Introduction

Affiliation

■ Professor
Department of Mathematics & Physics
North South University (NSU)
Dhaka, Bangladesh

■ Research Coordinator
School of Engineering and
Physical Science (SEPS)
North South University
Dhaka, Bangladesh

■ Team Leader
Big-Matrix Lab, NSU
Dhaka, Bangladesh
https://big-matrix.com/

Contact

SAC-1025, North South University
Bashundhara, Dhaka 1229, Bangladesh
 monir.uddin@northsouth.edu
 +88-01-823-600-151(with WhatsApp)

Personal Details

Date of Birth: 11/30/1978
Nationality: Bangladeshi
Marital Status: Married

Links

  NSU Profile
 GitHub
in Linkedin
 Google Scholar

Education

PhD in Math. (2015)

Max Planck Institute (MPI) for Dynamics
of Complex Technical Systems, Magdeburg
Germany

Title: Computational Methods for Model
Reduction of Large-Scale Sparse Structured
Descriptor Systems

Supervisors: ■ **Prof. Dr. Peter Benner**
MPI for Dynamics of Complex Technical Systems,
Magdeburg, Germany
■ **Prof. Dr. Matthias Heinkenschloss**
Computational Applied Math. & Operations Research,
Rice University, Houston, USA

MS in Applied Math. (2011)

Stockholm University, Stockholm, Sweden
(Thesis from TU Chemnitz, Germany)

Title: Model Reduction for Piezo-Mechanical
System using Balanced Truncation

Supervisors: ■ **Prof. Dr. Peter Benner**
MPI for Dynamics of Complex Technical Systems,
Magdeburg, Germany
■ **Prof. Dr. Boris Shapiro**
Department of Mathematics, Stockholm University
Stockholm, Sweden

MSc in Pure Math. (2005)

Chittagong University, Chittagong, Bangladesh
Thesis Group, First Class

BSc in Math. (2003)

Chittagong University, Chittagong, Bangladesh
Thesis Group, First Class

HSC (1996)

Chittagong College, Chittagong, Bangladesh
Science Group, First Class

SSC (1994)

Musapur Hazi A. B. High School
Chittagong, Bangladesh, Science Group, First Class

Career

Jan 2025 - Present	**Professor**, Department of Mathematics and Physics North South University(NSU), Bangladesh
May 2019 - Dec 2024	**Associate Professor**, Department of Mathematics and Physics North South University(NSU), Bangladesh
Aug 2015 - Apr 2019	**Assistant Professor**, Department of Mathematics and Physics North South University(NSU), Bangladesh
May 2015 - Aug 2015	**Assistant Professor**, Department of Mathematics American International University, Bangladesh
Aug 2011 - Apr 2015	**PhD Research Fellow** Dept. of Computational Methods in Systems and Control Theory (CSC) Max-Planck-Institute, Magdeburg, Germany
Mar 2011 - Jul 2011	**Research Assiste** Dept. of Mathematics, Stockholm University, Stockholm, Sweden
Jul 2010 - Feb 2011	**Research Assistent** for (Masters Thesis) Dept. of Mathematics, TU Chemnitz, Chemnitz, Germany
Mar 2006 - Oct 2008	**Lecturer**, Department of Natural Science Stamford University, Bangladesh

Research Interest

- Artificial Intelligence (AI) in Healthcare
- Model Order Reduction (MOR) of Large-Scale Sparse Dynamical Systems
- Control Theory and it's Applications
- Iterative Methods for Large Sparse Matrix Equations
- Numerical Linear Algebra, Optimization and Scientific Computing
- Data Science, Machine Learning, Deep learning and LLM
- Computational Biology

Teaching Interest

- **Undergraduate Maths:** Calculus, Linear Algebra, Differential Equations (ODE and PDE), Probability, Numerical Methods etc.
- **Advance Maths:** Numerical Linear Algebra, Control Theory, Optimization, Model Order Reduction (MOR) etc.
- **Artificial Intelligence:** Data Science, Machine Learning, Deep Learning, Large Language Model etc.
- **Applications:** Mathematical Modeling, Computational Biology, Image Processing etc.
- **Programming:** Matlab, Python, R etc.

