Muhammad K Akbar, PhD

Mechanical and Manufacturing Engineering Department, Tennessee State University
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RESEARCH INTEREST

Computational Fluid Dynamics; HVAC Design for Buildings; Thermal Fluids, Hurricane Storm Surge Model Development; Porous Media; Gas Turbine Film Cooling; Catalyticl Converter Simulation; Multiphase Flow; Particulate Flow; Microchannel / Minichannel Flow; MPI based Parallel Model Development; Delayed Detached Eddy Simulation Turbulence Model Development; MATLAB and ANSYS FLUENT Based Modeling; Fluid Structure Interaction; Solar Energy.

PROFESSIONAL PREPARATION

Bangladesh University of Engineering & Technology	Mechanical Engineering	B.Sc.	1995
Bangladesh University of Engineering & Technology	Mechanical Engineering	M.Sc.	1998
University of Alabama	Engineering Science & Mechanics	M.S.	2001
Georgia Institute of Technology	Mechanical Engineering	Ph.D.	2004

APPOINTMENTS

Associate Professor	Tennessee State University	8/18 – present
Assistant Professor	Tennessee State University	9/12 – 7/18
Senior Research Associate	Jackson State University	8/08 – 8/12
Visiting Assistant Professor	Georgia Institute of Technology	1/05 – 8/08
Graduate Research Assistant	Georgia Institute of Technology	8/01 – 12/04
Graduate Research Assistant	University of Alabama	1/99 – 5/01
Lecturer	Bangladesh University of Engineering & Technology	9/96 – 12/98

JOURNAL PUBLICATIONS

1. Alsaidi, B., Joe, W. Y., & Akbar, M. (2019). Simplified 2D Skin Lattice Models for Multi-Axial Camber Morphing Wing Aircraft. Aerospace, 6(8), 90.
2. Alsaidi, B., Joe, W. Y., & Akbar, M. (2019). Computational Analysis of 3D Lattice Structures for Skin in Real-Scale Camber Morphing Aircraft. Aerospace, 6(7), 79.
3. Musinguzi, A., Akbar, M. K., Fleming, J. G., & Hargrove, S. K. (2019). Understanding Hurricane Storm Surge Generation and Propagation Using a Forecasting Model, Forecast Advisories and Best Track in a Wind Model, and Observed Data—Case Study Hurricane Rita. Journal of Marine Science and Engineering, 7(3), 77.
4. Alghamdi, A., Akbar, M.K. (2018) Implementation of an Implicit Solver in ADCIRC Storm Surge Model. J. Mar. Sci. Eng. 6, 62.
5. Traum, M. J., Hadi, F., & Akbar, M. K. (2018). Extending “Assessment of Tesla Turbine Performance” Model for Sensitivity-Focused Experimental Design. Journal of Energy Resources Technology, 140(3).
6. Alghamdi, A., Akbar, M. (2017). Profiling and Evaluation of Implicit and Explicit Storm Surge Models. Int. J. Comput. Theory Eng, 9, 417-421.
7. Akbar, M., Kanjanda, S., Musinguzi, A. (2017). Effect of Bottom Friction, Wind Drag Coefficient, and Meteorological Forcing in Hindcast of Hurricane Rita Storm Surge Using SWAN+ADCIRC Model. Journal of Marine Science and Engineering, 5(3), 38.

8. Akbar, M. K., Luettich, R. A., Fleming, J. G., & Aliabadi, S. K. (2017). CaMEL and ADCIRC Storm Surge Models—A Comparative Study. Journal of Marine Science and Engineering, 5(3), 35.
9. Akbar, M., Alsaidi, B., Painter, R., Sharpe, L., Ghiaasiaan, M. The Effects of Coolant Pipe Geometry and Flow Conditions on Turbine Blade Film Cooling, Journal of Thermal Engineering (accepted for publication on Dec 7, 2016).
10. Bryant, K. M., Akbar, M. (2016). An Exploration of Wind Stress Calculation Techniques in Hurricane Storm Surge Modeling. Journal of Marine Science and Engineering, 4(3), 58.
11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. Akbar, M.K., and Ghiaasiaan, S.M., "A CFD Model for Aerosol Transport in Rising Gas Bubbles," J. Aerosol Sci., 37, 2006, 735–749.
17. 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. 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)

I. Bryant, K., Musinguzi, A., Akbar, M., & Fleming, J. G. (2020, May). Hurricane Storm Surge from Irma and Maria in Puerto Rico and the Virgin Islands: Analyzing Wind, Pressure, Track, Forward Speed, Rain, and the Saffir-Simpson Scale. In 34th Conference on Hurricanes and Tropical Meteorology. AMS.

