

MD AFSAR ALI
CURRICULUM VITA

Department of Mathematics
and Statistics
York University
Keele Campus
4700 Keele Street, Toronto
ON Canada, M3J 1P3

43 Curzon Crescent
Guelph, ON, N1K1Z8
Ph: (226) 500- 3416
mali06@yorku.ca

EDUCATION

- PhD Applied Mathematics, University of Guelph, Canada, 2018
Dissertation: Numerical Solution of a Single-Species Biofilm Model on
Structured Non-Orthogonal Grids
Advisors: Prof. Hermann J. Eberl
- MS Mathematics (Computational), KTH Royal Institute of Technology, Sweden, 2010
Dissertation: Simulation of Flow past the Swift Wing
Advisors: Prof. Jesper Ooppelstrup
- MS Applied Mathematics, University of Dhaka, Bangladesh, 1996
- BS Mathematics, University of Dhaka, Bangladesh, 1995
Minored in Physics and Statistics

PROFESSIONAL APPOINTMENTS/EMPLOYMENT

- 2019–Present Postdoctoral Fellow, Department of Mathematics and Statistics, York
University, Canada
- 2018–2019 Assistant Professor, Department of Mathematics, National University,
Bangladesh: Directorate of Education (Attached)
- 2010–2011 Assistant Professor, Department of Mathematics, Government S. K.
College, National University, Bangladesh
- 2002–2006 Lecturer, Department of Mathematics, Government Titumir College,
National University, Bangladesh
- 1999-2001 Lecturer, Department of Mathematics, Darshana Government College,
National University, Bangladesh,

PUBLICATIONS

Journal Publications

- 2020 Means, S., **Ali, M. A.**, Ho, H., & Heffernan, J. Mathematical Modeling for Hepatitis B Virus: Would Spatial Effects Play a Role and How to Model It? *Frontiers in physiology*, 11, 146. <https://doi.org/10.3389/fphys.2020.00146>
- 2018 **Ali M. A.**, Eberl H. J., Sudarsan R. Numerical Solution of a Degenerate, Diffusion Reaction Based Biofilm Growth Model on Structured Non-Orthogonal Grids, *Commun. Comput. Phys.*, 24(3), 695-741 <https://doi.org/10.4208/cicp.OA-2017-0165>
- 2018 **Ali M.A.**, Eberl H.J., Sudarsan R. A Simulation Study of the Effect of Meso-Scopic Sinusoidal Surface Roughness on Biofilm Growth. In: Kilgour D., Kunze H., Makarov R., Melnik R., Wang X. (eds) *Recent Advances in Mathematical and Statistical Methods*. AMMCS 2017. *Springer Proceedings in Mathematics & Statistics*, vol 259. http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-319-99719-3_29

Manuscript in Submission

Md Afsar Ali., Harvey Ho., Shaw Mean & Jane Heffernan. A single-cell HBV model for viral dynamics in the Liver: Global sensitivity analysis approach, Submitted to *Journal of Mathematical Biology*.

Manuscripts in Preparation

Ali M. A., Mahmuda Ruma, Christopher Chow & Jane Heffernan. Epidemic trends for a new corona virus under effective control measures: An Anylgic Modeling approach

Ali M. A. & Jane Heffernan. Age and Phase Structured Model for Malaria Parasite Replication Dynamic in the Human Blood and a Potential Control Strategy of Malaria.

Ali M. A., Harvey Ho., Shaw Mean & Jane Heffernan. Spatial HBV Model - Expansion of Prior Representative Sinusoidal Model to Investigate the Role of Cytokine Interferon in the Innate Immune Response.

Ali M. A., Mahmuda Ruma, Christopher Chow & Jane Heffernan. Multi-patch model on COVID-19 transmission in a theme park scenario.

