laboratory development. |
| Aug. 2001 – Dec. 2004 | Graduate Research Assistant  Georgia Institute of Technology, Atlanta, Georgia | Research, teaching |
| Jan. 1999 – Apr. 2001 | Graduate Research Assistant  University of Alabama, Tuscaloosa, Alabama | Research, teaching |
| Sep. 1996 – Dec. 1998 | Lecturer/ Assistant Professor  Bangladesh University of Engineering and Technology | Teaching, research, advising students |

# RESEARCH REPORTS

1. Aliabadi, S., and **Akbar, M.K.** “(MSFP)2 Multi-Purpose, Multi-Scale Storm Surge And Flood Forecasting For Planning And Preparedness”, SERRI Report 70004-01, Nov. 2010.
2. Watts, M., Aliabadi, S., and **Akbar, M.K.** “Development of an Ensemble Modeling System for the Simulation of Realistic Levee Overtopping Flows from Hurricanes”, SERRI Report 80005-1, Nov. 2011.
3. Ghiaasiaan, S.M., Karrila, S., Xie, T., and **Akbar, M.K.** “Bubble Size Control to Improve Oxygen-Based Bleaching,” Final Report, Georgia Institute of Technology, presented to US Department of Energy, 2004.
4. Ghiaasiaan, S.M., and **Akbar, M.K.** “Modeling of Thin Film Evaporative Cooling,” Final Report, Georgia Institute of Technology, presented to NASA Langley Research Center, September 2004.

# JOURNAL PUBLICATIONS

1. **Akbar, M.K.**, Aliabadi, S. “Hybrid Numerical Methods to Solve Shallow Water Equations for Hurricane Induced Storm Surge Modeling”. Environmental Modelling & Software, Volume 46, August 2013, Pages 118–128.
2. Akbar, M.K., Aliabadi, S., Patel, R, and Watts, M. “Fully Automated and Integrated Multi-Scale Forecasting Scheme for Emergency Preparedness”. *Environmental Modelling & Software*, Volume 39, January 2013, Pages 24-38.
3. Aliabadi, S., Akbar, M.K., Patel, R. “Hybrid Finite Element / Volume Method for Shallow Water Equations”. *Int. J. Num. Meth. Fluids*. 83 (2010), 13, 1719–1738.
4. Akbar, M.K., Rahman, M., S.M. Ghiaasiaan. "Particle Transport in a Small Square Enclosure under Laminar Natural Convection Induced by Temperature Gradient". *J. Aerosol Sci.*, 40 (2009) 747 - 761.
5. Akbar, M.K., and Ghiaasiaan, S.M., “Simulation of Taylor Flow in Capillaries Based on the Volume-of-Fluid Technique”, *Ind. Eng. Chem. Res.* 45(15), July 2006, 5396-5403.
6. **Akbar, M.K.**, and Ghiaasiaan, S.M., “A CFD Model for Aerosol Transport in Rising Gas Bubbles,” *J. Aerosol Sci*., **37**, 2006, 735–749*.*
7. Akbar, M.K., and Ghiaasiaan, S.M., “Radiation Heat Transfer and Soot Thermophoresis in Laminar Tube Flow,” *Numerical Heat Transfer, Part A,* Volume 47, Issue 7, 2005, 653 - 670*.*
8. **Akbar, M.K.**, and Ghiaasiaan, S.M., “Modeling the Gas Absorption in a Spray Scrubber with Dissolving Reactive Particles”, *Chem. Eng. Sci.,* **59(5)**, March 2004, 967-976.
9. **Akbar, M.K.**, Ghiaasiaan, S.M., and Karrila, S., “An Experimental Study of Interfacial Surface Area Concentration in a Short Column Subject to Paper Pulp-Water-Gas Three-phase Flow,” *Chem. Eng. Sci.,* **59(5)**, March 2004, 1079-1086.
10. **Akbar, M.K.**, Yan, J., and Ghiaasiaan, S.M., “Mechanism of Gas Absorption Enhancement in a Slurry Droplet Containing Reactive, Sparingly Soluble Micro Particles”, *Int. J. Heat and Mass Transfer*, **46,** 2003, 4561-4571.
11. **Akbar, M.K.**, and Ghiaasiaan, S.M., “Stability of stratified gas-liquid two-phase flow in a horizontal annular channels,” *Experimental Thermal and Fluid Science*, **28,** 2003, 17–21.
12. **Akbar, M.K.**, Plummer, D.A., and Ghiaasiaan, S.M., “On gas–liquid two-phase flow regimes in microchannels,” *Int. J. Multiphase Flow*, **29,** 2003, 855-865*.*

