Dr. Mohebujjaman

Contact Information

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Education

Degree — Ph.D. in ***Applied and Computational Mathematics,*** August 2017
Dissertation: *Efficient Numerical Methods for Magnetohydrodynamic Flow*
Concentration: Computational and Applied Mathematics
Advisor: Dr. Leo G. Rebholz, Professor, Department of Mathematical Sciences, Clemson University, Clemson, SC, USA
Co-advisor: Dr. Timo Heister, Assistant Professor, Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT, USA

Degree — M.S. in ***Applied Mathematics,*** August 2015
Project: *Linear Solvers for Saddle Point Problems Arising in Navier-Stokes Simulations.*
Advisor: Dr. Leo G. Rebholz, Professor, Department of Mathematical Sciences
Clemson University, Clemson, SC, USA

Degree — M.S. in ***Applied Mathematics,*** March 2009, *First Class First*
Thesis: *MHD Heat and Mass Transfer Flow Along a Stretching Sheet with Heat Generation/Absorption.*
Advisor: Dr. Abdus Samad, Professor, Applied Mathematics
University of Dhaka, Dhaka, Bangladesh

Degree — B.S. (Honors) in ***Mathematics,*** December 2006, *First Class First*
Project: *Perturbation Methods in Aero-fluid Dynamics*
Minor: Statistics and Computer Science
Advisor: Dr. Abdus Samad, Associate Professor, Mathematics
University of Dhaka, Dhaka, Bangladesh

Employment

2019-present	***Post-doctoral Associate***, Plasma Science and Fusion Center, MIT, Cambridge, MA
2018- 2019	***Post-doctoral Fellow***, *Department of Biomedical Engineering and Mechanics*, Virginia Tech, Blacksburg, VA, USA
2017 - 2019	***Visiting Assistant Professor***, *Department of Mathematics*, Virginia Tech, Blacksburg, VA, USA
2015-2017	***Graduate Teacher of Record***, *Department of Mathematical Sciences*, Clemson University, Clemson, SC, USA
2012-2015	***Graduate Teaching Assistant***, *Department of Mathematical Sciences*, Clemson University, Clemson, SC, USA
2010 - 2012	***Faculty***, *Department of Mathematics*, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
2009-2010	***Faculty in Mathematics,*** *Department of Textile Engineering*, Southeast University, Dhaka, Bangladesh
2008-2009	***Faculty in Mathematics***, *Department of Computer Science and Engineering*, University of Information Technology and Sciences, Dhaka, Bangladesh

Journal Referee

1. SIAM Journal on Numerical Analysis
2. Journal of Discrete and Continuous Dynamical Systems, Series B
3. Numerical Methods for Partial Differential Equations Journal

Research Interests

Numerical Analysis/Methods, data analysis, large scale simulation of fluid flow problems including Newtonian Navier-Stokes equations, Magnetohydrodynamics (MHD), Uncertainty Quantification (UQ), fast algorithms, reduced order modeling (ROM), large scale parallel implementation of fluid flow problem using deal.II (massively parallel), undergraduate research, and Mathematical pedagogy.

