### Alumni Index

#### 2017

<table>
<thead>
<tr>
<th>Name</th>
<th>Ph.D Thesis</th>
<th>Advising Professor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Lansdell</td>
<td>&quot;On neural encoding: its estimation, application, and development.</td>
<td>Adrienne Fairhall</td>
</tr>
<tr>
<td>Yian Ma</td>
<td>&quot;Irreversibility in Stochastic Dynamic Models and Efficient Bayesian Inference.&quot;</td>
<td>Hong Qian</td>
</tr>
<tr>
<td>Susan C. Massey</td>
<td>&quot;Multi-scale modeling of paracrine PDGF-driven glioma growth and invasion.&quot;</td>
<td>Kristin Swanson</td>
</tr>
<tr>
<td>Scott Moe</td>
<td>&quot;High order shock capturing methods with compact stencils for use with adaptive mesh refinement and mapped grids.&quot;</td>
<td>Randall LeVeque</td>
</tr>
<tr>
<td>Donsub Rim</td>
<td>&quot;Uncertainty quantification problems in tsunami modeling and reduced order models for hyperbolic partial differential equations.&quot;</td>
<td>Randall LeVeque</td>
</tr>
<tr>
<td>Daniel Shapero</td>
<td>&quot;Data assimilation problems in glaciology.&quot;</td>
<td>Randall LeVeque/Ian Joughin</td>
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<tr>
<td>Timothy B. Oleskiw</td>
<td>&quot;On computing shape: a study of the neural processes concerning naturalistic boundary conformation within the ventral visual pathway.&quot;</td>
<td>Eric Shea-Brown</td>
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<tr>
<td>Niket Thakkar</td>
<td>&quot;Energy and Charge Transfer in Open Plasmonic Systems.&quot;</td>
<td>David Masiello</td>
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<tr>
<td>Benjamin Segal</td>
<td>&quot;The stability and instabilities of stationary solutions to the nonlinear Schroedinger and sine-Gordon equation.&quot;</td>
<td>Bernard Deconinck</td>
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</table>

#### 2016

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<thead>
<tr>
<th>Name</th>
<th>Ph.D Thesis</th>
<th>Advising Professor(s)</th>
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<tbody>
<tr>
<td>Xing Fu</td>
<td>&quot;Integrating Data-Driven Methods in Nonlinear Dynamical Systems: Control, Sparsity, and Machine Learning.&quot;</td>
<td>Nathan Kutz</td>
</tr>
<tr>
<td>Jakob Kotas</td>
<td>&quot;Dynamic, convex, and robust optimization with Bayesian learning for response-guided dosing.&quot;</td>
<td>Archis Ghate</td>
</tr>
<tr>
<td>Bethany Lusch</td>
<td>&quot;Machine learning and data decompositions for complex networked dynamical systems.&quot;</td>
<td>Nathan Kutz</td>
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<tr>
<td>Syuzanna Sargsyan</td>
<td>Dimensionality hyper-reduction and machine learning for dynamical systems with varying parameters.</td>
<td>Nathan Kutz</td>
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<tr>
<td>Mauricio del Razo Sarmina</td>
<td>&quot;Stochastic Modeling of Reversible Biochemical Reaction-Diffusion Systems and High-Resolution Shock-Capturing Methods for Fluid Interfaces.&quot;</td>
<td>Randall LeVeque/Hong Qian</td>
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#### 2015

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<thead>
<tr>
<th>Name</th>
<th>Ph.D Thesis</th>
<th>Advising Professor(s)</th>
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<tbody>
<tr>
<td>Natasha A. Cayco Gajic</td>
<td>&quot;Coordinated Neural Activity: Mechanistic Origins and Impact on Stimulus Coding.&quot;</td>
<td>Eric Shea-Brown</td>
</tr>
<tr>
<td>Kathleen M. Curtius</td>
<td>&quot;Multiscale Modeling of Esophageal Adenocarcinoma.&quot;</td>
<td>Georg Luebeck</td>
</tr>
<tr>
<td>Mikala C. Johnson</td>
<td>&quot;Self-Optimizing Metamaterial Antennas.&quot;</td>
<td>Nathan Kutz</td>
</tr>
</tbody>
</table>
Natalie E. Sheils
"Interface Problems Using the Unified Transform Method."
Bernard Deconinck

