Zachary Peter Kilpatrick

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Education

- ◇ **University of Utah**, Ph.D. in Mathematics (Advisor: Paul Bressloff); August 2010
- ◇ **University of Utah**, M.S. in Mathematics; May 2007
- ◇ **Rice University**, B.A. in Computational and Applied Mathematics; May 2005

Professional Experience

- ◇ **University of Pittsburgh**, NSF Postdoctoral Research Fellow (MSPRF), Fall 2010 –

Research interests

Mathematical Neuroscience, Bifurcation Theory, Nonlinear Waves, Stochastic Processes

Publications

Z.P. Kilpatrick and G.B. Ermentrout, *Wandering bumps in stochastic neural fields*, (2012) submitted.

S.M. Jayasuriya* and Z.P. Kilpatrick, *Effects of time-dependent stimuli on a competitive neural network model of perceptual rivalry*, Bull. Math. Biol., 6 (2012) pp. 1396-1426.

Z.P. Kilpatrick and G.B. Ermentrout, *Response of traveling waves to transient inputs in neural fields*, Phys. Rev. E, 85 (2012) 021910.

Z.P. Kilpatrick and G.B. Ermentrout, *Hallucinogen persisting perception disorder in neuronal networks with adaptation*, J Comp. Neurosci., 32 (2012) pp. 25-53.

Z.P. Kilpatrick and G.B. Ermentrout, *Sparse gamma rhythms arising through clustering in adapting neuronal networks*, PLoS Comput. Biol. 7 (2011), e1002281.

P.C. Bressloff and Z.P. Kilpatrick, *Two–dimensional bumps in piecewise smooth neural fields with synaptic depression*, SIAM J Appl. Math., 71 (2011) pp. 379-408.

Z.P. Kilpatrick and P.C. Bressloff, *Binocular rivalry in a competitive neural network model with synaptic depression*, SIAM J Appl. Dyn Syst., 9 (2010) pp. 1303-1347.

Z.P. Kilpatrick and P.C. Bressloff, *Stability of bumps in piecewise smooth neural networks with nonlinear adaptation*, Physica D, 239 (2010) pp. 1048-1060.

Z.P. Kilpatrick and P.C. Bressloff, *Spatially structured oscillations in a two-dimensional excitatory neuronal network with synaptic depression*, J Comp. Neurosci., 28 (2010) pp. 193-209.

Z.P. Kilpatrick and P.C. Bressloff, *Effects of synaptic depression and adaptation on spatiotemporal dynamics of an excitatory neuronal network*, Physica D, 239 (2010) pp. 547-560.

P.C. Bressloff and Z.P. Kilpatrick, *Nonlocal Ginzburg-Landau equation for cortical pattern formation*, Phys. Rev. E, 78 (2008), paper 041916.

Z.P. Kilpatrick, S.E. Folias, and P.C. Bressloff, *Traveling pulses and wave propagation failure in inhomogeneous neural media*, SIAM J Appl. Dyn. Syst., 7 (2008), pp. 161-185.

*undergraduate author

Fellowships & Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship (MSPRF), Fall 2010 –

OCCAM Visiting Student Fellowship, University of Oxford, Fall 2009

NSF Student Research Grant, University of Utah, Fall 2009 – Spring 2010

Red Sock Award for a Best Poster, SIAM Conference on Dynamical Systems, May 2009

NSF Research Training Grant, University of Utah, Fall 2008 – Spring 2009

NSF-IGERT Fellowship, University of Utah, Fall 2005 – Spring 2007

Barry M. Goldwater Scholarship, National, 2004

Teaching Experience

Analytic Geometry and Calculus II, University of Pittsburgh; Spring 2011

Analytic Geometry and Calculus I, University of Pittsburgh; Fall 2010

Mathematical Biology Journal Club I & II, University of Utah; Spring 2009

Mathematical Biology Journal Club I & II, University of Utah; Fall 2008

Calculus for Biologists II, University of Utah; Spring 2008

Calculus for Biologists I, University of Utah; Fall 2007

Activities

- **Journal Referee**: *SIAM Journal of Applied Mathematics, SIAM Journal of Applied Dynamical Systems, SIAM Books, Journal of Mathematical Biology, Journal of Mathematical Neuroscience, Journal of Computational Neuroscience, Physica D, PLoS One, Physical Review E*
- **SIAM Student Chapter (University of Pittsburgh)**, faculty advisor, 2011-
- **NSF-RTG Research Experience for Undergraduates**, mentor, 2010-
- **Society for Industrial and Applied Mathematics**, member, 2004-
- **American Mathematical Society**, member, 2005-
- **Rice Student Mentorship Program in Biosciences**, mentor, 2003-2005

