

VITA 2015 – KEITH PROMISLOW

Dept. of Mathematics	Citizenship: USA
Michigan State University	Born: Ontario Canada
East Lansing MI 48824	

Educational Background

1991	PhD	Applied Mathematics	Indiana University
1986	BS	Mathematics	North Carolina State University
1986	BS	Physics	North Carolina State University

Positions Held

2014-	Chair, Department of Mathematics	MSU
2006-2010	Executive Committee/Co-Founder	MCIAM [†]
2007-Current	Professor	Michigan State University
2003-06	Associate Professor	Michigan State University
2000-03	Associate Professor	Simon Fraser University
2001-02	Visiting Professor	Brown University
1995-00	Assistant Professor	Simon Fraser University
1991-95	NSF Postdoctoral Fellow	Pennsylvania State University
1992-93	NATO Postdoctoral Fellow	Université de Paris XI, Orsay

Awards – Honors

2012	Plenary Speaker at SIAM Annual General Meeting
2011	The AMS representative for the <i>Coalition for National Science Funding</i> 2011 Capital Hill Exhibit
2010	Kloosterman Professor, University of Leiden
2007	J.S. Frame Teaching Excellence Award
2002	BC Science Council’s “Young Innovator” Award
2001	President’s Faculty Lecture Series Speaker, SFU
2000	PIMS Industrial Outreach Prize

Books and Edited Collections

- [2] T. Kapitula and K. Promislow, *Spectral and Dynamical Stability of Nonlinear Waves*, Springer, Applied Mathematical Sciences **185** ISBN 978-1-4614-6994-0 (2013), (370 pages), over 8000 downloads.
- [1] S. Paddison and K. Promislow, eds., *Device and Materials Modeling of Polymer Electrolyte Membrane Fuel Cells*, Springer, New York, 588 pages (2008).
K. Promislow, Phase change and hysteresis in PEMFCs, chapter 7 in *Device and Materials Modeling of Polymer Electrolyte Membrane Fuel Cells*.

[†]Michigan Center for Industrial and Applied Mathematics

Submitted for Publication in Refereed Journal

- [65] N. Gavish and K. Promislow, Generalized Poisson-Boltzmann models from Differential Capacitance data: an inverse problem, submitted.
- [64] N. Gavish and K. Promislow, A Systematic Interpretation of Differential Capacitance Data, submitted.

Accepted for Publication in a Refereed Journal

- [63] K. Promislow and Qiliang Wu, Existence of pearled patterns in the planar Functionalized Cahn-Hilliard equation, *J. Differential Equations* to appear.
- [62] Shibin Dai and K. Promislow, Competitive Geometric Evolution of Amphiphilic Interfaces, *SIAM Math. Analysis* **47** (1), 347-380 (2015).
- [61] A. Doelman, G. Hayrapetyan, K. Promislow, and B. Wetton, Meander and Pearling of Single-Curvature Bilayer Interfaces in the Functionalized Cahn-Hilliard Equation, *SIAM Math. Analysis* **46** (6), 3640-3677 (2014).
- [60] J. Duncan, Q. Wu, K. Promislow, G. Henkelman, Biased gradient-squared descent saddle point finding method, *Journal Chemical Physics*, **140** 194102 <http://dx.doi.org/10.1063/1.4875477> (2014)
- [59] G. Hayrapetyan and K. Promislow, Spectra of Functionalized Operators arising from hypersurfaces, to appear in *ZAMP* (2014).
- [58] A. Christlieb, J. Jones, K. Promislow, B. Wetton, and M. Willoughby, High accuracy solutions to energy gradient flows from material science models, *J. Comp. Physics* **257** (2014) 193-215
- [57] K. Promislow and L. Yang, Existence of compressible bilayers in the functionalized Cahn-Hilliard equation, *SIAM J. Dynamical Systems* **13** (2) 629-657 (2014).
- [56] Shibin Dai and K. Promislow, Geometric Evolution of Bilayers under the Functionalized Cahn-Hilliard equation, *Proc. Roy. Soc. London, Series A*, **469** 20120505 (2013).
- [55] T. Bellsky, A. Doelman, T. Kaper, K. Promislow, Adiabatic Stability of Semi-Strong Interactions in an Activator-Inhibitor system: The Weakly Damped Regime, *Indiana Univ. Math J.* **62** 18091859 (2013) .
- [54] A. Christlieb, K. Promislow, Z. Xu, On the unconditionally gradient stable scheme for the Cahn-Hilliard equation and its implementation with Fourier method, *Comm. Math. Sci.* **11** 345-360 (2013)
- [53] K. Promislow, J. Jones, Z. Xu, N. Gavish, and A. Christlieb, Variational Models of Pore Networks in Ionomer Membranes: the Role of Electrostatics, *Electrochemical Society Transactions*, **50** 161-173 (2013).
- [52] K. Promislow and H. Zhang, Critical points of Functionalized Lagrangians, *Discrete and Continuous Dynamical Systems, A* **33** 1-16 (2013).
- [51] N. Gavish, J. Jones, Z. Xu, A. Christlieb, K. Promislow*, Variational Models of Network Formation and Ion Transport: Applications to Perfluorosulfonate Ionomer Membranes, *Polymers* **4** (2012) 630-655. Invited Paper for Special Issue on *Polymer Thin Films and Membranes*, * =corresponding author.
- [50] T. Kapitula and K. Promislow, Stability indices for constrained self-adjoint operators, *Proc. AMS* **140** (2012) 865-880.
- [49] K. Promislow, J. St. Pierre, B. Wetton, A simple, analytic model of polymer electrolyte membrane fuel cell anode recirculation at operating power including nitrogen crossover, *J. Power Sources* **196** 10050-10056 (2011).