Olga Trichtchenko
"On the Instability of Water Waves with Surface Tension."
Bernard Deconinck

2014

Meng-Huo Chen
"Analysis of an Aggregation-based Algebraic Multigrid Method and its Parallelization."
Anne Greenbaum

Yu Hu
"Collective Activity in Neural Networks: the Mathematical Structure of Connection Graphs and Population Codes."
Eric Shea-Brown

Jihwan Kim
"Finite Volume Method for Tsunamis Generated by Submarine Landslides."
Randall LeVeque

Guillaume Lajoie
"On Driven Neural Assemblies: Synchrony, Chaos and Entropy."
Eric Shea-Brown

2013

Jacob R. Grosek
"Robust Real-Time Image Processing Through Dynamic Mode Decomposition."
Nathan Kutz

Christopher R. Jones
"Single-column and mixed-layer model analysis of subtropical stratocumulus response mechanisms relevant to climate change."
Christopher Bretherton

Grady I. Lemoine
"Numerical Modeling of Poroelastic-Fluid Systems Using High-Resolution Finite Volume Methods."
Randall LeVeque

Russell C. Rockne
"Patient-Specific Mathematical Radiation Oncology."
Kristin Swanson

Thomas D. Trogdon
"Riemann-Hilbert Problems, Their Numerical Solution and the Computation of Nonlinear Special Functions."
Bernard Deconinck

Mingyuan Zhong
"Value function approximation methods for Linearly-solvable Markov Decision Process."
Emo Todorov

Ying Zhou
"Geographic Range Shifts under Climate Warming."
Mark Kot

2012

Nicholas Cain
"Probabilistic, Statistical, and Dynamical Models of Neural Decision Making."
Eric Shea-Brown

Joshua Jacobs
"Vortex Dynamics of Geostrophically Adjusted Density Perturbations in Stratified, Incompressible Fluids."
Randall LeVeque/Pascale Lelong

Laura Matarajt Arbetman
"Optimal Vaccine Allocation for Pandemic Influenza."
Mark Kot/Ira Longini

Vishal Vasan
"Some Boundary-Value Problems for Water Waves."
Bernard Deconinck

Matthew Williams
"Exploiting Low Dimensionality in Nonlinear Optics and Other Physical Systems."
Nathan Kutz

Yun Zhang
"ETG-ETL Portfolio Optimization."
James Burke

Jiansong Zhou
"Climate Response to Solar Variation: Cyclic and Secular."
Ka Kit Tung

2011

Lisa Bishop
"The Origin of Noise-Induced Phenomena: A Mathematical Analysis of Mesoscopic Chemical and Biochemical Dynamics."
Hong Qian

Jonathan Claridge
"Numerical methods and studies of parabolic problems, operator splitting, and adaptive mesh refinement."
Randall LeVeque
Goldwyn  "Mathematical modeling of cochlear implants -- from single neurons to psychoacoustics."  Eric Shea-Brown

Edwin Ding  "Modeling High-Energy Temporal and Spatial Mode-Locking."  Nathan Kutz

Woo Hyun Kim  "On the Behavior of the Entropy Production Rate of a Diffusion Process in Nonequilibrium Steady State."  Hong Qian

Eleftherios Kirkinis  "Renormalization Group Methods in Applied Mathematics."  Robert O'Malley

Christine Lind  "Mathematical Models for Molecular Motors."  Hong Qian

Kyle Mandli  "Finite Volume Methods for the Multilayer Shallow Water Equations with Applications to Storm Surges."  Randall LeVeque

Peizhe Shi  "The Coupled Process and its Applications in Cellular Molecular Biology."  Hong Qian

2010

Kirsten Fagnan  "High-resolution Finite Volume Methods for Extracorporeal Shock Wave Therapy."  Randall LeVeque

Minsun Kim  "A mathematical framework for spatiotemporal optimality in radiotherapy."  Archis Ghate

Eric MacHorro  "A study of several numerical methods for the Boltzmann transport problems."  Anne Greenbaum


2009

Christopher Curtis  "Exact and approximate methods for computing the spectral stability of traveling-wave solutions."  Bernard Deconinck