Organizing

- **Spatiotemporal dynamics in networks of the brain**, (with Stefanos Folias)
  Minisymposium: SIAM Conference on the Life Sciences, San Diego CA, August 2012
- **Criticality, threshold phenomena, and network dynamics**, (co-organizer)
  Conference: CBSG Theme Days, University of Pittsburgh, Pittsburgh PA, May 2012
- **SIAM/MAA Mid-Atlantic Regional Applied Mathematics**, (co-organizer)
  Conference: Shippensburg University, Shippensburg PA, April 2012
- **Sensorimotor processes reflected in spatiotemporal dynamics of neuronal activity**, (with Jian-Young Wu)
  Workshop: Computational Systems Neuroscience, Snowbird UT, February 2012
- **The role of adaptation and depression in neuronal network dynamics** (with Rodica Curtu)
  Minisymposium: SIAM Conference on the Life Sciences, Pittsburgh PA, July 2010
- **Cortical network dynamics** (with Steve Coombes)
  Minisymposium: SIAM Conference on the Life Sciences, Montreal QC, August 2008
- **IGERT Annual Student Workshop** (co-organizer)
  Workshop: IGERT, University of Utah, Salt Lake City UT, May 2008

Invited talks

- **Transitions induced by noise and depression in competitive networks**,
  SIAM Conference on the Life Sciences, San Diego CA, August 2012
- **Wandering and transitions of pulses in stochastic neural fields**,
  Canadian Applied and Industrial Mathematics, Toronto ON, June 2012
- **Wandering bumps in stochastic neural fields**,
  Progress in Neural Field Theory, Reading UK, April 2012

- ◇ **Optimizing memory using synaptic heterogeneity**,
  Progress in Neural Field Theory, Reading UK, April 2012
- ◇ **Waves, transients, and wandering in continuum neural field equations**,
  University of Houston, Houston TX, February 2012
- ◇ **Processing of inputs by neural fields**,
  Hungarian Academy of Sciences, Budapest, Hungary, November 2011
- ◇ **Stimulus-induced transitions of traveling waves in neural fields**,
  CIRM, Marseille, France, October 2011
- ◇ **Waves and oscillations in neural field models of visual cortex**,
  Rice University, Houston, TX, January 2011
- ◇ **Dynamics in a spatially extended neuronal network with synaptic depression**,
  University of Nottingham, Nottingham, UK, November 2009
- ◇ **Spatiotemporal dynamics in a neuronal network with synaptic depression**,
  INRIA, Sophia Antipolis, France, October 2009
- ◇ **Short term synaptic plasticity in spatially extended neuronal networks**,
  NIH-NIDDK, Bethesda, MD, September 2009
- ◇ **Short term synaptic plasticity in spatially extended neuronal networks**,
  University of Pittsburgh, Pittsburgh, PA, September 2009

CONTRIBUTED PRESENTATIONS

- ◇ **Optimizing working memory using synaptic heterogeneity** [poster]; SFN, New Orleans LA, October 2012
- ◇ **Wandering bumps in stochastic neural fields** [poster]; SIAM Life Sciences, San Diego CA, August 2012
- ◇ **Sparse gamma rhythms arising through clustering in adapting neuronal networks** [poster]; CoSyNe, Salt Lake City UT, February 2012
- ◇ **Sparse gamma rhythms arising through clustering in adapting neuronal networks** [poster]; SIAM Dynamical Systems, Snowbird UT, May 2011
- ◇ **Bumps in piecewise smooth neural fields with synaptic depression** [talk]; MAA Allegheny Mountain Section, Clarion University, Clarion PA, April 2011
- ◇ **Binocular rivalry in a competitive neural network model with synaptic depression** [poster]; MBI, The Ohio State University, Columbus OH, August 2010
- ◇ **Waves, bumps, and binocular rivalry in neuronal networks with synaptic depression** [talk]; SIAM Life Sciences, Pittsburgh, PA, July 2010
- ◇ **Spatially structured oscillations in an excitatory neuronal network with synaptic depression** [poster]; Computational Neurosciences, Berlin, Germany, July 2009
- ◇ **Spatially structured oscillations in an excitatory neuronal network with synaptic depression** [poster]; Honoring John Rinzel (60), New York, NY, June 2009
- ◇ **Spatially structured oscillations in an excitatory neuronal network with synaptic depression** [poster]; SIAM Dynamical Systems, Snowbird UT, May 2009
- ◇ **Spatiotemporal dynamics of an excitatory neuronal network with synaptic depression** [talk]; MAA Intermountain Section, Provo UT, March 2009
- ◇ **A nonlocal Ginzburg-Landau equation for cortical pattern formation** [talk]; SIAM Life Sciences, Montreal QC, August 2008
- ◇ **A nonlocal Ginzburg-Landau equation for cortical dynamics** [poster]; Gordon Research Conference - Theoretical Biology, Il Ciocco, Barga, Italy, June 2008
- ◇ **Traveling pulses and wave propagation failure in inhomogeneous neural media** [poster]; IGERT Symposium, Carnegie Mellon University, Pittsburgh, PA, June 2007

- ◇ **Traveling pulses in a one-dimensional neural network model with long-range horizontal connections** [talk]; SIAM Life Sciences, Raleigh NC, August 2006
- ◇ **An adjoint method for parametrizing spiking neuron models** [poster]; Biomedical Engineering Research Conference, Houston TX, February 2005
- ◇ **An adjoint method for parametrizing spiking neuron models** [poster]; Houston Conference on Theoretical Neuroscience, Houston, TX, October 2004

References

Bard Ermentrout, University Professor of Computational Biology
Department of Mathematics, University of Pittsburgh
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Paul Bressloff, Professor of Mathematics
Department of Mathematics, University of Utah
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Frank Beatrous, Professor of Mathematics (concerns teaching)
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