Jeremy Upsal

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University of Washington
Seattle, WA

Education

9/2014 – Present **The University of Washington**

- Ph.D. in Applied Mathematics – Expected June 2020 – Advisor: Bernard Deconinck
- M.S. in Applied Mathematics – Awarded January 2016 – Advisor: Bernard Deconinck
- Courses completed
  - Amath 584/585/586 (Numerical analysis sequence)
  - Amath 573 (Nonlinear waves)
  - Amath 575 (Dynamical systems)
  - Amath 570 (Spectral Methods and Approximation Theory)
  - Amath 568 (Advanced ODEs and perturbation)
  - Amath 505 (Fluid Dynamics)
  - Amath 500 (Methods of Applied Mathematics Journal Club)
  - Math 554/555 (Linear analysis sequence)
  - Math 556 (Operator Theory and Distributions, joint with Math 526)
  - Amath 572 (Intro to applied stochastic analysis)
  - AA 580 (Geometric Methods in Nonlinear Control)
- Reading courses
  - With Gunther Uhlmann on the Calderon Inverse problem on Riemannian Manifolds.
  - With Bernard Deconinck and research group on spectral and dynamical stability of nonlinear waves.
  - With Bernard Deconinck and research group on the Fokas Unified Transform Method.
  - With Bernard Deconinck and research group on Riemann Surfaces and differential equations.
  - With Bernard Deconinck and research group on normal form theory for ODEs.
  - With Bernard Deconinck and research group on perturbation theory for linear operators (Kato).
  - With Bernard Deconinck and research group on inverse spectral theory.
  - With UW Amath graduate students on a variety of pedagogy research.

8/2011 – 5/2014 **University of Colorado at Boulder, College of Engineering**

- BS in Applied Mathematics, Minor in Physics
- Magna Cum Laude

Publications

- *On the nonintegrability of equations for long- and short-wave interactions*, Physics Letters A, Volume 38, Issue 29: 1916-1921. With B. Deconinck. (2018) `https://arxiv.org/abs/1710.09427`
- *The orbital stability of elliptic solutions of the Focusing Nonlinear Schrödinger Equation*, Submitted. With B. Deconinck. (2019) `https://arxiv.org/abs/1901.08702`.

Research Experience

9/2014 – Current **University of Washington Department of Applied Mathematics**

- My thesis work focuses on studying the stability of solutions to integrable PDEs.
- I have worked on a project involving computation of Riemann Surfaces for finite-genus solutions to PDEs.

- I have worked on examining the connection between the Schottky-Prime function on Riemann Surfaces built through Schottky Uniformization and the Riemann Theta Function on Riemann Surfaces built from an algebraic curve.
- I have worked on studying integrability of various Hamiltonian PDEs using Hamiltonian normal form theory, classical perturbation theory, and the method of Zakharov and Schulmann.

4/2014 – 8/2014 **University of Colorado at Boulder Applied Math Department**
- Worked towards analytically describing all regions of stability in the four-wave mixing equations with explosive instability.
- Advisor Professor Harvey Segur.
- Funded under NSF Award Number 1107354.

5/2012 – 8/2014 **University of Michigan undergraduate research assistant**
- NSF REU with advisors Professor Brian Arbic and Dr. David Trossman on a physical oceanography project.

Presentations

3/18/2019 **Real Lax spectrum implies stability**
- Talk at The Eleventh IMACS International Conference on Nonlinear Equations and Wave Phenomena
- In this talk, I present work on determining the stability of solutions of integrable equations through a description of the Lax spectrum.

4/13/2019 **Aligning exams to learning goals and Bloom's taxonomy in a scientific computing course**
- Talk at the Annual Meeting of the Pacific Northwest Section of the Mathematical Association of America
- In this talk, I present work on aligning course learning goals and Bloom's taxonomy level with assessment.