Dean Gull  "Steady State Analysis of Chemical Reaction Systems."  Hong Qian

Larry Jean  "Stochastic multi-scale modeling of carcinogenesis."  Georg Luebeck

David Ketcheson  "High Order Strong Stability Preserving Time Integrators and Numerical Wave Propagation Methods for Hyperbolic PDEs."  Randall LeVeque

Michael Nivala  "Nonlinear Stability in Integrable Hamiltonian Systems."  Bernard Deconinck

Katie Oliveras  "Stability of periodic surface gravity water waves."  Bernard Deconinck

Yiyi Shi  "Theory of Random Networks and Their Applications."  Hong Qian

Melissa Vellela  "Mesoscopic dynamics of biochemical kinetic equations."  Hong Qian

2008

Brandon Bale  "Modeling the stability and dynamics of mode-locked fiber lasers."  Nathan Kutz

Miguel Gomez  "Optimization-based Analysis of Rigid Mechanical Systems with Unilateral Contact and Kinetic Friction."  Anne Greenbaum

Gunog Seo  "The dynamics of simple predator-prey models with Holling functional responses."  Mark Kot

Jason Slemons  "Toward the solution of the eigenproblem: Nonsymmetric tridiagonal matrices."  Loyce Adams

2007

Jihyoun Jeon  "Mathematical modeling of pre-malignant lesions in multistage carcinogenesis."  Suresh Moolgavkar

Matthew
Patterson
Santosh Srivastava
"Algebro-geometric algorithms for integrable systems,"
Deconinck Maya Gupta

2006

David George
"Finite volume methods and adaptive refinement for tsunami propagation and inundation,"
Randall LeVeque

Eleftherios Gkioulekas
"A theoretical study of the cascades of 3D, 2D, and QG turbulence,"
Ka Kit Tung

Rafael Meza
"Some Extensions and Applications of Multistage Carcinogenesis Models,"
Suresh Moolgavkar

Damon Toth
"Analysis of Age-Structured Chemostat Models,"
Mark Kot

2005

Edward Farnum
"Stability and Dynamics of Solitary Waves in Nonlinear Optical Materials,"
Nathan Kutz

William Heuett
"New Methods for Modeling Large-Scale Biochemical Networks,"
Hong Qian

Rie Komuro
E. David Ford

Marica Pelanti
"Wave Propagation Algorithms for Multicomponent Compressible Flows with Applications to Volcanic Jets,"
Randall LeVeque

Matthew Peters
"Moist convection and the large scale tropical circulation,"
Christopher Bretherton

David Williams
"Solving singular perturbation problems: An amplitude equation approach,"
Robert O'Malley

2004

Sarah Hewitt
"Dynamics and Stability of Periodic Spatial Patterns in the Optical Parametric Oscillator,"
Nathan Kutz

Viktoria Hsu
"Ion Transport through Biological Cell Membranes: From Electro-Diffusion to Hodgkin-Huxley via a Quasi Steady-State Approach,"
Hong Qian

Jan Medlock
"Integro-differential-Equation Models in Ecology and Epidemiology,"
Mark Kot

Timothy Reluga
"Some results on temporal and spatial heterogeneity in theoretical ecology,"
Mark Kot

2003

Kathleen Coughlin
"Stratospheric and Tropospheric Signals Extracted Using the Empirical Mode Decomposition Method,"
Ka Kit Tung

Rebecca Crabb
"A Dynamic Game for Managing a Conservative Pollutant in an Estuary,"
Thomas Leschine

Steven Kusiak
"The Scattering Support and the Inverse Scattering Problem at Fixed Frequency,"
John Sylvester

2002

Derek Bale
"Wave Propagation Algorithms On Curved Manifolds With Applications to Relativistic Hydrodynamics,"
Randall LeVeque

Eric Dolven
"Seaquake Waves - Standing Wave Dynamics with Faraday Excitation and Radiative Loss,"
Harry Yeh

Long Lee
"Immersed Interface Methods for Incompressible Flow with Moving Interfaces,"
Randall LeVeque
Blessing Mudavanhu
"A New Renormalization Method for the Asymptotic Solution of Multiple Scale Singular Perturbation Problems."
Robert O'Malley

James Rossmanith
"A Wave Propagation Method with Constrained Transport for Ideal and Shallow Water Magnetohydrodynamics."
Randall LeVeque

2001

Tiernan Fogarty
"Finite Volume Methods for Acoustics and Elasto-plasticity with Damage in a Heterogeneous Medium."
Randall LeVeque

