Muhammad Mohebujjaman

Contact Information

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Education

Degree Ph.D. in ***Applied and Computational Mathematics,*** May 2017 (*expected)*
Dissertation: *Efficient Numerical Methods for Magnetohydrodynamics Flow*
Concentration: Computational and Applied Mathematics
Advisor: Dr. Leo G. Rebholz, Professor, Mathematical Sciences
Clemson University, Clemson, SC, 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, Mathematical Sciences
Clemson University, Clemson, SC, USA

Degree M.S. in ***Applied Mathematics,*** March 2009, *First class (ranked 1st out of 11 students)*
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 (ranked 1st out of 64 students)*
Project: *Perturbation Methods in Aero Fluid Dynamics*
Minor: Statistics, Computer Science and Physics
Advisor: Dr. Abdus Samad, Associate Professor, Mathematics
University of Dhaka, Dhaka, Bangladesh

Mathematical Sciences PhD Examinations

I have passed PhD preliminary exams on Operation Research, Analysis and Computational Mathematics. I also have passed the 'Thesis Proposal'.

Research Interests

Large scale simulation of fluid flow problems including Newtonian Navier-Stokes equations, Magnetohydrodynamics, Uncertainty Quantification, fast algorithms, reduced order modeling, large scale parallel implementation of fluid flow problem using deal.II (massively parallel).

Refereed Journal Publications and Ongoing Works

1. Higer order accurate algorithm for MHD flow ensembles simulation, in preparation.
2. The effect of divergence error in snapshot creation in reduced order modeling, in preparation.
3. High order algebraic splitting for magnetohydrodynamics simulation, M. Akbas, M. Mohebujjaman, L. Rebholz, and M. Xiao, submitted. https://goo.gl/3IxVUa
4. Decoupled, unconditionally stable, higher order discretizations for MHD flow simulation, T. Heister, M. Mohebujjaman and Leo G. Rebholz, Journal of Scientific Computing, to appear. https://goo.gl/FozaYU

5. An efficient algorithm for computation of MHD flow ensembles, M. Mohebujjaman and Leo G. Rebholz, Computational Methods in Applied Mathematics, 17(1), 121-137, 2017.

6. 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, Vol: 310, p 388-405, 2016.

7. 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.

Refereed Journal Publications before Clemson employment

8. 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, Vol 1(1), pp: 30-58, 2011.

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

10. 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. Vol. 30 pp: 76-88, 2010.

11. 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 Vol: 10(2) pp: 133-142, 2010.

12. 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 Univ. J. Sci. 58(1): 91-96, 2010.

13. Numerical Study of Magnetohydrodynamic Forced Convective Flow of a Micropolar Fluid past a Non-linear Stretching Sheet with Variable Viscosity. M.A. Rahman, M.A. Samad, M.M. Rahman and M. Mohebujjaman, Dhaka Univ. J. Sci. Vol. 57(2): 243-248, 2009.

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

Learned Programming Languages/Software Packages

Mathematics	Large scale implementation of deal.ii library using C++, FreeFem++, Matlab, Mathematica, Maple, Sage, SAS, R, Lindo, LaTeX, VisIt, Paraview, TechPlot
General	C, C++ with Multithreading and MPI, Python, Fortran, Java, MySQL, Perl, CUDA, IPython nb, GraphLab
Platforms	Linux/Unix (Experience Operating Computer Clusters), Ubuntu and Windows

Research Position

2014	Research Assistant, Clemson University, Clemson, SC, Funded by National Science Foundation (NSF), Award Number: 1112593
Published Journal	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, Vol: 310, p 388-405, 2016.

Teaching Experience

2015-Present ***Graduate Teacher of Record,*** **Clemson University,** Clemson, SC, USA

Class Teaching MATH 2060: *Calculus of Several Variables* (37 students, Spring 2017)

Duties Responsible for all course duties (teaching, holding office hours, preparing lecture notes, distribute lecture notes at the beginning of each class, preparing weekly group home works and in class quizzes, exams, proctoring, grading home works, quizzes and exams, maintaining webassign and blackboard, preparing webassign home works).