- [48] Z. Zhang, K. Promislow, J. Martin, H. Wang, B. J. Balcom, Bi-modal water transport behavior across a simple Nafion membrane, *J. Power Sources* **196** 8525-8530 (2011).
- [47] N. Gavish, G. Hayrapetyan, K. Promislow, L. Yang, Curvature driven flow of bi-layer interfaces, *Physica D* **240** 675-693 (2011).
- [46] P. van Heijster, A. Doelman, T. Kapper, and K. Promislow, Front interactions in a three-component system, *SIAM J. on Applied Dynamical Systems* **9** 292-232 (2010).
- [45] K. Promislow and B. Wetton, PEM fuel cells: A Mathematical Overview, Invited Review Paper to *SIAM Applied Math.* **70** 369-409 (2009)
- [44] Mohar Guha and K. Promislow, Front propagation in a noisy, nonsmooth excitable media, *Discrete and Cont. Dyn. Systems, Ser. A* **23** (3) 617-638 (2009)
- [43] Z. Zhang, A. Marble, B. MacMillian, K. Promislow, J. Martin, H. Wang, B. Balcom, Spatial and Temporal Mapping of Water Content across Nafion Membranes under Wetting and Drying Conditions, *J. Magnetic Resonance* **194** (2) 245-253 (2008).
- [42] Z. Zhang, J. Martin, J. Wu, H. Wang, K. Promislow, B. Balcom, Magnetic Resonance Imaging of Water Content across the Nafion Membrane in an Operational PEM Fuel Cell, *J. Magnetic Resonance* **193** (2) 259-266 (2008).
- [41] R. Moore and K. Promislow, The semi-strong limit of multipulse interaction in a thermally driven optical system, *J. Diff. Eqs.* **245** (6) (2008) 1616-1655.
- [40] K. Promislow, P. Chang, H. Haas, and B. Wetton, A Two Phase Unit Cell Model for Slow Transients in Polymer Electrolyte Membrane Fuel Cells, *J. Electrochem. Soc.* **155** (7) A494-A504 (2008).
- [39] I. Nazarov and K. Promislow, The impact of membrane constraint on PEM fuel cell water management, *J. Electrochem. Soc.* **154** B623-630 (7) (2007).
- [38] P. A. C. Chang and K. Promislow, Nonlinear stability of oscillatory pulses in the parametric nonlinear Schrödinger equation, *Nonlinearity* **20** 743-763 (2007).
- [37] A. Shah, G.-S. Kim, and K. Promislow, Mathematical modelling of the catalyst layer of a polymer electrolyte fuel cell, *IMA J. Applied Math.* **72** (2007), 1-29. doi:10.1093/imamat/hxm005
- [36] P. A. C. Chang, G.-S. Kim, K. Promislow, B. Wetton, Reduced dimensional computational models of polymer electrolyte membrane fuel cell stacks, *J. Comp. Physics* **223** 797-821 (2007).
- [35] J. St-Pierre, B. Wetton, G.S.-Kim, K. Promislow, Limiting current operation of proton exchange membrane fuel cells, *J. Electrochem. Soc.* **154** (2) (2007) B186-B193.
- [34] A. Doelman, T. Kaper, K. Promislow, Nonlinear asymptotic stability of the semi-strong pulse dynamics in a regularized Gierer-Meinhardt model, *SIAM Math. Analysis* **38** (6) (2007) 1760-1787.
- [33] A. Shah, G.-S. Kim, W. Gervais, A. Young, K. Promislow, J. Li, S. Ye, The effects of water and microstructure on the performance of polymer electrolyte fuel cells, *J. Power Sources*, **160** (2006), 1251-1268.
- [32] P. Berg, A. Novruzi, K. Promislow, Analysis of a cathode catalyst layer model for a polymer electrolyte fuel cell, *Chemical Engineering Science* **61** (13) (2006), 4316-4331.
- [31] P. Berg, A. Calgar, J. St Pierre, K. Promislow, B. Wetton, Electrical coupling in Proton Exchange Membrane fuel cell stacks: mathematical and computational modelling *IMA J. Applied Math.*, **71** (2) (2006), 241-261.
- [30] I. Nazarov and K. Promislow, Ignition Bifurcations in a Stirred Tank PEM Fuel Cell, *Chemical Engineering Science* **61** (10) (2006) 3198-3209.

