MD ABDUL HAMID
PhD Candidate
Department of Mechanical Science and Engineering
University of Illinois Urbana-Champaign (UIUC)

mdabdul2@illinois.edu
mahamid.me.buet@gmail.com

Education

- University of Illinois Urbana-Champaign (UIUC)
  - PhD in Mechanical Science and Engineering (MechSE) [August 2017-present]
- Bangladesh University of Engineering and Technology (BUET)
  - M.Sc. in Mechanical Engineering (ME) [January, 2016]
  - B.Sc. in Mechanical Engineering (ME) [February, 2013]

Thesis dissertations

- PhD Thesis: Current research work is focused on developing new theories for transient solute transport through porous media with simultaneous advection, diffusion and reaction. Supervisor: Dr. Kyle C. Smith, (MechSE, UIUC)
- MSc Thesis: Control of shock wave oscillation in transonic internal flow around an airfoil using cavity. Supervisor: Dr. A. B. M. Toufique Hasan, (ME, BUET)
- BSc Thesis: A CFD study on compressible flow around a biconvex circular-arc airfloil in a channel. Supervisor: Dr. A. B. M. Toufique Hasan, (ME, BUET)

Patent applications

- Kyle C. Smith, Md Habibur Rahman, Irwin C. Loud, Vu Q. Do, **Md Abdul Hamid** and Colby Warden, Tapered, interdigitated channels for uniform, low-pressure flow through porous electrodes for desalination and beyond, US Provisional Patent Application 63/743995, 2025.

Journal publications

1. **Md Abdul Hamid** and Kyle C. Smith, Up-scaling of transient dispersion thorough porous media using multi-continuum approach (*in preparation*).
2. **Md Abdul Hamid** and Kyle C. Smith, **V**olume-Averaging Theory for Up-Scaling of Short-Time Hydrodynamic Dispersion through Porous Media (*to be submitted*).
3. Md Habibur Rahman, Irwin C. Loud, Vu Q. Do, **Md Abdul Hamid** and Kyle C. Smith, Tapered, Interdigitated Channels for Uniform, Low-Pressure Flow through Porous Electrodes for Desalination and Beyond, Electrochemical Acta, 514, 145632, 2025.
4. **Md Abdul Hamid** and Kyle C. Smith, A Bottom-Up, Multi-Scale Theory for Transient Mass Transport of Redox-Active Species through Porous Electrodes Beyond the Pseudo-Steady Limit, Journal of Power Sources, 565, 232756, 2023.
5. **Md Abdul Hamid** and Kyle C. Smith, Modeling the transient effects of pore-scale convection and redox reactions in the Pseudo-Steady limit, Journal of The Electrochemical Society, 167 (1), 013521, 2020.
6. **Md Abdul Hamid**, A. B. M. Toufique Hasan, M. Ali, Y. Mitsutake, T. Setoguchi and S. Yu, Unsteady Transonic Flow Control around an Airfoil in a Channel, Journal of Thermal Science, 25 (2), 117-122, 2016.
7. **Md Abdul Hamid**, A. B. M. Toufique Hasan, S. M. Alimuzzaman, S. Matsuo, and T. Setoguchi, Compressible flow characteristics around a biconvex arc airfoil in a channel, Propulsion and Power Research, 3 (1), 29-40, 2014.

Conference publications, presentations and abstracts

1. **Md Abdul Hamid** and Kyle C. Smith, A Theory of Hydrodynamic Dispersion and Reaction in Porous Media Beyond the Long-Time Limit, Interpore 2025 (17th Annual Meeting & Conference Courses), Abstract ID 366 (to be presented on May 22, 2025).
2. **Md Abdul Hamid** and Kyle C. Smith, A transient theory for solute transport through redox flow battery electrodes in the creeping flow regime, 51st Midwest Universities Fluid Mechanics Retreat (MUFMECH), Session-F, Talk No 35, 2024.
3. **Md Abdul Hamid** and Kyle C. Smith, A Bottom-up Transient Theory for Concentration Polarization with Applicability to over-Limiting Current Conditions, 243rd ECS Meeting Abstract, MA2023-01, 1669, 2023.
4. **Md Abdul Hamid**, Venkat P. Nemani, Yite Wang and Kyle C. Smith, Exploring multi-scale interactions in redox flow batteries for resilient energy storage, Applied energy symposium, MIT A+B, 2020.
5. **Md Abdul Hamid** and A. B. M. Toufique Hasan, Passive Control of Shock Oscillation Around a Biconvex Circular Arc Airfoil in a Channel, 6th BSME International Conference on