Karl Knaub
"On the Asymptotic Behavior of Internal Layer Solutions of Advection-Diffusion-Reaction Equations."
Robert O'Malley

David Luke
"Analysis of Optical Wavefront Reconstruction and Deconvolution in Adaptive Optics."
James Burke

2000

Arnold Kim
"Optical Pulse Propagation, Diffusion and Depolarization in Discrete Random Media."
Akira Ishimaru

Mark Martin
"The Influence of Seasonal and Climatic Environmental Changes on Plankton in the Marine Mixed Layer."
Mark Kot

Benjamin Moskowitz
"An Analysis of Frictional Feedback in the Madden-Julian Oscillation."
Christopher Bretherton

Dominik Obrist
"On the stability of the swept leading-edge boundary layer."
Peter Schmid

Darryl Yong
"Solving boundary-value problems for systems of hyperbolic conservation laws with rapidly varying coefficients."
Jirair Kevorkian

1999

Donna Calhoun
"A Cartesian Grid Method for Solving the Streamfunction Vorticity Equations in Irregular Geometries."
Randall LeVeque

Kristin Swanson
"Mathematical Modeling of the Growth and Control of Tumors."
James Murray

1998

Trachette Jackson
"Mathematical Models in Two-Step Cancer Chemotherapy."
James Murray

Patrick Nelson
"Mathematical Models of HIV Pathogenesis and Immunology."
James Murray

Eric Stollnitz
"Reproducing Color Images with Custom Inks."
David Salesin

Christopher Thompson
"A Linear, Stochastic, Dynamical Model of El Nino/Southern Oscillation."
Ka Kit Tung

1997

David Salinger
"A Splitting Algorithm for Multistage Stochastic Programming with Application to Hydropower Scheduling."
Terry Rockafellar

1996

Daphne Manoussaki
"Modelling formation of vascular networks in vitro."
James Murray

Wendell Orlando
"Nonlinear Baroclinic Adjustment and Wavenumber Selection as a Mechanism for Atmospheric Heat Transport."
Ka Kit Tung
Louis Stern  
Randall LeVeque

Rebecca Tyson  
"Pattern formation by E. coli - mathematical and numerical investigation of a biological phenomenon."  
James Murray

Zhiyun Yang  
"A Cartesian Grid Method For Elliptic Boundary Value Problems in Irregular Regions."  
Loyce Adams

Cynthia Young  
"The two-frequency mutual coherence function of a Gaussian beam pulse in weak turbulence."  
Akira Ishimaru

Chaoming Zhang  
"Immersed interface methods for hyperbolic systems of partial differential equations with discontinuous coefficients."  
Randall LeVeque

1995

Julian Cook  
"Mathematical Models for Dermal Wound Healing: Wound Contraction and Scar Formation."  
James Murray

Ming Fang  
"On the Axisymmetric Circulation of the Atmosphere."  
Ka Kit Tung

Paul Kulesa  
"A Model Mechanism for the Initiation and Spatial Patterning of Teeth Primordia in the Alligator."  
James Murray

Thomas Milac  
"The Linear Elastostatics of Spherical Shells."  
Frederic Wan

Hugh Rand  
"Mesoscale Dynamics of the Marine Atmospheric Boundary Layer."  
Christopher Bretherton

Lei Wang  
"Asymptotic Analysis of a Class of Three-Degree-Of-Freedom Hamiltonian Systems Near Stable Equilibria."  
Jirair Kevorkian

Katrin White  
"Territoriality and Survival in Wolf-Deer Interactions."  
James Murray

1994

Margaret Brown  
"Geophysical inverse methods applied to the deduction of the emissions of atmospheric source gases."  
Ka Kit Tung

George Chen  
"Forward-Backward splitting techniques: Theory and Applications."  
Terry Rockafellar

Chonghua Gu  
"Shear Center of Plates with Variable Thickness."  
Frederic Wan

Jacques Laforgue  
"Using Exponential Asymptotics to Study the Metastability and Supersensitivity of Shock and Transition Layers."  
Robert O'Malley

Zhiili Li  
"The Immersed Interface Method - A Numerical Approach for Partial Differential Equations with Interfaces."  
Randall LeVeque