- [29] K. Promislow, J. Stockie, B. Wetton, A Sharp Interface Reduction for Multiphase flow in a Porous PEM Fuel Cell Electrode, *Proc. Roy. Soc. London: Series A* **462**, No. 2067 (March 2006) 789-816.
- [28] R. Moore and K. Promislow, Renormalization group reduction of pulse dynamics in thermally loaded optical parametric oscillators, *Physica D* **206** (2005) 62-81.
- [27] K. Promislow and B. Wetton, A Simple Mathematical Model of Thermal Coupling in Fuel Cell Stacks, *Journal Power Sources*, **150** (2005), 129-135.
- [26] G.S. Kim, J.St. Pierre, K. Promislow, B. Wetton, Electrical Coupling in Proton Exchange Membrane Fuel Cell Stacks, *Journal of Power Sources*, **152** (2005) 210-217.
- [25] P. Berg, K. Promislow, J. Stumper, and B. Wetton, Discharge of a Segmented Polymer Electrolyte Membrane Fuel Cell, *Journal of Fuel Cell Science and Technology* **2** (May 2005), 111-120.
- [24] P. Berg, K. Promislow, J. St. Pierre, J. Stumper, B. Wetton, Water management in PEM fuel cells, *J. Electrochem. Soc.* **151** (No. 3) (2004) A341-A354.
- [23] John Stockie, K. Promislow, B. Wetton, A Computational Study of Multicomponent Gas Transport in a Porous Fuel Cell Electrode, *International J. Numerical Methods in Fluids*, **41**, (2003), 577-599.
- [22] R. Carretero-Gonzalez and K. Promislow, Localized breathing solutions for Bose-Einstein condensates in periodic traps. *Phys. Rev. A.* **66** Sept 033610 (2002).
- [21] Keith Promislow, A renormalization method for modulational stability of quasi-steady patterns in dispersive systems, *SIAM J. Math. Analysis* **33** No. 6 (2002), 1455-1482.
- [20] R. Bradean, K. Promislow, B. Wetton, Transport phenomena in the porous cathode of a proton exchange membrane fuel cell, *Numerical Heat Transfer, Part A*, **42** (2002) 1-18.
- [19] J. Bronski, L. Carr, R. Carretero-Gonzalez, B. Deconinck, J. Kutz, K. Promislow Stability of Attractive Bose-Einstein Condensates in a Periodic Potential, *Phys. Rev. E* **64** Nov. 056615 (2001), 11 pages.
- [18] Keith Promislow and John Stockie, Adiabatic Relaxation of Convective-Diffusive Gas Transport in a Porous Fuel Cell Electrode, *SIAM J. Appl. Math.* **62** No. 1 (2001), 180-205.
- [17] J. Bronski, L. Carr, B. Deconinck, J. Kutz, K. Promislow, Repulsive Bose-Einstein condensate in Period Potentials: Wells Barriers, and Standing Waves, *Phys. Rev. E* **63** Mar. 036612 (2001) 12 pages.
- [16] Brian Topp, Keith Promislow, Gerda de Vries, Robert Miura, Diane Finegood, A Model of β -Cell Mass, Insulin, and Glucose Kinetics: Pathways to Diabetes, *Journal of Theoretical Biology* **206** No. 4 (2000), 605-619.
- [15] Keith Promislow and J. Nathan Kutz, Bifurcation and Asymptotic Stability in the Large Detuning Limit of the Optical Parametric Oscillator, *Nonlinearity* **13** (2000), 675-698.
- [14] Yi Li and Keith Promislow, The Mechanism of the Polarizational Mode Instability in Birefringent Fiber Optics, *SIAM Journal on Math. Anal.*, **31** (2000), 1351-1373.
- [13] Jerry Bona, Françoise Demengel, Keith Promislow, Fourier Splitting and Dissipation of Nonlinear Dispersive Waves, *Proc. Roy. Soc. Edinburg, Series A*, **129** (1999), 477-502.
- [12] Yi Li and Keith Promislow, Structural Stability of non-ground state traveling wave of a Nonlinear Schrödinger System, *Physica D* **124** (1998), 137-165.
- [11] Keith Promislow, Applications of center manifolds, *Maple Tex* **4**, no.1, (1997), 77-87.
- [10] Leonid Berlyand and Keith Promislow, Effective Elastic Moduli of a Soft Medium with Hard Polygonal Inclusions and Extremal Behavior of Effective Poisson's ratio, *J. of Elasticity* **40**, no. 1 (1995) 45-73.