	Thermal Engineering (ICTE 2014), (Paper ID: 272), 19-21, 2014. 6. **Md Abdul Hamid**, S. M. Alimuzzaman, M. M. Rahman and A. B. M. Toufique Hasan, A Numerical Investigation on Transonic Flow around a Biconvex Circular Arc Airfoil in a Channel, Proceedings of the 14th Asian Congress of Fluid Mechanics, Hanoi and Halong, Vietnam, 15-19, 326-330, 2013.
Research experiences	○ Conducted experiments on laboratory-scale flow cells, e.g., electrochemical impedance spectroscopy (EIS) and cyclic voltammetry. ○ Gathered experience in working in cleanrooms. Worked in MNMS, UIUC for three months (May-July 2020), while attempting to manufacture porous electrode consisting of array of glassy carbon micropillars on a graphite substrate using photolithography (C-MEMS) ○ Helped Prof. Kyle Smith to review several submissions (more than 5) in different peer reviewed journals. ○ Acted as assistant in-charge of High-Speed Aero Lab and Bio-Fluid laboratory, Department of Mechanical Engineering, BUET (2015 - 2017). ○ Represented Bio-Fluid laboratory in national workshop on HEQEP achievements, 2015 ○ Acted as a member of the Secretary Committee of International Conference on Mechanical Engineering (ICME 2013 and ICME 2015). ○ Attended workshop on Bio-Fluid Dynamics (2013) held at BUET, Bangladesh
Teaching Experience	○ Working as graduate assistant (Teaching Assistant) at the Department of Mechanical Science and Engineering in University of Illinois Urbana-Champaign (UIUC) in multiple semesters (more than 10 semesters) [August 2017 - Present] ○ Worked as teaching fellow for TAM 335: Introductory Fluid Mechanics, at Department of Mechanical Science and Engineering in University of Illinois Urbana Champaign (UIUC) for Spring-2024 semester [Spring 2024] ○ Have been selected as one of the excellent TAs by Center for Innovation in Teaching & Learning (CITL) based on the IECS evaluation in the fall 2022 semester. [Fall 2022] ○ Worked as an assistant professor at Department of Mechanical Engineering in Bangladesh University of Engineering and Technology [July 2016 – August 2017] ○ Worked as lecturer at Department of Mechanical Engineering in Bangladesh University of Engineering and Technology [March 2013 - July 2016] ○ Attended the teacher's appreciation workshop (2015) held at BUET, Bangladesh
Organizing Experiences	○ Organized Industrial Training (ME 370) for 180 students in about 40 different industries in Bangladesh for four (04) consecutive years [2013 - 2016] ○ Organized International Conference on Mechanical Engineering (ICME) in the department twice [2013, 2015] ○ Acted as ● Convener, Shahid Smrity Hall (teacher's residential dormitory unit) at BUET ● Founding Joint Secretary of BUET Energy Club ● Vice president of BADHON (Volunteer Blood Donating Organization), Dr. M. A. Rashid Hall unit (BUET Zone)
Skills	○ Programming language: MATLAB, Python, C ○ Web development tools (front end): HTML, CSS ○ Simulation tools: Ansys Fluent ○ Drawing and design tools: Solid Works, AutoCAD ○ Data processing tools: Matplotlib, Inkscape, Techplot ○ Documentation and presentation tools: Office Suits
Reference	○ Dr. Kyle C. Smith Email: kcsmith@illinois.edu Associate Professor, Department of Mechanical Science and Engineering (MechSE) University of Illinois Urbana-Champaign (UIUC)