II. Bryant, K., Musinguzi, A., & Akbar, M. (2019, January). The Saffir–Simpson Scale: Simple, Straightforward, and Insufficient. In 99th American Meteorological Society Annual Meeting. AMS.

III. Alsaidi, Bashir, Muhammad Akbar, Sara La, W. Yeol Joe, Hangil You, Seongik Kim, and Gunjin Yun. "Modeling and Stress Analysis of Composite Skin Structure for Camber Morphing Wing." In 2018 Multidisciplinary Analysis and Optimization Conference, p. 2934. 2018.

IV. Traum, Matthew J., Muhammad K. Akbar, Mohammad Habibi, Fatemeh Hadi, S. Keith Hargrove, and W. Yeol Joe. "Introducing the TOP-DOWN-TOP Pedagogy: Systems Thinking that Inspires, Engages, & Promotes Persistence." (2018).

V. Bryant, K., Alghamdi, A., Musinguzi, A., and Akbar, M. "Incorporating Rainfall into Storm Surge Prediction for Hurricane Irma" 33rd Conference on Hurricanes and Tropical Meteorology, 16-20 April 2018, Ponte Vedra Beach, Florida.

VI. La, S., Joe, W.J., Akbar, M.K. Surveys on Skin Design for Morphing Wing Aircraft: Status and Challenges (Control ID#: 2795396). AIAA Science and Technology Forum and Exposition (SciTech 2018). Kissimmee, Florida, 8-12 January 2018.

VII. 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.

VIII. 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

IX. 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.

FUNDS RECEIVED or PROPOSAL UNDER REVIEW

1. **Muhammad Akbar (PI)**: Excellence in Research: Effect of Hurricane Structure, Track, and Landfall Features on Storm Surges (TSU Grants Account # 222481-13940-250). Funded by the National Science Foundation, May 15, 2020 to May 14, 2023, **$406,331.**
2. **Woong Yeol Joe (PI), Muhammad Akbar (Co-PI)**: Design and Manufacturing of Advanced Multi-dimensional Mesostructured Composite Skins for Morphing Wings (TSU Grants Account # 222385/13490/250). Air Force Research Laboratory, September 1, 2016 to August 31, 2018. **$200,000.**
3. **Lonnie Sharpe (PI), Roger Painter (Co-PI), Muhammad Akbar (Co-PI)**: Film Cooling Processes for Gas Turbine Blades Using Numerical Simulation Methods (TSU Grants Account # 222308/13490/250). Air Force Research Laboratory, January 1, 2015 to December 31, 2015. **$90,000.**
4. **Muhammad Akbar (PI)**: Research Initiation Award: Development and Study of an Implicit Model for Rapid and Accurate Simulation of Hurricane Storm Surge (TSU Grants Account # 222285-86/13490/250). Funded by the National Science Foundation, June 15, 2014 to May 31, 2017, **$209,403.**
5. **Muhammad Akbar (PI)**: Implicit Solver for ADCIRC Storm Surge Model (TSU Grants Account# 222288/13490/250). Funded by the Department of Homeland Security, May 01, 2014 to March 30, 2015. Amount **$44,101.**

AWARDS & RECOGNITIONS

- Registered Professional Engineer (PE) in the state of Tennessee.
- Exceptional Commitment to Students via Education and Mentorship Award 2018, College of Engineering, Tennessee State University.
- '2018 Research Mentorship Award Winner', 40th Annual University-Wide Research Symposium, Tennessee State University
- Dr. Muhammad Akbar in the NEWS: TSU Professor Creates Simulation Model to Predict Storm Surge in the Event of Hurricanes. (Tennessee State University Newsroom, June 16, 2014) http://tnstatenewsroom.com/archives/15649
- Dr. Muhammad Akbar's Graduate Student Ms. Kyra Bryant received best thesis award in the state of Tennessee by Tennessee Conference of Graduate Schools (TCGS) (Tennessee State University Newsroom, February 12, 2017): http://tnstatenewsroom.com/archives/19632
- '2016 Research Mentorship Award Winner', 38th Annual University-Wide Research Symposium, Tennessee State University.
- 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.
- One of my journal papers (*"On gas–liquid two-phase flow regimes…"*) was among the most cited articles in the *International Journal of Multiphase Flow* (Elsevier) for the period 2002-2005.
- Faculty mentor for 2 (two) President's Undergraduate Research Awards (PURA) at Georgia Tech in spring 2006.
- GWW School of Mechanical Engineering *nomination* for the Georgia Tech Chapter Sigma Xi Best PhD Thesis Award in 2005.

IMMIGRATION STATUS

Naturalized US Citizen