Trevor Norton

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Education

Boston University — Boston, Massachusetts
Ph.D. in Mathematics — *Sep 2018 – May 2023*

Virginia Polytechnic Institute and State University — Blacksburg, Virginia
M.Sc. in Mathematics — *Aug 2016 – May 2018*

Virginia Polytechnic Institute and State University — Blacksburg, Virginia
B.Sc. in Mathematics, Minor in Computer Science — *Aug 2011 – May 2015*

Research Experience

Traveling Wave Solutions in the FPUT Lattice — Boston, Massachusetts
Boston University — *May 2019 – Present*

- Collaborated with Professor C. Eugene Wayne in studying front solutions and modulation equations for the Fermi-Pasta-Ulam-Tsingou (FPUT) lattice. This research was the basis of my thesis, and there is one paper in preparation.
- Expanded on previous to show that there is a kink-like solution to the FPUT that is approximated by the kink solution for the defocusing modified Korteweg-de Vries (mKdV) equation.
- Developed new methods for treating non-localized, traveling wave solution to the lattice to show that the mKdV serves for generally as a modulation equation for certain solutions to the FPUT.

Analytic Solutions to the NPBE — Boston, Massachusetts
Boston University — *Aug 2019 – Present*

- Collaborated with a group led by Professors Julio Castrillón-Candás and Mark Kon in studying how PDE theory can be applied to problems of Uncertainty Quantification. This research led to one paper in preprint and one paper in preparation.
- Collaborated on a paper in which an iteration argument is used to show existence of strong solutions to the nonlinear Poisson-Boltzmann equation (NPBE). This was used to show the analyticity of solutions with respect to stochastic parameters, and thus implies the sub-exponential convergence in error of a sparse grid computation.
- Authored a paper in which new techniques are developed to show analyticity of solutions for nonlinear PDEs with interfaces. This result is used to show the analyticity of the solution of the NPBE with respect to stochastic parameters, and *a priori* bounds are developed for the region of analyticity.

Galerkin Approximations of DDEs with Multiple Delays — Blacksburg, Virginia
Virgina Polytechnic Institute and State University — *Sep 2016 – May 2018*

- Collaborated with Professor Honghu Liu on extending previous results for Galerkin approximations of delay differential equations (DDEs) to the case with multiple delay terms. This research was the basis of my Master's thesis
- Generalized previous results to the case with multiple delay terms in the linear part of a delay differential equations.
- Progressed research into multiple delay terms in the nonlinear part of the delay differential equation.

Publications and Preprints

Brian Choi, Jie Xu, Trevor Norton, Mark Kon, and Julio E. Castrillón-Candás. *Existence of Strong Solution for the Complexified Non-linear Poisson Boltzmann Equation*. 2021. arXiv: 2106.05811 [math.AP].

Trevor Norton, Julio E. Castrillón-Candás, and Mark Kon. *The Analyticity of Solutions to the Nonlinear Poisson Boltzmann Equation with Discontinuities at an Interface and Random Domains*. (in preparation).

Trevor Norton and Eugene Wayne. *Long-Time Approximations of Small-amplitude, Long-wavelength FPUT Solutions*. (in preparation).

Work Experience

Teaching Fellow/Research Fellow — Boston, Massachusetts
Boston University — *Sep 2018 – May 2023*

- Collaborated with different groups in research on partial differential equations and dynamical systems.
- Tutored students in one-on-one sessions for low-level Mathematics and Statistics classes at the University.
- Taught four summer courses and led nine discussion sections in Mathematics Statistics department and the Computer Science department.

Teaching Assistant/Research Assistant — Blacksburg, Virginia
Virginia Polytechnic Institute and State University — *Aug 2016 – May 2018*

- Tutored undergraduate students in freshman- and sophomore-level mathematics courses.
- Led and assisted students in lab activities for classes at the University.
- Collaborated with a professor on research in delay differential equations and Galerkin methods.

Software Engineer — McLean, Virginia
Science Applications International Corporation — *Jul 2015 – Jul 2016*

- Maintained and expanded the capabilities of a web application, which used the JavaServer Faces framework and an SQL database.
- Designed new features for the application in Java, using Hibernate to integrate with the database.
- Responsible for software maintenance across the application, which required knowledge of the entire system.

Teaching

Basic Statistics and Probability — Boston University
Lab Coordinator — *Spring, 2023*

Basic Statistics and Probability — Boston University
Teaching Assistant — *Fall, 2022*

Calculus I — Boston University
Instructor — *Summer 2, 2022*

Basic Statistics and Probability — Boston University
Teaching Assistant — *Spring, 2022*

Multivariate Calculus — Boston University
Teaching Assistant — *Spring, 2021*

Combinatoric Structures — Boston University
Teaching Assistant — *Fall, 2020*

Discrete Mathematics — Boston University
Instructor — *Summer 2, 2020*

Probability in Computing — Boston University
Teaching Assistant — *Spring, 2020*

Probability in Computing — Boston University
Teaching Assistant — *Fall, 2019*

Linear Algebra — Boston University
Instructor — *Summer 2, 2019*

Linear Algebra — Boston University
Instructor — *Summer 1, 2019*

Differential Equations — Boston University
Teaching Assistant — *Spring, 2019*

Statistics I — Boston University
Instructor — *Fall, 2018*

Technical Skills

Programming: Java, Python, MATLAB, and exposure to SQL, HTML, CSS

Technologies: Git/Github, and exposure to Tortoise SVN

Libraries: Numpy, Pandas, Scikit-learn, Seaborn, Tensorflow

Relevant Coursework

Numerical Analysis, Probability, Statistical Methods of Bioinformatics, Data Structures, Algorithm Analysis

Awards & Achievements

Departmental Outstanding Teaching Fellow: Awarded to Teaching Fellows within the department for exemplary performance in teaching over an academic year (Spring 2023)

Outstanding Applied Discrete Mathematics Senior: Awarded to a graduating student in the Applied Discrete Mathematics track in recognition for academic achievement (Spring 2015)