Technologies Projector and *Mathematica* coding.

Class Taught MATH 1060: *Calculus of One Variable I* (48 students, Fall 2016)

Duties Responsible for all course duties (taught, held office hours, prepared printed lecture notes including learning activities, distributed lecture notes at the beginning of each class, prepared weekly group home works and in class quizzes, proctoring, grading (home works, learning activities, quizzes), maintaining webassign and blackboard, led old exams problem solving session before exams).

Technologies Big screen Tvs, *Smart Podium Interactive Pen Display*, *Blackboard* and *WebAssign*.

Class Taught MATH 1080: *Calculus of One Variable II* (29 students, Spring 2016)

Duties Responsible for all course duties (taught, held office hours, weekly meeting with course coordinator, observed other instructor's class teaching and made comments and suggestions, prepared printed lecture notes including learning activities, distributed lecture notes at the beginning of each class, prepared weekly group home works and in class quizzes, proctoring, grading (quizzes and exams), maintaining webassign and blackboard, led old exams problem solving session before exams, weekly meeting with teaching assistant and supplementary instructor leader, attended teaching professional development class).

Technologies Projector, *Smart Podium Interactive Pen Display*, *Blackboard* and *WebAssign*.

Class Taught MATH 1040: *Pre-Calculus and Introductory Differential Calculus* (35 students, Fall 2015)

Duties Responsible for all course duties (taught, held office hours, weekly meeting with course coordinator, prepared printed lecture notes including learning activities, distributed lecture notes at the beginning of each class, prepared weekly home works, exams, proctoring, grading (home works, learning activities and exams), maintaining webassign and blackboard, led old exams problem solving session before exams).

Technologies Projector, *Smart Podium Interactive Pen Display*, *Blackboard* and *WebAssign*.

2012-2016 ***Teaching Assistant,*** **Clemson University,** Clemson, SC, USA

Course MATH 3110: *Linear Algebra* (Summer 2016). Went to the class for 15 minutes every day, led learning activity and problem solving sessions. The professor had a surgery and could not come to the class. I taught seven full classes as her substitute. Graded home works and learning activities.

Course MATH 2080: *Introduction to Ordinary Differential Equations* (Summer 2016). It was an online course. Graded home works and exams on blackboard.

Teaching Experience

Course MATH 3650: *Numerical Methods for Engineers* (Summer 2015). Graded home works, held office hours and helped students in *Matlab* coding.

Course MATH 2060: *Calculus of Several Variables* (Summer 2015). Graded home works, exams and proctored.

Course MATH 3650: *Numerical Methods for Engineers* (Spring 2015). Graded home works, exams and proctored

Course MATH 8530: *Matrix Analysis* (Fall 2012 & 2014). Graded home works.

Course MATH 4340: *Advanced Engineering Mathematics* (Summer 2014). Graded traditional written home works as well as online home works using *canvas*, held office hours.

Course MATH 6530: *Advanced Calculus* (Fall & Summer 2013). Graded home works, prepared home work keys, uploaded grades and keys on blackboard, taught in problem solving class once a week.

Course MATH 4190: *Discrete Mathematical Structures* (Spring 2013). Graded home works and uploaded grades on blackboard.

Course MATH 1070: *Differential and Integral Calculus* (Fall 2012). Graded home works and learning activities. Sat in class, answered questions of the students in learning activity sessions, proctored exams.

Course MATH 2080: *Introduction to Ordinary Differential Equations* (Summer & Spring 2012), Graded home works, exams and proctored.

2010-2012 ***Lecturer,*** **Bangladesh University of Engineering and Technology (BUET),** Dhaka, Bangladesh

Class Taught MATH 193: *Vector Calculus* (30 students, Fall 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, proctored, held office hours, mentored). The course was designed for *Industrial Production Engineering students.*

Class Taught MATH-291: *Introduction to Ordinary Differential Equations* (Fall 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, proctored, held office hours and mentored). I taught this course for the *EEE, Civil Engineering, Urban Planning and Design* departments students.