- [9] Jerry Bona, Keith Promislow, and C. Eugene Wayne, Higher Order Asymptotics of Decay for Nonlinear, Dispersive, Dissipative Wave, Equations, *Nonlinearity* **8**, no 6. (1995) 1179-1206.
- [8] Jerry Bona, Keith Promislow, and C. Eugene Wayne, On the Asymptotic Behavior of Solutions to Nonlinear, Dispersive, Dissipative Wave Equations, *J. Math and Comput. in Simul.* **37**, (1994) 265-277.
- [7] Keith Promislow, The Squeezing Property and the Decay of Small Wavelengths in Dissipative Dynamical Systems, *Applicable Analysis* **53**, (1994) 233-239.
- [6] Keith Promislow and Roger Temam, Approximation and Localization of Attractors, in *Shape Optimization and Free Boundaries*, ed. M.C. Delfour, Mathematical and Physical Sciences, Series C, Klumer, Academic Publishers, (1992).
- [5] Keith Promislow and Roger Temam, Localization and Approximation of Attractors for the Ginzburg-Landau Equation, *J. Dyn. Diff. Eq.* **3**, (1991) 491-514.
- [4] Keith Promislow, Time Analyticity and Gevrey Regularity for solutions of a class of Dissipative Partial Differential Equations, *Nonlinear Anal.: TMA* **16**, (1991) 959-980.
- [3] Keith Promislow and Roger Temam, Approximate Interaction Laws for Small and Large Waves in the Ginzburg-Landau Equation, *IMA J. of Appl. Math.* **46**, (1991) 121-136.
- [2] Keith Promislow, Induced Trajectories and Approximate Inertial Manifolds for the Ginzburg-Landau Partial Differential Equation, *Physica D* **41**, (1990) 232-252.
- [1] M. Klenin and Keith Promislow, (undergraduate Honors project) Configurational Entropy of a 2-D Continuous Random Network, *Journal of Non-Crystalline Solids* **75** (1985), 141-146.