HONORS AND AWARDS

2011–2016 Doctoral Fellowship, University of Guelph, Canada, \$25600/year

2012, 2013 Dean's Scholarship, University of Guelph, Canada, \$3300, \$1130

INVITED TALKS

- 2019 “Latin Hypercube Sampling and the Sensitivity Analysis of a Hepatitis B-viral Model,” Applied Mathematics, Modeling and Computational Science Conference, Wilfrid Laurier University, August 18-23
- 2017 “Numerical Solution of a Degenerate, Diffusion Reaction Based Biofilm Growth Model on Structured Non-Orthogonal Grids,” Applied Mathematics, Modeling and Computational Science Conference, Waterloo, ON, Canada, August 20-25

CONFERENCE ACTIVITY/PARTICIPATION

- 2019 CMS Winter meeting, York University, Chelsea Hotel, Toronto, ON
- 2019 Workshop, Borders in Public Health and Mathematical Epidemiology, The Fields Institute, University of Toronto, ON
- 2018 Workshop, The Role of Mathematics in Combating Antibiotic Resistance and Developing Novel Antibacterial, The Fields Institute, Toronto, ON
- 2016 Biomathematics and Biostatistics Symposium: Spatial Ecology: Applications of the Mathematical Sciences, University of Guelph, Guelph, Canada.
- 2015 AMMCS–CAIMS Congress: A Joint meeting International Conference Series and the Canadian Applied and Industrial Mathematics Society, Wilfrid Laurier University, Waterloo, Canada
- 2015 Biomathematics and Biostatistics Symposium: Mathematics and Statistics of Food Safety, University of Guelph, Canada
- 2014 Biomathematics and Biostatistics Symposium: Mathematics and Statistics of Food Safety, University of Guelph, Canada

TEACHING EXPERIENCE

York University, Canada

Calculus–Mathematics for the Life and Social Sciences (Remote, Summer, 2020)
Linear Algebra I (Summer, 2019)

National University, Bangladesh, 1999–2018

Numerical methods for ordinary and partial differential equation
Differential equation
Calculus I

Coordinate Geometry
Basic Algebra
Calculus of Several Variables
Linear Algebra
Hydrodynamics
Numerical Analysis
Ordinary Differential Equation
Partial Differential Equation
Fluid Mechanics
Linear Programming
Fortran Programming
Introductory Statistics
Geometry
Trigonometry

KTH Royal Institute of Technology, Stockholm, Teaching Assistant

Multivariate Calculus (Fall, 2008)
Numerical Methods for Ordinary and Partial Differential Equation (Winter, 2009)

University of Guelph, Teaching Assistant

Calculus I (Fall, 2011)
Calculus II (Fall, 2011)
Advanced Calculus I (Winter, 2014)
Numerical Methods (Fall 2012, Winter 2013)
Business Mathematics (Fall 2013, Winter 2014)

RESEARCH EXPERIENCE

Postdoctoral Research Fellow, Department of Mathematics & Statistics, York University, Canada, Advisor: Jane Heffernan

Research Projects:

Spatial HBV Model - Expansion of Prior Representative Sinusoidal Model to Investigate the Role of Cytokine Interferon in the Innate Immune Response

Age- and- Phase Structured Model for Malaria Parasite Replication Dynamic in RBC

A Cellular Automata Computer Model to Investigate the Efficacy of the Innate Immune Response in Preventing Mosquito-Borne Viral Infections in the Human Skin

Global Sensitivity Analysis: A case study of the Single-Cell Hepatitis B Virus Infection Dynamics in the Liver using Latin Hypercube Sampling based PRCC and variance-based Sobol' method.

Visiting Research Fellow, Auckland Bioengineering Institute, Auckland University, 2019
Supervisor: Harvey Ho

Research Projects:

Mathematical Modelling of a Single Cell Hepatitis B Virus Infection Dynamics in the Liver

Spatial Hepatitis B Virus Model - Extension of Prior Representative Sinusoidal Model to Exploit the Role of Cytokine Interferon to Control HBV Replication in the Liver

Research Assistant, Department of Mathematics & Statistics, University of Guelph,
Supervisor: Hermann J. Eberl

Research Projects:

Grid Generation on Irregular Geometry

Numerical Solution of a Single-Species Biofilm Model on Structured Non-Orthogonal Grids

The Effect of Surface Roughness on Quorum Sensing Induction

Effect of Substratum Roughness on Biofilm Activity and Structure

Research Assistant, Department of Scientific Computing, KTH Royal Institute of Technology, Sweden, Supervisor: Jesper Oppelstrup

Research Project:

Simulation of Flow Past the Wing of Swift (a bird) Using Lattice Vortex Method.