Refereed Journal Publications and Ongoing Works

1. Low-rank calibrated filtered reduced order modeling of fluid flows, **M. Mohebujjaman**, M. Balajewicz, and T. Iliescu in preparation.
2. Dufor and Soret effects on Magnetohydrodynamic Non-Newtonian flows along a moving stretching sheet, F. Kamronnaher, and **M. Mohebujjaman**, in preparation.
3. Nonintrusive stabilization of reduced order models for uncertainty quantification of time-dependent convection-dominated flows, M. Gunzburger, T. Iliescu, **M. Mohebujjaman**, and M. Schneier, submitted. Preprint: https://arxiv.org/abs/1810.08746
4. Commutation Error in Reduced Order Modeling of Fluid Flows, B. Koc, **M. Mohebujjaman**, C. Mou, and T. Iliescu, submitted. Preprint: https://arxiv.org/abs/1810.00517
5. High order efficient algorithm for computation of MHD flow ensemble, **M. Mohebujjaman**, submitted. Preprint: https://bit.ly/2CxpEZC.
6. Physically-Constrained Data-Driven Correction for Reduced Order Modeling of Fluid Flows, **M. Mohebujjaman**, L. G. Rebholz, and T. Iliescu, International Journal for Numerical Methods in Fluids, in press. Preprint: https://arxiv.org/pdf/1806.00350.pdf
7. Data-Driven Filtered Reduced Order Modeling Of Fluid Flows, X. Xie, **M. Mohebujjaman**, L.G. Rebholz, and T. Iliescu, SIAM Journal on Scientific Computing, 40(3), B834-B857, 2018.
8. Energy Balance and Mass Conservation in Reduced Order Models of Fluid Flows, **M. Mohebujjaman**, L.G. Rebholz, X. Xie, and T. Iliescu, Journal of Computational Physics, 321, 128-142, 2017.
9. High order algebraic splitting for magnetohydrodynamics simulation, M. Akbas, **M. Mohebujjaman**, L. Rebholz, and M. Xiao, Journal of Computational and Applied Mathematics, 321, 128-142, 2017.
10. Decoupled, unconditionally stable, higher order discretizations for MHD flow simulation, T. Heister, **M. Mohebujjaman** and L. G. Rebholz, Journal of Scientific Computing, 71(1), 21-43, 2017.
11. An efficient algorithm for computation of MHD flow ensembles, **M. Mohebujjaman** and L. G. Rebholz, Computational Methods in Applied Mathematics, 17(1), 121-137, 2017.
12. Analysis of a family of optimally accurate regularization methods for Navier-Stokes equations, N. Jiang, **M. Mohebujjaman**, L. Rebholz and C. Trenchea, Computer Methods in Applied Mechanics and Engineering, 310, 388-405, 2016.
13. Numerical analysis and testing of a fully discrete, decoupled penalty-projection algorithm for MHD in Elsässer variable, M. Akbas, S. Kaya, **M. Mohebujjaman** and Leo G. Rebholz, International Journal of Numerical Analysis and Modeling, 13(1), 90-113, 2016.

14. Heat and Mass Transfer of an MHD Forced Convection Flow Along a Stretching Sheet with Chemical Reaction, Radiation and Heat Generation in Presence of Magnetic Field, M.S. Hossain, M.A. Samad and **M. Mohebujjaman**, International Journal of Physics and Research, 1(1), 30-58, 2011.

15. Informative Motif Detection Using Data Mining, F. A. Hoque, **M. Mohebujjaman** and N. Noman, Research Journal of Information Technology, 3(1), 26-32, 2011.

16. MHD Heat and Mass Transfer Free Convection Flow Along a Stretching Sheet with Suction when Buoyancy Opposes the Flow, **M. Mohebujjaman** and M. A. Samad, GANIT: Journal of Bangladesh Mathematical Society, 30, 76-88, 2010.

17. MHD Heat Transfer Mixed Convection Flow Along a Vertical Stretching Sheet in Presence of Magnetic Field With Heat Generation, **M. Mohebujjaman**, Tania S. Khaleque and M. A. Samad, International Journals of Basic and Applied Sciences IJBAS-IJENS 10(2), 133-142, 2010.

18. Magnetohydrodynamic Heat and Mass Transfer Forced Convection Flow Along a Stretching Sheet with Heat Generation/ Absorption. M. A. Samad, **M. Mohebujjaman**, M. Mustak Mia and M. A. Rahman, Dhaka University Journal of Science 58(1), 91-96, 2010.

19. Numerical Study of Magnetohydrodynamic Forced Convective Flow of a Micropolar Fluid past a Nonlinear Stretching Sheet with Variable Viscosity. M. A. Rahman, M. A. Samad, M.M. Rahman and **M. Mohebujjaman**, Dhaka University Journal of Science, 57(2), 243-248, 2009.

20. MHD Heat and Mass Transfer Free Convection Flow along a Vertical Stretching Sheet in Presence of Magnetic Field with Heat Generation. M. A. Samad and **M. Mohebujjaman**, Research Journal of Applied Science, Engineering and Technology 1(3), 98-106, 2009.

Projects

1. Modeling Filter Compression, Fluid Generation and Parallelizing the Potts Model, GORE, Mathematical Problems to Industry (MPI) 2016, Duke University, Durham, NC. Link: https://goo.gl/pdY32U

2. C++ parallel implementation of incompressible viscous time-dependent NSE simulation using projection method in Dealii, HPC class 2015, Clemson University. Link: https://goo.gl/UMIAt5

3. Water Accumulation in Plant Cells During Fruit Growth, GSMMC 2016 at Rensselaer Polytechnic Institute, Troy, NY. Link: https://goo.gl/rdiQkG

4. Linear Solvers for Saddle Point Problems Arising in Navier-Stokes Simulations. MS project at Clemson University, 2015.