Refereed Conference Proceedings and Presentations

- [CP13] N. Kraitzman and K. Promislow, An Overview of Network Bifurcations in the Functionalized Cahn-Hilliard Free Energy, *Dynamics, Games and Science III* (2014) Springer CIM Series in Mathematical Sciences, editors: Jean Pierre Bourguignon, Rolf Jeltsch, Alberto Pinto, and Marcelo Viana.
- [CP12] B. Wetton, G.S. Kim, K. Promislow, J. St.-Pierre, PEM unit cell model considering alternative reactions, *Proceedings of ASME FUELCELL06*, Anaheim CA, May 2006.
- [CP11] B. Wetton, P. Chang, G.S. Kim, J. St-Pierre, K. Promislow, A Comprehensive Steady Model of PEMFC stacks, THERMEC 2006 meeting, Vancouver BC.
- [CP10] J. St-Pierre, G. Kim, K. Promislow, J. Stockie, and B. Wetton, Low Cell Voltage Unit Cell Models, *Proton Exchange Membrane Fuel Cells, In Honor of Supramaniam Srinivasan*, 208th Meeting of The Electrochem. Soc., Oct. 2005.
- [CP9] K. Promislow and I. Nazarov, Ignition Bifurcations in a Stirred Tank PEM Fuel Cell, *Proceedings of ASME FUELCELL05*, May 2005.
- [CP9] R. Bradean, K. Promislow, B. Wetton, Phase change and two phase flow in cathode porous electrodes of fuel cells, IMECE04, Anaheim, CA, Nov 13-20, 2004.
- [CP8] B. Wetton, K. Promislow, A Calgar, J. St.-Pierre, A simple thermal model of PEM fuel cell stacks, in "Meeting Abstracts", Electrochemical Society volume 2004-2, The Electrochemical Society, Pennington, NJ 2004, abstract 1853.
- [CP7] P. Berg, A. Calgar, K. Promislow, B. Wetton, J. St.-Pierre, G.-S. Kim, Electrical coupling in proton exchange membrane fuel cell stacks, in "2004 Fuel Cell Seminar Abstracts," Courtesy Associates, Washington DC, 2004.

- [CP6] A. Novruzzi, K. Promislow, B. Wetton, 3D Hydrogen Fuel Cell Fluid Dynamics Computation, European Congress on Computational Methods in Applied Sciences and Eng., (ECCOMAS) 2004, P. Neittaanmäki, T Rossi, K. Majava, O. Pironneau (eds.) Jyväskylä, 24-28 July 2004.
- [CP5] B. Wetton, A. Calgar, K. Promislow, A simple thermal model of PEM Fuel Cell Stacks, in R.K. Shah, S. G. Kandlikar (Eds.), Fuel Cell Science, Engineering and Technology – 2004, ASME, New York, NY 2004, pp 151-155.
- [CP4] R. Bradean, K. Promislow, B. Wetton, Phase Change in Porous Fuel Cell Electrodes, “13th International Symposium on Transport Phenomena”, Victoria, BC, 14-18 July, 2002.
- [CP3] R. Bradean, K. Promislow, B. Wetton, Heat and Mass transfer in Porous Fuel Cell Electrodes, International Symposium on Advances in Computational Heat Transfer, Palm Cove, Queensland, Australia, May 20-25, 2001, 969-976.
- [CP2] Brian G. Topp, M. Dawn McArthur, Keith Promislow, Contributions of Beta-cell defects and insulin resistance in the pathogenesis of type 2 diabetes: An integrated model of glucose homeostasis. The American Diabetes Association 59th Scientific Sessions June 19-22, 1999, San Diego CA, USA
- [CP1] Brian Topp, Gerta De Vries, Robert Miura, Keith Promislow, Diane Finegood, The Beta-cell Mass, Insulin, and Glucose Model: Pathways to Diabetes (a) Workshop on Mathematical Problems in Physiology, IMA, University of Minnesota, Feb 15-19, 1999. (b) Annual meeting on Theory and Mathematics in Biology and Medicine, June 29-July 3, 1999, Vrije Universiteit Amsterdam, The Netherlands.

