

## Research Interests

- I am primarily interested in applied mathematics involving partial differential equations, probability theory, and inverse problems.
- Right now I'm working on three projects. The first project is wave propagation in random media in the weak-coupling limit (small fluctuations). In this limit, wave energy propagation can be modeled by transport equations—which describe the average energy density. The question is, "is this deterministic equation indeed the correct limit as fluctuation size goes to zero?" The second project involves a combination of deterministic and probabilistic methods for Monte Carlo simulation of Boltzmann transport. The third involves the use of polynomial chaos expansions for uncertainty quantification in very-large scale systems.
- I am also interested in inverse problems and other applications of partial differential equations, functional analysis, differential geometry, probability, random processes, and statistical inference

## Education

- **University of Washington** Seattle, WA  
*PhD, Mathematics* 2008
  - Advised by Gunther Uhlmann
  - Analysis with a specialization in inverse transport.
- **University of California** San Diego, CA  
*Master of Science, Electrical Engineering* 2004
  - Masters thesis on theoretical aspects of power amplifier optimization. Included lots of MATLAB programming.
- **University of California** San Diego, CA  
*Bachelor of Science, Electrical Engineering* 2002
  - Specialization in electronic circuits and systems. Extra coursework done in numerical analysis, mechanics, nonlinear dynamics, and MATLAB/Java/C programming.

## Research Positions

- **Columbia University** New York, NY  
*Postdoctoral Researcher* July 2008 - Present
  - NSF RTG award. Numerical Mathematics for Scientific Software. Working on inverse problems in plasma diagnostics, and radioactivity detection
- **Columbia University** New York, NY  
*Visiting Researcher* Spring 2007
  - Conducted work related to NSF FRG grant "Inverse Problems in Transport Theory" with Guillaume Bal.
- **University of Washington** Seattle, WA  
*Graduate Student Researcher* Summer 2006-present
  - Conducting research in inverse problems in transport theory (radiative transfer) as an advisee of Gunther Uhlmann.
- **University of California** San Diego, CA  
*Graduate Student Researcher* 2002-2004
  - Worked on digital predistortion methods as an advisee of Peter Asbeck.

- **University of California**  
*Undergraduate Student Researcher*

San Diego, CA  
2001-2002

- Worked on communication devices using chaotic frequency modulation with the Institute for Nonlinear Science.

## Honors

- VIGRE graduate fellowship, University of Washington, 2007-2008
- Graduate school “top scholar” award, University of Washington, 2004.
- Graduated magna cum laude, University of California in San Diego, 2004.

## Talks

- **“Stationary Transport with Averaged Measurements, and an Inverse Problem in Fusion Plasmas”**, *Summer school on inverse problems in radiative transfer, UC Merced, 2008.*
- **“The stationary transport equation with angularly averaged measurements”**, *Summer school on inverse problems in radiative transfer, University of Washington, 2007.*
- **“Inverse transport with isotropic sources and averaged measurements”**, *Inverse problems seminar, University of Washington, 2007.*

## Conference and other Presentations

- **“Inverse transport with angularly averaged measurements”**, I. Langmore, Ph.D thesis, University of Washington, 2008
- **“Memory effect evaluation and predistortion of power amplifiers”**, with P. Draxler, J. Deng, D. Kimball, and P.M. Asbeck, *2005 IEEE MTT-S International Microwave Symposium Digest.*
- **“Cortical algorithm applied to RF power amplifier memory modeling”**, with P. Draxler, and P.M.Asbeck, *Tech. Dig. 2004 IEEE Wireless and Microwave Technology Conference.*
- **“Time domain characterization of power amplifiers with memory effects”**, with P. Draxler, T.P. Hung, and P.M. Asbeck, *2003 IEEE MTT-S International Microwave Symposium Digest, vol. 2.*
- **“Ultra wide band communication device with chaotic frequency modulation”**, with A.R. Volkovskii *AIP conference proceedings, n676, 2003, p. 364.*

## Book Chapters

- **“Spread spectrum communication with chaotic frequency modulation”**, with A.R. Volkovskii, L. S. Tsimring, N. Rulkov, and S. Young, appearing in *Digital communications using chaos and nonlinear dynamics, chapter 3: Spread spectrum communication with chaotic frequency modulation* Springer (2006), ISBN:9780387297873

**Journal Articles: Published and Submitted. Preprints available at:**  
<http://www.columbia.edu/~il2176>

- **“Single scattering estimates for the scintillation function of waves in random media”**, with G. Bal and O. Pinaud, *To appear, Journal of Mathematical Physics.*
- **“Optical tomography for variable refractive index with angularly averaged measurements”**, with S. McDowall, *Comm. PDE.*, **33** (2008), pp. 2180-2207

**“Inverse transport with isotropic sources and angularly averaged measurements”**, with G. Bal and F. Monard, *Inverse Problems in Imaging*, **2**, no.1, pp. 23-42. Feb (2008).

**“The stationary transport problem with angularly averaged measurements”**, *Inverse Problems*, **24** (2008) 015024.

**“Spread spectrum communication system with chaotic frequency modulation”**, with A.R. Volkovskii, L.S. Tsimring, and N.F. Rulkov *Chaos*, v 15, n3, Sept 2005.