Projects

CTRG-24-SEPS-20 (2025)
Title: Advanced Diagnosis of Breast Cancer Using Deep Learning: Insights from Bangladeshi Mammography Data.
Funded by: NSU CTRG (TK. 500000)
Status: On-going

CTRG-23-SEPS-28 (2024)
Title: Optimization of the Bilinear Control System by Model Order Reduction Technique
Funded by: NSU CTRG (TK. 500000)
Status: DONE

CTRG-22-SEPS-06 (2023)
Title: Development of the Efficient Algorithms to optimize the Solar Thermal state of the Photo- voltaic Panel by analyzing the generated dynamic mathematical model
Funded by: NSU CTRG (TK. 500000)
Status: DONE

CTRG-21-SEPS-15 (2022)
Title: Model Order Reduction for Aircraft Wing Shape Optimization
Funded by: NSU CTRG (TK. 500000)
Status: DONE

MS20191055 (2021-2023)
Title: Developing Mathematical Algorithms and Software for the Model Reduction of Large-Scale Dynamical Systems
Funded by: Bangladesh Ministry of Education (BANBEIS) (TK. 1500000)
Status: DONE

CTRG-20-SEPS-2 (2021)
Title: Approximation of large-scale dynamical system over a Limited Time Interval
Funded by: NSU CTRG (TK. 500000)
Status: DONE

IAR/01/19/SE/18(2019-2020)
Title: Computation of Optimal Control for DAEs with Engineer- ing Applications
Funded by: IAR-UIU (TK. 400000)
Status: DONE

k345509 (2018-2019)
Title: Computational Methods for Approximation of Large-Scale Descriptor Systems
Funded by: NON-FUNDED
Status: DONE

Publications

- Book 01 (Publisher: CRC Press (Taylor and Francis Group))
- Book Chapters 06
- Journal 35
- Conferences 30

Citation Indices (on Aug 2025)

Google Scholar

Citations	1276
H-index	17
Link	Click Over

SCOPUS

Citations	461
h-index	8
Link	Click Over

Some Journal Publications

- (Elsvier-Q_1) M. S. Hossain, E. H. Khan, **M. M. Uddin**, and S.G. Omar, *Structure-Preserving Model Reduction Approach for Structured Index-2 Descriptor-Systems*, Numerical Linear Algebra with Applications, Vol. 32(1), 2025.

- (Elsvier-Q_2) U. Zulfiqar, Q. Y. Song, Z. H. Xiao, **M. M. Uddin**, and V. Sreeram, *H2-optimal model order reduction of linear quadratic output systems in finite frequency range.* Journal of Computational and Applied Mathematics, 2025. pp. 116914.

- (Elsvier-Q_1) K. S. Sanjid, M. S. S. Junayed, M. T. Hossain, Y. L. Wang, **M. M. Uddin**, and S. A. Haque.em From pixels to pathology: A novel dual-pathway multi-scale hierarchical upsampling network for MRI-based prostate zonal segmentation, Intelligent Systems with Applications, Vol. 22, 2024. pp. 200382.

- (Spinger-Q_1) Mahtab Uddin, **M. M. Uddin**, and M. A. Hakim Khan, *SVD-Krylov based sparsity-preserving techniques to optimally stabilize the incompressible Navier-Stokes flows*, International Journal of Dynamics and Control, 2023. pp. 1-11.

- (Elsvier-Q_1) Bin Iqbal, K.I., Du, X., **M. M. Uddin**, Uddin, M.F., *Balanced truncation for reduced-order modeling of Piezoelectric Tonpilz Transducer on the limited frequency interval*, Applied Mathematical Modelling, 2022, 111, pp. 63–77

- (Elsvier-Q_1) Du, X., Iqbal, K.I.B., **M. M. Uddin**, Fony, A.M., Hossain, M.T., Ahmad, M.I. and Hossain, M.S., 2021. Computational techniques for H_2 optimal frequency-limited model order reduction of large-scale sparse linear systems. Journal of Computational Science, 2021, 55, p.101473.