10/27/2017, 11/9/2017, & 6/12/2018 **On the orbital stability of elliptic solutions to focusing NLS**
- Talk at the SIAM Pacific Northwest Regional Conference in Corvallis, OR., for the UW Applied Math seminar, and at the SIAM Nonlinear Waves and Coherent Structures conference in Orange, CA.
- In this talk, I present work on stability properties of a special class of solutions to the focusing Nonlinear Schrödinger equation.

7/31/2017 & 6/2018 **On the orbital stability of elliptic solutions to focusing NLS**
- Poster presented at the Recent Advances in Nonlinear Waves conference in honor of Harvey Segur's 75th Birthday. Seattle, WA. and at the NSF-CBMS conference on Solving Problems in Multiply-Connected Domains, Irvine, CA.
- This poster presents work on stability properties of a special class of solutions to the focusing Nonlinear Schrödinger equation.

3/30/2017 & 4/18/2017 **On the integrability of long and short wave interaction models**
- Poster presented at The Tenth IMACS International Conference on Nonlinear Equations and Wave Phenomena and at the Water Waves Session at ICERM.
- This poster focuses on the integrability of two different coupled long and short wave interaction models.

10/8/2016 & 1/24/2017 **Methods in Applied Mathematics Journal Club Presentation**
- On the integrability of Hamiltonian PDEs via the method of Zakharov and Schulmann, parts 1 and 2 respectively.

12/9/2015 **Spectral methods final project**
- Graduate class at the University of Washington
- Titled "Fun with Spherefun"

6/6/2015 **Dynamical systems final project**
- Graduate class at the University of Washington
- Titled "Krein signature calculations for small amplitude periodic traveling wave solutions of dispersive Hamiltonian PDEs"

1/26/2015 **Methods in Applied Mathematics Journal Club Presentation**
- On undergraduate research titled "The explosive instability due to 4-wave mixing without dissipation or spatial variability"

12/4/2014 **Nonlinear waves final project**
- Graduate class at the University of Washington
- Titled "The AFM formulation of the water-wave problem"

5/3/2014 **Dynamical systems final project**
- Graduate class at the University of Colorado
- Titled "Bifurcating small-amplitude limit cycles from fine-focus origins of Polynomial Liénard systems"

12/8/2013 **Nonlinear waves final project**
- Graduate class at the University of Colorado
- Titled "The explosive instability due to 3-wave or 4-wave mixing without dissipation or spatial variability"

Teaching Experience

6/2017 – current **Instructor, University of Washington (with adjusted median evaluation score/5.0)**
- **Spring 2019, AMATH 383.** Partial Differential Equations and Waves.
- **Autumn 2018, AMATH 383.** Introduction to Continuous Mathematical Modeling.
- **Spring 2018, AMATH 353.** Partial Differential Equations and Waves (4.5/5.0).
- **Summer 2017, AMATH 353.** Partial Differential Equations and Waves (4.4/5.0).

7/2018 – 9/2018 **Instructor, The University of Washington Math Science Upward Bound program**
- The Math Science Upward Bound program is a federally funded program college-opportunity program that motivates and supports high school students from disadvantaged backgrounds in their pursuit of a college degree. `https://uwmsub.org`.
- **Summer 2018, Math 5.** Math 5 is the highest level of math class offered, it is a statistics course. The course is co-taught with Jake Price.
- **Summer 2018, Machine Learning.** The machine learning course is an elective course co-taught with Jake Price.

9/2014 – 12/2016 **Teaching assistant, University of Washington (with adjusted median evaluation score/5.0)**
- **Winter 2019, AMATH 402.** Introduction to Dynamical Systems and Chaos.
- **Autumn 2016, AMATH 383.** Introduction to Continuous Mathematical Modeling.
- **Summer 2016, AMATH 353.** Partial Differential Equations and Waves.
- **Summer 2016, AMATH 352.** Applied Linear Algebra and Numerical Analysis.
- **Spring 2016, AMATH 351.** Differential Equations.
- **Winter 2016, MATH 124.** First quarter in calculus sequence, Adjusted median instructor evaluation scores were (4.7/5.0) and (4.4/5.0) for my two sections.