# CONFERENCE PAPERS and POSTERS (Selected)

1. Akbar, M.K. Evaluation of Tides and Hurricane Surges in the Gulf of Mexico by using CaMEL Implicit Storm Surge Model. 19th Annual ADCIRC Model Workshop, National Oceanic and Atmospheric Administration, Silver Spring, Maryland. March 30-31, 2015.
2. **Akbar, M.**, Hitchcock, T., Schuetz, C. 2014. Effect of Heat Extraction from a Photovoltaic Module by Natural and Forced Air Circulation with and without Pre-Cooling of Air. AIAA-2014-2551, 11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Atlanta, Georgia, USA
3. **Akbar, M.** 2014. Finite Element Method Based Model to Solve Three Dimensional Heat Conduction Equations for Photovoltaic Modules. AIAA 2014-2551, 11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference, Atlanta, Georgia, USA
4. Akbar, M.K., Aliabadi, S. Parallel Finite Element Methods in Nonlinear Structural Dynamics Modeling for Fluid-Structure Interaction. 24th International Conference on Parallel Computational Fluid Dynamics. Atlanta, GA, USA. May 21-25, 2012.
5. Aliabadi, S., **Akbar, M.** Hybrid Finite Element and Volume Methods for Shallow Water Equations in Environmental Modeling. 11th US National Congress on Computational Mechanics. Minneapolis and St. Paul, Minnesota, USA, July 25-28, 2011.
6. Aliabadi, S., **Akbar, M.** Hybrid Finite Element / Volume Method to Solve Shallow Water Equations for Storm Surge Modeling. Hurricanes, Major Disasters, Coastal Protection and Rapid Recovery in Texas and Gulf Coast Region, 3rd Annual Conference (THC-2011). University of Houston, Houston, Texas, USA, August 5, 2011.
7. **Akbar, M.K.**, and Aliabadi, S. “Multi-Scale and Multi-Physics Integrated Hurricane, Water Surge, and Overland Flow Modeling in Parallel Platform”, ADCIRC 2010 Workshop, ERDC, Vicksburg, MS, April 16-17, 2010.
8. **Akbar, M.K.**, and Aliabadi, S. “Integrated Hurricane and Overland Flow Modeling in Parallel Platform”, 21st International Conference on Parallel Computational Fluid Dynamics—(ParCFD 2009), May 18-22, 2009, Moffett Field, CA.
9. Rahman, M. and **Akbar, M.K.**, “Particle Transport in a Small Square Enclosure Under Natural Convection Induced By High Temperature Gradient”. *Inaugural International Conference of the Engineering Mechanics Institute*, Minneapolis, May 18-21, 2008.
10. Stewart, B. K., **Akbar, M. K.**, and Ghiaasiaan, S.M. 2005, “Thin-film Evaporative Cooling of a Side-pumped Solid state Laser Diode Oscillator for Space-based LIDAR Applications.” *Proc. SPIE- The International Society for Optical Engineering*. Paper Number: SPIE2005-598405.
11. **Akbar, M.K.**, and Ghiaasiaan, S.M., 2004, “Radiation Heat Transfer and Soot Thermophoresis in Laminar Tube Flow,” *ASME H****eat Transfer/Fluids Engineering Summer Conference*, Charlotte, North Carolina. Paper Number:** HT-FED2004-56686.
12. Akbar, M.K., Sharif, M.A.R., and Bradt, R.C., 2000, “Turbulent Dispersed Particulate Flow in a Zigzag Channel,” *ASME Design Engineering Technical Conferences*, Baltimore, Maryland. Paper Number: DETC2000/CIE-14675.
13. Akbar, M.K., Sharif, M.A.R., and Bradt, R.C., 2001, “Particle Trajectory Calculation in Turbulent Flow Through a Zigzag Channel,” *4th International Conference On Multiphase Flow*; New Orleans, Louisiana. Paper Number: ICMF2001-834.
14. Akbar, M.K., Sharif, M.A.R., and Bradt, R.C., 2001, “Effect of Forces on a Particle in a Straight Channel Turbulent Flow,” *4th International Conference On Multiphase Flow*; New Orleans. Louisiana, Paper Number: ICMF2001-947.