- (IEEE-Q_1) Shuzan, M.N.I., Chowdhury, M.H., Hossain, M.S., Chowdhury, M.E., Reaz, M.B.I., **M. M. Uddin**, Khandakar, A., Mahbub, Z.B. and Ali, S.H.M., A novel non-invasive estimation of respiration rate from motion corrupted photoplethysmograph signal using machine learning model. IEEE Access, 2021, 9, pp.96775-96790.

- (Elsvier-Q_1) **M. M. Uddin**, *Structure Preserving Model Order Reduction of a Class of Second-Order Descriptor Systems via Balanced Truncation*, Applied Numerical Mathematics, 2020, 152, pp. 185–198.

- (IET-Q_1) **M. M. Uddin**, *Gramian-based model-order reduction of constrained structural dynamic systems*, Mathematical and Computer Modelling of Dynamical Systems, IET Control Theory & Applications, Vol. 12 (17), 2018, pp. 2337 - 2346.
  DOI: 10.1049/iet-cta.2018.5580

- (Tailor & Francis-Q_3) P. BENNER, J. SAAK AND **M. M. Uddin**, *Structure preserving MOR for large sparse second order index 1 systems and application to a mechatronic model*, Mathematical and Computer Modelling of Dynamical Systems, Tailor & Francis, Vol. 22 (6), August 2016, pp. 509–523.
  DOI: 10.1080/13873954.2016.1218347

- (Spinger-Q_2) **M. M. Uddin**, J. SAAK, B. KRANZ AND P. BENNER, *Computation of a compact state space model for an adaptive spindle head configuration with piezo actuators using balanced truncation*, Production Engineering (Spinger), vol. 6, September 2012, pp. 577–586.
  DOI: 10.1007/s11740-012-0410-x

Note: Please see details here:
http://www.northsouth.edu/faculty-members/seps/mathematics-physics/dr.-mohammad-monir-uddin.html

Contributary/Invited Talks/Lectures

- Invited talks/Lectures 11
- International Conferences talks 12
- Poster Presentations 03
- International workshops 03

Invited Talks/ Lectures

- **22 Aug 2025:** Multimodal AI for Breast Cancer Diagnosis from Mammograms: Segmentation and Comprehensive Report Generation, 19th BSA National Conference, 2025, Bangladesh China Friendship Conference Center, Dhaka

- **28 Feb 2025:** Multimodal AI for Breast Cancer Diagnosis: Precision Segmentation and Comprehensive Report Generation from Mammograms, 5th Bangladesh Breast Cancer Conference 2025, Pan Pacific Sonargaon, Dhaka

- **7 Feb 2025:** Recent Updates on Model Order Reduction of Large-Scale Descriptor Systems, A F Mujibur Rahman Foundation-Bangladesh Mathematical Society 3rd NMC, BUET, Dhaka

- **5 Jan 2024:** Computational Methods for Model Order Reduction of Large-Scale Sparse Descriptor Systems, Shanxi University, Taiyuan, China

- **5 Jan 2024** Computational Methods for Model Order Reduction of Large-Scale Sparse Descriptor Systems, Shanxi University, Taiyuan, China

- **25 Dec 2023** Model Order Reduction of Large-Scale Sparse Descriptor Systems. Yangtze University, Jingzhou, China

- **(12-23) Jun 2023:** Numerical Linear Algebra in Engineering and Data Science. International Summer Program, Shanghai University, China

- **14 Jan 2023** Recent Updates on Model Order Reduction of Large-Scale Descriptor Systems. A F Mujibur Rahman-Bangladesh Mathematical Society National Mathematical Conference 2022, Jahangir Nagar University, Dhaka

- **(13-25) Jun 2022:** Numerical Linear Algebra with Application in Engineering and Data Science. International Summer Program, Shanghai University, China

- **(21 Jun-2 Jul) 2021:** Linear Algebra and Linear Control Systems. International Summer Program, Shanghai University, China

- **(14-24) Apr 2020:** Linear Algebra and Linear Control Systems. International Summer Program, Shanghai University, China