- **Spring 2015, MATH 126.** Third quarter in calculus sequence. Adjusted median instructor evaluation scores were (4.4/5.0) and (4.3/5.0) for my two sections.
- **Winter 2015, MATH 125.** Second quarter in calculus sequence. Adjusted median instructor evaluation scores were (4.3/5.0) and (3.6/5.0) for my two sections.
- **Autumn 2014, MATH 125.** Second quarter in calculus sequence. Adjusted median instructor evaluation scores were (4.0/5.0) and (4.0/5.0) for my two sections.

8/2013 – 5/2014 **Applied Mathematics Learning Assistant (LA), University of Colorado at Boulder**
- **Fall 2013, APPM 4440.** Undergraduate Applied Analysis 1.
- **Spring 2014, APPM 3310.** "Matrix Methods," (undergraduate Linear Algebra).

9/2011 – 5/2014 **Math Tutor with The University of Colorado Student Academic Success Center**

Mentoring

7/2018 – 2/2019 **Mentor to undergraduate Math student Ryan Bushling**
I continued advising Ryan as he continued his WXML project (below) by computing the stability spectrum for the constant solutions of the Benjamin-Ono equation.

1/2018 – 6/2018 **University of Washington WXML (Washington Experimental MathLab) graduate mentor**
I was a graduate mentor for two undergraduate students at the University of Washington. Together we computed the stability spectrum of the mKdV equation using Hill's method.

Work Experience

12/2016 – current **University of Washington DRS (Disability Resources for Students) Exam Proctor**
I proctor exams for students with special considerations for test taking.

9/2016 – current **Tutor at Jeremy Upsal Consulting**
I have been a tutor for a variety of undergraduate and high-school students both in the Seattle area and in other cities via online chat.

6/2013 – 12/2013 **Student Assistant at University of Colorado Boulder**
Working with Professor Harvey Segur and lab technicians, I redesigned old and designed new projects for the undergraduate PDE/Fourier Series class at the University of Colorado.

1/2012 – 5/2013 **IT/Systems Engineer at Colorado Space Grant Consortium**

Professional Activities, Services/Leadership, and Awards

9/2018 – current **Member of The University of Washington Applied Mathematics Diversity Committee**

6/2018 **Boeing Service Award to the UW Department of Applied Mathematics**

9/2017 – 8/2018 **UW Applied Math Graduate Student Representative**

1/2016 – Current **UW Applied PDEs Seminar Co-organizer**

9/2015 – 9/2017 **SIAM UW treasurer**

Academic Conferences/Workshops/Summer School

4/12/2019 – 4/13/2019 **The 2019 Annual Meeting of the Pacific Northwest Section of the Mathematical Association of America**
- Organized a session titled "Aligning practice and assessment with course learning goals" with Craig Gin and Kelsey Marcinko.
- Presented a talk on aligning examination content with course goals and Bloom's taxonomy in a beginning scientific computing course.
- `https://college.up.edu/math/pnw-maa.html`

4/17/2019 – 4/19/2019 **The Eleventh IMAC International Conference on Nonlinear Equations and Wave Phenomena**
- Organized a session titled "Stability and traveling waves" with Bernard Deconinck, Anna Ghazaryan, Mat Johnson, Stephane Lafortune, Yuri Latushkin, and Samuel Walsh.
- Presented a talk on determining the stability of solutions to integrable equations by understanding the Lax spectrum.
- `http://waves2019.uga.edu/index.shtml`

6/18/2018 – 6/22/2018 **NSF-CBMS Conference on Solving Problems in Multiply-Connected Domains**

6/11/2018 – 6/14/2018 **2018 SIAM Conference on Nonlinear Waves and Coherent Structures**
- Presented a talk on stability of elliptic solutions to the Nonlinear Schrödinger equation
- `http://www.siam.org/meetings/nwcs18/`

4/15/2017 – 4/29/2017 **2017 SIAM Pacific Northwest Regional Conference**
- Organized a session titled "Recent Advances in Nonlinear Waves" with Xin Yang
- Presented a talk on stability of elliptic solutions to the Nonlinear Schrödinger equation
- `https://sites.google.com/view/siampnw17/`