COMMUNITY INVOLVEMENT/OUTREACH

Math Learning Center, University of Guelph, Canada, Sept 2012 - Dec 2015

Advisor, Bangladeshi Student Association, University of Guelph, 2018

Founding Member, Bangladeshi Community of Guelph, Canada, 2016 - present

COMPUTER SKILLS

Programming: Fortran, MATLAB, Python, C

Applications: Fluent, COMSOL Multiphysics, Paraview, Gnuplot

Operating System: Linux, Ubuntu, Windows

PROFESSIONAL TRAINING/SKILLS

**Ontario high Performance Computing Summer School, SciNet HPC Consortium,
University of Toronto (July 13 - 17, 2015)**

Linux Shell

Introduction to High Performance Computing

Scientific Python

Parallel Python

Big Data Analytic Summer School, York University (Aug 13 - 17, 2016)

Data analytics foundations
Basic and advanced methods for analysis
Relevant data analytics tool sets
How to provision data for analysis

TEACHING INTEREST/COURSES PREPARED TO TEACH

Calculus, Calculus of Several Variables, Applied Calculus, Linear Algebra, Applied Linear Algebra, Introductory Statistics, Probability Theory, Ordinary and Partial Differential Equation, Numerical Methods for Solving Ordinary and Partial Differential Equation, Finite Difference Method, Finite Volume Method, Mathematical Modeling in Biology, Computational Mathematics

RESEARCH INTEREST

Mathematical Modelling in Biology, Disease Modelling, Mathematical Epidemiology, Biofilm Modeling, Mathematical Modeling of Hepatitis B-Virus in the Liver, Age and Phase-Structured Mathematical Modeling of Malaria Dynamics in the Human Blood, Infectious Dynamics of Corona Virus in a Mass Gathering, Agent Based Method, Ordinary Differential Equation, Delay Differential Equation, Stochastic Differential equation, Partial Differential Equation, Stability Analysis of the Model, Numerical Formulation Development, Scientific Computing, Statistical Analysis and Data Science

LANGUAGES

English: Fluent
Bengali: Native Language

PROFESSIONAL AFFILIATIONS

Member of the Canadian Mathematical Society, 2019 - present

REFERENCES

Jane Marie Heffernan, Professor
Department of Mathematics and Statistics
York University
Keele Campus
4700 Keele Street, Toronto
ON Canada, M3J 1P3
Phone: +1 (416) 736-2100 x 33943
Email: jmheffer@yorku.ca

Hermann J. Eberl, Professor
Department of Mathematics & Statistics
University of Guelph
50 Stone Rd E, Guelph, ON N1G 2W1
Phone: +1 519)-824-4120 x 52622
Email: heberl@uoguelph.ca

Stephen Watson, Professor, Chair
Department of Mathematics and Statistics
York University
Keele Campus
4700 Keele Street, Toronto
ON Canada, M3J 1P3
Phone: + 1 (416)736-2100 x 33911
Email: swatson@yorku.ca

Anna Lawniczak, Professor
Department of Mathematics & Statistics
University of Guelph
50 Stone Rd E, Guelph, ON N1G 2W1
Phone: +1 (519)-824-4120 x 53287
Email: alawnicz@uoguelph.ca

Harvey Ho, Research Scientist
Auckland Bioengineering Institute
University of Auckland
UniServices House, Level, 6/70 Symonds Street
Grafton, Auckland 1010, New Zealand
Phone: +64 9 923 2164,
Email: harvey.ho@auckland.ac.nz