Industrial Reports Presented to Ballard Power Systems

Commerical confidential reports which summarize yearly contract activity.

- [IR9] Akeel Shaw, Paul Chang, Keith Promislow, Brian Wetton
Transient unit cell and stack code for Ballard PEM fuel cells, Presented Jan 12, 2006, 65 pages.
- [IR8] Paul Chang, Keith Promislow, Brian Wetton
Modeling of catalyst layer performance, thermal coupling and flow sharing in PEM cell stacks. Presented Jan 13, 2005, 85 pages.
- [IR7] Peter Berg, Keith Promislow, Brian Wetton
Modeling of two-phase water management, electrical coupling of PEM cell stacks, thermal coupling of PEM cell stacks, and a transient model describing cell discharge. Presented Jan. 8 2004, 79 pages.
- [IR6] Peter Berg, Paul Chang, Keith Promislow, Brian Wetton
Modeling of single phase water management, PEM stack voltage distribution, gas flow distribution in PEM stacks. Presented Jan. 7 2003, 57 pages.
- [IR5] Peter Berg, Keith Promislow, Brian Wetton
Multi-species transport in PEM fuel cell electrode, multi-phase flow in gas flow-fields. Presented Jan. 8 2002, 34 pages.
- [IR4] Radu Bradean, Keith Promislow , Brian Wetton
Two space dimension models of saturated two-phase flows in a fuel cell electrode. Presented Jan. 25 2001, 25 pages.
- [IR3] Keith Promislow, John Stockie, Brian Wetton

- Gas Diffusion models in a 2D cross section of a PEM porous electrode. Presented Feb. 3 2000, 27 pages.
- [IR2] Keith Promislow, John Stockie, Huaxiong Huang,
Mathematical modeling of reactant flow through gas diffusion electrodes, two species counter-diffusion in a fuel cell electrode, parametric sensitivity. Presented Feb. 4 1999, 20 pages.
- [IR1] Keith Promislow and John Stockie,
Multi-species, non-isothermal Maxwell-Stefan diffusion model for convective-diffusive gas transport in porous electrodes. A multi-scale analysis outlines a two-stage adiabatic relaxation to steady-state. Presented Oct 5, 1999, 24 pages.

Current Grants

2014-17	NSF-DMS Applied Math Geometric Evolution of Multicomponent Amphiphilic Networks. PI: K. Promislow	\$328,438
2011-14	NSF-DMS Applied Math (one year NCE) Network formation and ion transport in polymer electrolyte membranes. PI: K. Promislow	\$329,940

Funding History (Expired Grants)

2012	ICERM Conference Support, PI ICERM Topical Workshop: <i>Bridging Scales in Computational Polymer Chemistry</i> , August 6-10, Providence, RI.	\$30,000
2010-11	NSF Conference Support, PI Support for Poly- and Polymer Electrolytes for Energy Conversion: Ab initio, Molecular, and Continuum models, held at Lorentz Center at University of Leiden, Netherlands, August 23-27, 2010.	\$20,000
2009-12	NSF-Solar Energy Initiative, lead math PI (co-PI) Design and Development of Efficient Solid-State Dye-Sensitized Solar Cells. This joint CHE-MAT-DMS solicitation requires 3 lead PIs: one each in chemistry, material science, and mathematics. I am the lead math PI, James McCusker is the overall PI. Total budget \$1,906,221	\$583,290 (My portion)
2007-11	NSF-DMS Applied Mathematics Polymer Electrolyte Membranes – Phase Separation and Ion Transport, PI: K. Promislow. One year NCE to May 2012.	\$388,235
2009-10	NSF-IGMS, PI Composite Polymer Membranes for Energy Conversion. Provides funding for my sabbatical in 2009-10 while I spend a year in Greg Baker's lab in chemistry. NSF requires the dean as co-PI.	\$99,998
2009-11	DoD (Air-Force) STTR, Phase II, PI of subcontract	\$144,000