Class Taught MATH-221: *Laplace Transformation* (40 students, Fall 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, proctored, held office hours and mentored). This course was designed for *Chemical Engineering students.*

Class Taught MATH 163: *Calculus of One Variable I* (60 students, Fall 2010 and Spring 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, proctored and held office hours). I taught this course for *Mechanical Engineering* and *Naval Architecture* students.

Class Taught MATH 153: *Calculus of One Variable I* (35 students, Spring 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, proctored, held office hours). The syllabus for this course was designed for the students of *Materials & Metallurgical Engineering* departments.

Teaching Experience

Service — Weekly meeting with department head and other faculty members, class distribution to the faculty members, contributed to writing grant proposal for development of the department facilities, service to university.

2011 — ***Adjunct Lecturer,*** **Manarat International University**, Dhaka, Bangladesh

Class Taught — MATH-102: *Mathematics for Business* (30 students, Fall 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded and proctored).

2011 — ***Adjunct Lecturer,*** **United International University,** Dhaka, Bangladesh

Class Taught — BMT-1103: *Business Mathematics I* (25 students, Spring 2011). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, held office hours and proctored).

2009-2010 — ***Lecturer,*** **Southeast University,** Dhaka, Bangladesh

Classes Taught — MATH 1011: *College Algebra*, (30 students, Spring, Summer and Fall 2009, Spring and Summer 2010), MATH 1023: *Business Calculus* (30 students, Spring, Summer and Fall 2009, Spring and Summer 2010), MATH-135: *Introduction to Ordinary Differential Equations* (35 students, Spring 2010). Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, held office hours, proctored and services to the department and university).

2008-2009 — ***Lecturer,*** **University of Information Technology and Sciences,** Dhaka, Bangladesh, (Fall 2008)

Classes Taught — MAT-161: *College Algebra* (25 students), MAT-163: *Calculus of One Variable I*, (30 students) MAT-165: *Introduction to Ordinary Differential Equations* (30 students), MAT-265: *Complex Variables* (25 students).

Duties — Responsible for all course duties (taught, prepared lecture notes, quizzes, exams, graded, held office hours and proctored), prepared class schedule, distributed classes to the faculty members, services to the department and university, assisted in undergraduate admission.

Practicum Experience

Fall 2015 — Completed Teaching Professional Development Course, Clemson University, SC, USA. Responsibilities included weekly meetings with the professor and several sessions of observed teaching. Professor also observed my teaching and informed me about the shortcomings.

2011 — Attended three days long 'Teacher's Appreciation Workshop'. Observed teaching techniques from several professors, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.

2010 — Attended a day long 'Teachers training workshop', organized by Southeast University, Dhaka, Bangladesh.

Private Tutoring

2013-Present — Provided scheduled individual tutoring sessions for Clemson University courses ranging from basic algebra to linear algebra

Teaching Experience

2002-2008 Provided scheduled individual tutoring sessions for students in Dhaka City courses ranging from high school math to first year university math courses.

Conferences/Seminars Presentations

01-07-2017 Efficient Numerical Methods for Magnetohydrodynamics Flow, **Talk**, *Joint Mathematics Meetings 2017, Atlanta, GA

12-13-2016 Higher Order Numerical Schemes for Magnetohydrodynamics Flow and their Analysis, **Talk**, *Paul J. Atzberger's Research Group, University of California, Santa Barbara (UCSB), CA

11-13-2016 Efficient Numerical Methods for Magnetohydrodynamics Flow, **Invited Talk**, *AMS Sectional Meeting Program, North Carolina State University, Raleigh, NC

11-11-2016 Unconditionally stable efficient ensemble averaging scheme for Magnetohydrodynamics flows, **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

12-03-2016 Decoupled, unconditionally stable higher order discretizations for MHD simulation, **Talk**, *40th Society for Industrial and Applied Mathematics Southeastern Atlantic Section Conference (SIAM-SEAS), University of Georgia, Athens, GA, USA

06-02-2016 Decoupled, unconditionally stable higher order discretizations for MHD simulation, **Talk**, 8th Annual JohnFest / SIAM Student Conference, Clemson University, Clemson, SC, USA