Kristyn Maschhoff  
"Methods for Solving Large Symmetric Eigenvalue Problems Associated with Configuration Interaction Electronic Structure Calculations."  
Loyce Adams

William Mell  
"An Investigation of Closure Models for Nonpremixed Turbulent Reacting Flow."  
George Kosaly

Mike Neubert  
"The Nonlinear Dynamics of Predator-Prey Growth and Dispersal."  
Mark Kot

David Stevens  
"An Adaptive Multilevel Method for Boundary Layer Meteorology."  
Chris Bretherton

Mei Zhu  
"Mechanisms for Biological Pattern Formation: Nonlinear Effects."  
James Murray

1993

Charles Mannix  
"An Investigation of Numerical Methods Applicable to a Certain Class of Singular Integral Equations."  
Ka Kit Tung

Ke-Ming Shyue  
"Front Tracking Methods based on Wave Propagation."  
Randall LeVeque

1991

Yeng Bun  
"Evolution of Three-Dimensional Disturbances in a Mixing Layer."  
William Criminale
### 1990

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Kevin Gates</td>
<td>&quot;Divide and Conquer Methods for the Symmetric Tridiagonal Eigenvalue Problem.&quot;</td>
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<tr>
<td>Jeffrey Greenough</td>
<td>&quot;A Weakly Nonlinear Theory of Confined Supersonic Instability Modes.&quot;</td>
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<tr>
<td>Steven Siems</td>
<td>&quot;A Numerical Investigation of Cloud-Top Entrainment Instability and Related Experiments.&quot;</td>
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<tr>
<td>Ciyou Zhu</td>
<td>&quot;Methods for Large-Scale Extended Linear-Quadratic Programming.&quot;</td>
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<td>Loyce Adams</td>
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<td>James Riley</td>
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### 1989

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<th>Name</th>
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<tbody>
<tr>
<td>Scott Coble</td>
<td>&quot;Automatic Control of Extracorporeal Blood Oxygenation.&quot;</td>
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<tr>
<td>Mark Pernarowski</td>
<td>&quot;The Mathematical Analysis of Bursting Electrical Activity in Pancreatic Beta Cells.&quot;</td>
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<tr>
<td>Ruoxin Zhang</td>
<td>&quot;Problems of Hierarchical Optimization: Nonsmoothness and Analysis of Solutions.&quot;</td>
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<td>Lois Adams</td>
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<td>James Riley</td>
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### 1988

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<tr>
<td>Richard Beyer</td>
<td>&quot;A Computational Model of the Cochlea using the Immersed Boundary Method.&quot;</td>
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<td>David Bosley</td>
<td>&quot;Transient and Sustained Resonance in Very Slowly Varying Oscillatory Hamiltonian systems with Application to Free-Election Lasers.&quot;</td>
</tr>
<tr>
<td>Marie Lelong</td>
<td>&quot;Weakly-nonlinear Internal Wave/Vortical Mode Interactions in Stably-Stratified Flows.&quot;</td>
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<tr>
<td>Maria Ong</td>
<td>&quot;Hierarchical Basis Preconditioners for Second-Order Elliptic Problems in Three Dimensions.&quot;</td>
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<tr>
<td>Radhakrishnan Srinivasan</td>
<td>&quot;Asymptotic Solutions of Weakly Nonlinear, Dispersive Wave Propagation Problems by Fourier Analysis.&quot;</td>
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<tr>
<td>Kraig Winters</td>
<td>&quot;Intensification and Instability of Internal Gravity Waves at Caustics and Critical Levels.&quot;</td>
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### 1987

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Pierre Mourad</td>
<td>&quot;A Numerical Streamline Approach to Steady Internal Flows.&quot;</td>
</tr>
<tr>
<td>Donald Owen</td>
<td>&quot;A Numerical Streamline Approach to Steady Internal Flows.&quot;</td>
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### 1986

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<th>Name</th>
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</table>
| Jeffrey Cordova   | "Numerical Streamline Methods for Solving Steady Flow Problems (Methods, Compressible, Free Surface, Finite Difference)."
| Jie Sun           | "On Monotropic Piecewise Quadratic Programming (Network, Algorithm, Convex Programming, Decomposition Method)." |
|                   |                                                                       |

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Department of Applied Mathematics  
University of Washington  
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Seattle, WA 98195-3925
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