5. Efficiency of Different Algorithms over Sparse Matrices, Advanced Numerical Analysis class, Clemson University, 2012. Link: https://goo.gl/hSffwE

6. Word problem and Automatic groups, Data Structure class, Clemson University, 2012.

7. Perturbation Methods in Aero Fluid Dynamics. Hours Project, University of Dhaka, 2006.

Workshop

1. SAS Visual Analytics training workshop 2017, SAS and Clemson University, Clemson, SC

2. NVIDIA GPU Programming and Deep Learning workshops 2017, NVIDIA and Clemson University

3. Big Data Analytics with Hadoop MapReduce and Python 2017, Clemson University, SC

4. Introduction to Hadoop MapReduce with Python, 2017, Clemson University, SC

5. Introduction to R for Data Science on Super Computer, 2017, Clemson University, SC

6. High Performance Computing with Spatial Data using R 2016, Clemson University, SC

7. *Mathematical Problems to Industry (MPI) 2016, Duke University, Durham, NC
8. *Graduate Student Mathematical Modeling Camp (GSMMC) 2016, Rensselaer Polytechnic Institute, Troy
9. COMSOL Multi-physics & Application Builder Workshop Clemson, 2015, Clemson University, SC
10. Intel Xeon Phi Training Workshop on Stampede supercomputer, 2014, Clemson University, SC
11. Teacher's Appreciation Workshop, 2011, Bangladesh University of Engineering and Technology, Dhaka

(* = received travel support)

Research Position

2014 Research Assistant, Clemson University, Clemson, SC, Funded by National Science Foundation (NSF)

Learned Programming Languages/Software Packages

Mathematics Large scale implementation of deal.ii library using C++ with MPI, FreeFem++, Matlab, Mathematica, Maple, Sage, R, SAS, IPython Notebook, Lindo, LaTeX, VisIt, Paraview, TechPlot

General C, C++ with Multithreading and MPI, Python, Fortran, Java, MySQL, Perl, CUDA, COMSOL, GraphLab

Platforms Mac, Linux/Unix (Simulation Experience on Palmetto Super Computer), Ubuntu and Windows

Key Courses

Statistics Basic Statistics, Probability, Data Analysis, Principle of Statistics, Mathematical Statistics, Machine Learning, Statistical Methods, SAS Lab.

Operations Research Mathematical Programming, Advanced Linear Programming, Network Flow Programming, Stochastic Processes.

Computational Mathematics Introduction to Scientific Computing, Advanced Numerical Analysis, Data Structures, Finite Element Method, Numerical Methods for Fluids Flow, Fluid Dynamics, Numerical Methods for Differential Equations, Grad-div stabilization methods in computational fluid dynamics, Sparse Matrix Algorithms and Advanced Topics in FEM, Numerical Partial Differential Equations.

Applied Analysis Linear Analysis, Dynamical Systems, Measure and Integration, Functional Analysis, Ordinary and Partial Differential Equations, Topology, Complex Analysis.

Algebra Matrix Analysis, Theory of Graphs, Number Theory, Abstract Algebra, Linear Algebra, Discrete Mathematics.

Applied Mathematics and Others Mathematical Hydrology, Aerodynamics, Mathematical Modeling in Biology, Fuzzy Mathematics, Astronomy, Hydrodynamics, Methods of Applied Mathematics, History of Mathematics, Tensor Analysis, Differential Geometry, Mechanics, Electricity and Magnetism, Mechanics and Waves, Analytic and Vector Geometry, Computer Fundamentals, Programming Methodology.

Professional Memberships

AMS : American Mathematical Society, SIAM : Society for Industrial and Applied Mathematics,
BMS : Bangladesh Mathematical Society

Conferences/Seminars Presentations

10-06-2018 **Invited talk**, The 4th Annual Meeting of SIAM Central States Section, University of Oklahoma, Norman, OK, USA

03-10-2018 **Invited talk**(two different talks), *42nd SIAM Southeastern Atlantic Sectional Conference, UNC Chapel Hill, North Carolina, USA

02-17-2018 **Contributing talk**, *Ninth Annual Graduate Student Mini-conference in Computational Mathematics, University of South Carolina, SC, USA

11-03-2017 **Colloquium talk**, Department of Mathematics, Virginia Tech, Blacksburg, VA

03-01-2017 **Talk**, SIAM CSE 2017, Atlanta, GA

01-07-2017 **Talk**, *Joint Mathematics Meetings, Atlanta, GA

12-13-2016 **Invited Talk**, *Paul J. Atzberger's Research Group, University of California, Santa Barbara (UCSB), CA

11-13-2016 **Invited Talk**, *AMS Sectional Meeting Program, North Carolina State University, Raleigh, NC