> Note: Please visit here for details:
> http://www.northsouth.edu/faculty-members/seps/mathematics-physics/dr.
> -mohammad-monir-uddin.html

Supervision and Reviewing Thesis

PhD Theses Supervision

- Thesis Title: Krylov Subspace Techniques for Structure-Preserving Model Reduction of Large-Scale Sparse Second-Order Differential Algebraic Equations (DAEs)

Name of Student: Md. Motlubar Rahman
University: Jahangirnagar University, Bangladesh
Status: Completed in 2022 (April)

– Thesis Title: Frequency Limited structure preserving Model order reduction of large-scale dynamical systems
Name of Student: Mahtab Uddin
University : Bangladesh University of Engineering Technology
Status: Completed in 2025 (January)

– Thesis Title: Numerical studies on model order reduction of Biological system
Name of Student: Md. Shafiqul Islam
University :Jahangirnagar University, Bangladesh
Status: On Going

– Thesis Title: Model reduction of large-scale second-order system with application in Engineering
Name of Student: Md. Saiduzzaman
University: Jahangirnagar University, Bangladesh
Status: On Going

Masters Theses Supervision

– Computational techniques for Riccati-based feedback stabilization of large-scale sparse index-2 descriptor system
Name of Student: Md. Toriqul Islam
University: Bangladesh University of Engineering Technology (BUET)
Status: Completed on February 2022

Theses Review

– 2017: Reviewed an M.Phil thesis titled *Efficient solution of Lyapunov equation for descriptor system and application to model order reduction* from Dept. of Mathematics, Bangladesh University of Technology

– 2020: Reviewed an M.Phil thesis titled *Numerical Study on Continuous-Time Algebraic RICCATI Equations Arising from Large-Scale Sparse Descriptor Systems* from Dept. of Mathematics, Bangladesh University of Technology

Service to the University

– **Since 2025:** Research Coordinator for School of engineering and Physical Sciences (SEPS), Office of Research, North South University

– **2021-2023:** CPC (Career Placement Center) Coordinator for SEPS, CPC, Noth South University

– **Since 2022:** Member of NSU-SEPS Scientific Review Committee

– **Since 2020:** NSU Graduate Program Coordinator

- **2020-2023:** Coordinator of Biweekly Colloquium for the Department of Mathematics and Physics, NSU
- **Since 2016:** Coordinator of Mat125 (Linear Algebra) for the Department of Mathematics and Physics, NSU

Service to the Community

- Guest Editor of a special issue titled: *Numerical Linear Algebra for Large-Scale Dynamical Systems* of AIMS - Mathematical Biosciences and Engineering, 2020
- Editorial Board Member, Journal of Applied Mathematics and Computation, Since 2019
- Reviewing internationally renowned journals
- Session Co-Chair (ICFS – 2022), Buet, 11 November 2022
- Session Chair 1st National Conference on Advances in Science and Technology, Faculty of Science, Buet, 7-8 December 2023
- Session Co-Chair (ICCE – 2019), Coxs Bazar, 7-9 February, 2019
- Chair Panel Session in SUSCOM 2022, 6-7 Aug 2022, IUBET
- IPC Local Chairs, LSMS2024 & ICSEE2024 September 13-15 2024, Suzhou, China

Membership

Since 2020	Founder and Team Leader, Big-Matrix Lab
Since 2021	Asian Simulation Societies (ASIASIM)
Since 2020	Life member of the Alumni Association of German University Bangladesh (AAGUB)
Since 2020	Life member of Chittagong University Math Alumni Association (CUMAA)
2012 - 2015	Member of International Max-Plank Research School (IMPRS), Magdeburg Germany
2012 - 2015	Member of Society of Industrial and Applied Mathematics (SIAM) Student- Chapter, Magdeburg, Germany
2013 - 2014	SIAM academic member, Philadelphia USA
2012 - 2015	Member of Magdeburg International PhD Students Magdeburg, Germany
2013 - 2015	Member of Matrix Equations Team at MPI Magdeburg, Magdeburg, Germany