4/15/2017 – 4/29/2017 **Institute for Computational and Experimental Research in Mathematics (ICERM), Providence RI.**
- Long term visitor for the semester program entitled "Singularities and Waves in Incompressible Fluids"
- Presented a poster at the poster session
- `https://icerm.brown.edu/programs/sp-s17/`

3/29/2017 – 4/1/2017 **The Tenth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens GA.**
- Presented a poster at the poster session
- `http://waves2017.uga.edu/index.shtml`

10/31/2016 – 11/4/2016 **Workshop on Theoretical and Computational Aspects of Nonlinear Surface Waves at BIRS, Banff, Alberta CA**
- `https://www.birs.ca/events/2016/5-day-workshops/16w5112`

9/6/2016 – 12/6/2016 **College Mathematics Instructor Development Source (CoMInDS) (online)**
- `http://www.maa.org/programs/faculty-and-departments/cominds`

8/8/2016 – 8/11/2016 **2016 SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia PA**
- `http://www.siam.org/meetings/nwcs16/`

7/25/2016 – 8/5/2016 **Gene Golub SIAM Summer School 2016, Drexel University, Philadelphia PA**
- This two week course focuses on stochastic processes in Nonlinear Waves.
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http://www.math.drexel.edu/ song/Gene%20Golub%20Summer%20School/homepage1.html

6/13/2016 – 6/24/2016 **University of Chicago Third Summer School in Analysis, Chicago IL**
- This two week course focused on partial differential equations.
- `http://math.uchicago.edu/chicagoanalysis/`

1/6/2016 – 1/9/2016 **Joint Math Meetings, Seattle WA**
- Attended sessions on water waves and nonlinear waves and coherent structures

7/7/2014 – 7/18/2014 **Train Tracks, Diffeomorphisms of Surfaces and Automorphisms of Free Groups RTG, University of Utah**
- Instructor: Mladen Bestvina
- `http://www.math.utah.edu/agtrtg/traintracks/`

5/20/2013 – 5/23/2013 **Layered Ocean Model Workshop**
- A description of the workshop can be found at: `http://coaps.fsu.edu/LOM/`

5/20/2012 – 5/25/2012 **Duke University Mathematical Biology Workshop**
- A description of the workshop can be found at: `http://www.math.duke.edu/mathbio/undergrad.html`

Professional Societies

1/2015 – Current **American Mathematical Society (AMS)**

10/2014 – Current **Association for Women in Mathematics (AWM)**

8/2014 – Current **Society for Industrial and Applied Mathematics (SIAM)**

Outreach

9/2018 – current **Member of the University of Washington Department of Applied Mathematics Diversity Committee**

3/14/2019 **Volunteer for the SIAM Pi Day Math Fair event at Northshore Middle School, Bothell WA**

4/28/2018 **Volunteer for the Girl Scouts Math Fair at the University of Washington**

3/19/2018 **Volunteer for The University of Washington Math Fair**

9/2017-8/2018 **Graduate Student Representative for the University of Washington Department of Applied Mathematics**

3/2/2019, 11/17/2018, 3/10/2018, 2/25/2017 **Volunteer for the Math For Love Julia Robinson Mathematics Festival, Seattle WA**

3/5/2016 **Volunteer for the SIAM Math Fair at the Pacific Science Center, Seattle WA**

12/11/2017, 12/16/2016, 12/8/2014 **Volunteer for the SIAM Math Fair at Lockwood Elementary, Bothell WA**

1/2014 – 5/2014 **Volunteer AVID tutor at Boulder High School, Boulder CO**

Computer Skills/Other

- Operating systems: Proficient in Windows OS, Linux/Unix systems, and OSX.
- Programming/Scripting: Working knowledge of FORTRAN, C++, Python, Java, Bash, Mathematica, MATLAB, Sage, as well as a limited knowledge of PowerShell and Maple.
- Other software: MySQL, MS Office Suite, and LaTeX.