11-11-2016 **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

12-03-2016 **Talk**, *40th SIAM Southeastern Atlantic Section Conference (SIAM-SEAS), University of Georgia, Athens, GA, USA

06-02-2016 **Talk**, 8th Annual JohnFest / SIAM Student Conference, Clemson University, Clemson, SC, USA

09-02-2015 **Talk**, Mathematical Sciences Department, Clemson University, Clemson, SC, USA

03-21-2015 **Talk**, *39th Society for Industrial and Applied Mathematics Southeastern Atlantic Section Conference (SIAM-SEAS), The University of Alabama, Birmingham, AL, USA

03-24-2015 **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

11-20-2012 **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

(* = received travel support)

Honors and Awards

1. $10,000 travel support, Department of mathematics, Virginia Tech, Blacksburg, VA.
2. Travel support for 42nd SIAM-SEAS Conference, UNC Chapel Hill, NC.

3. Travel support for Ninth Annual Graduate Student Mini-conference in Computational Mathematics, Columbia, SC, 2018, University of South Carolina.
4. Travel support for SIAM-CSE, Atlanta, GA, 2017, Clemson University.
5. Travel support for Joint Mathematics Meetings, Atlanta, GA, 2017, Clemson University.
6. AMS Sectional Meeting at North Carolina State University at Raleigh, Raleigh, NC, Travel Support Award, 2016.
7. SIAM Student Chapter Representative at AN16 Expenses Support, 2016.
8. Travel Award for SIAM-SEAS conference 2016. Department of Mathematical Sciences, Clemson University.
9. Travel Award for SIAM-SEAS conference 2015. Department of Mathematical Sciences, Clemson University.
10. Graduate Student Teaching Assistantship Award, 2012-2017. Department of Mathematical Sciences, Clemson University.
11. Dhaka to USA, One way travel award, 2013. Ministry of Finance, People's Republic of Bangladesh.
12. A.F. Mujibur Rahman Foundation Gold Medal and Cash Award 2009. Department of Mathematics, University of Dhaka. Awarded to the student of the Department of Mathematics with best result in MS.
13. University Grants Commission Merit Scholarship, 2008. Ministry of Education, Bangladesh.
14. A.F. Mujibur Rahman Foundation Gold Medal and Cash Award 2008. Department of Mathematics, University of Dhaka. Awarded to the student of the Department of Mathematics with best result in BS.
15. Mitra Yushuf Trust Fund Scholarship, 2006, University of Dhaka. For achieving the highest grade (mark) in third year offered by the Department of Mathematics.
16. Hasina Shiddki Trust Fund Scholarship, 2005, University of Dhaka. For achieving the highest grade (mark) in second year offered by the Department of Mathematics.

Service and Volunteering

Description	The Department of Mathematical Sciences, Clemson University sponsor annual 'Clemson Calculus Challenge'. The Clemson Calculus Challenge invites high school calculus students from South Carolina, Northeast Georgia, Western North Carolina, and Eastern Alabama to compete in a one-day event. The students take an individual test in the morning and participate in a team competition in the afternoon. Responsibilities include morning setup, morning proctoring, afternoon setup, afternoon runners, exam grading. https://goo.gl/V0NXyp
Description	'Bangladesh Association Clemson' a graduate student orgranization
Position	President (Fall 2014 - Fall 2015)

References

1. Dr. Traian Iliescu, Professor, 428 McBryde Hall, Department of Mathematics, Virginia Tech, Blacksburg, VA 24061-0123, Phone: (540) 231-5296, Email: iliescu@vt.edu
2. Dr. Leo G. Rebholz, Professor and Thesis Advisor, Department of Mathematical Sciences, Clemson University, Long Hall 208, Clemson, SC, 29634, Phone: (864) 656-1840, Email: rebholz@clemson.edu
3. Dr. Timo Heister, Assistant Professor and Thesis Advisor, The University of Utah, Thesis advisor, WEB 3608, Scientific Computing and Imaging Institute, 72 S Central Campus Drive, Room 3750, Salt Lake City, UT 84112, Phone: (864) 656-0411 Email: heister@clemson.edu

4. Dr. Chris Cox, Department Chair and Professor at Clemson University in Mathematical Sciences, Martin O-224, Clemson, SC, 29634, Phone: (864) 656-1517, Email: clcox@clemson.edu

5. Dr. Martin Klaus, Professor, Department of Mathematics, Virginia Tech, 472 McBryde Hall, Blacksburg, VA 24061-0123, Phone: (540) 231-6533, Email: klaus@math.vt.edu