09-02-2015 Unconditionally stable, higher order discretizations, second order convergence in time for MHD simulation, Graduate Student Seminar, **Talk**, Mathematical Sciences Department, Clemson University, Clemson, SC, USA

03-21-2015 Numerical analysis and testing of a fully discrete, decoupled algorithm for MHD in Elsässer variable, **Talk**, *39th Society for Industrial and Applied Mathematics Southeastern Atlantic Section Conference (SIAM-SEAS), The University of Alabama, Birmingham, AL, USA

03-24-2015 Numerical methods for magnetohydrodynamic flow in Elsässer variables, **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

11-20-2012 Heat and mass transfer for free convection flow along a vertical stretching sheet in presence of magnetic field, **Talk**, Computational Math Seminar at Department of Mathematical Sciences, Clemson University, Clemson, SC, USA

(* = received travel support)

Workshop

1. Introduction to R for Data Science on Super Computer, 2017, Clemson University, SC
2. High Performance Computing with Spatial Data using R, Clemson University, SC
3. *Mathematical Problems to Industry (MPI) 2016, Duke University, Durham, NC
4. *Graduate Student Mathematical Modeling Camp (GSMMC) 2016, Rensselaer Polytechnic Institute, Troy
5. COMSOL Multi-physics & Application Builder Workshop Clemson, 2015, Clemson University, SC
6. Intel Xeon Phi Training Workshop on Stampede Supercomputer, 2014, Clemson University, SC
7. Teacher's Appreciation Workshop, 2011, Bangladesh University of Engineering and Technology, Dhaka

(* = received travel support)

Key Courses

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

Honors and Awards

1. Travel support for Joint Mathematics Meetings, Atlanta, GA, 2017, Clemson University.
2. AMS Sectional Meeting at North Carolina State University at Raleigh, Raleigh, NC, Travel Support Award, 2016.
3. SIAM Student Chapter Representative at AN16, Boston Expenses Support, 2016.
4. Travel Award for SIAM-SEAS conference 2016. Department of Mathematical Sciences, Clemson University.
5. Travel Award for SIAM-SEAS conference 2015. Department of Mathematical Sciences, Clemson University.
6. Graduate Student Teaching Assistantship Award, 2012-present. Department of Mathematical Sciences, Clemson University.
7. Dhaka to USA, One way travel award, 2013. Ministry of Finance, People's Republic of Bangladesh.
8. 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.
9. University Grants Commission Merit Scholarship, 2008. Ministry of Education, Bangladesh.
10. 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.
11. Mitra Yushuf Trust Fund Scholarship, 2006, University of Dhaka. For achieving the highest grade (mark) in third year offered by the Department of Mathematics.
12. Hasina Shiddki Trust Fund Scholarship, 2005, University of Dhaka. For achieving the highest grade (mark) in second year offered by the Department of Mathematics.

Test Score

GRE Verbal: 580 Quantitative: 790 Total: 1370/1600

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)

Professional Memberships

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

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 RPI. 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.

References

1. 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
2. Dr. Taufiquar Khan, Professor, Department of Mathematical Sciences, Martin O-201, Clemson University, Clemson, SC, 29634, Phone: (864) 656-3257, Email: khan@clemson.edu
3. Dr. Qingshan Chen, Assistant Professor and Dissertation Committee Member, Department of Mathematical Sciences, Clemson University, Martin O-210, Clemson, SC, 29634, Phone: (864) 656-4565, Email: qsc@clemson.edu
4. Dr. Chris Cox, Interim 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. Timo Heister, Assistant Professor of Mathematical Sciences and Developer of dealII, Dissertation Committee Member, Martin O-14, Clemson University, Clemson, SC, 29634, Phone: (864) 656-0411, Email: heister@clemson.edu
6. Dr. Meredith Burr , Lecturer and MATH 1080 Course Coordinator, Department of Mathematical Sciences, Martin O-216, Clemson University, Clemson, SC, 29634, Phone: (864) 656-6406, Email: burr3@clemson.edu