	Renormalization Group methods for dense plasmas exhibiting critical kinetic phenomena. Industrial partner NumerEx, PIs: John Lugenland (NumerEx), Russell Caflesch (UCLA). Total budget \$500,000.	(My portion)
2007-09	Unrestricted Gift from W. L. Gore and Associates to MCIAM	\$15,000
2006-09	MSU Quality Fund: PIs G. Bao and K. Promislow Michigan Center for Industrial and Applied Mathematics.	\$345,000
2008-09	NSF Conference Grant Multiscale and Stochastic Modeling, Analysis, and Computation, PIs: Di Liu and K. Promislow	\$20,000
2008	IMA-PI Conference Support Multiscale and Stochastic Modeling, Analysis, and Computation, PIs: Di Liu and K. Promislow	\$5,000
2006-08	MSU – Intramural Research Grant Proposal Bi-continuous Fuel Cell Membranes via Self-Assembly of Functional Nanoparticles, PIs: G. Baker and K. Promislow	\$60,000
2005-08	NSF-DMS Applied Mathematics Patterns, Stability, and Thermal Effects in Parametric Gain Devices, PIs R. Moore and K. Promislow	\$121,027
2005-06	MITACS Ballard Project Ballard Power Systems, MSU, UBC: “PEMFC Catalyst Layer, Water Management and Degradation Modeling.” PIs B. Wetton and K. Promislow	CAD\$300,000
2004-05	MITACS Ballard Project Ballard Power Systems, MSU, UBC: “PEMFC Catalyst Layer, Water Management and Stack Modeling.” PIs K. Promislow and B. Wetton	CAD\$300,000
2004-06	NSF-DMS Applied Mathematics Water Management in PEM Fuel Cells. PI K. Promislow	\$110,000
2003-04	NSF-DMS ACT Grant Water Management for Portable PEM fuel cells, One year NSF-ACT award. PIs P. Bates and K. Promislow	\$125,996
2004	MSU Start-up Funds	\$50,000
2004	MITACS Ballard Project Ballard Power Systems, MSU, UBC: “PEM Stack Electrical, Thermal and Water Management Modeling for Ballard PEM Fuel Cell.” PIs K. Promislow and B. Wetton	CAD\$280,000
2003	MITACS Ballard Project “PEM Stack and Water Management Modeling for Ballard PEM Fuel Cells.” PIs K. Promislow and B. Wetton	CAD\$240,000
2003	CFI Proposal (Main Principle Investigator) “Computational Fuel Cell Dynamics” Create a large-scale computational facility for fuel cell simulation. Ballard \$100K, SGI \$300K CFI \$800K, BCKDF\$800K	CAD\$2,070,000
2002	MITACS Ballard Project “Temperature and Water Management Modeling for Ballard PEM Fuel Cell” PIs K. Promislow and B. Wetton	CAD\$240,000
2001	MITACS Ballard Project	CAD\$300,000

	“Seal analysis and Mass Transport in the GDL,” PIs K. Promislow and B. Wetton	
2000-04	NSERC Research Grant “Modeling and Analysis of Physical Systems”, PI K. Promislow	CAD\$20,000/year
2000	MITACS Ballard Project “Temperature and Water Management Modeling for Ballard” PIs K. Promislow and B. Wetton	CAD\$218,500
1999	MITACS-MMSC Ballard Project “Gas Diffusion for Porous Electrodes,” PIs K. Promislow and B. Wetton	CAD\$218,500
1998	Ballard Power Systems “Mathematical Model of Reactant Flow through Gas Diffusion Electrodes.” PI K. Promislow	CAD\$14,000
1996-00	NSERC Research Grant “Invariant Manifolds and Asymptotic Behavior in Physical Systems.” PI- K. Promislow	CAD\$12,000/year
1995	New Faculty Start-up Equipment Grant	CAD\$25,000
1995	President’s Research Grant “Self-Focusing Singularity in the Generalized K-dV Eq.”	\$10,000
1994-95	National Science Foundation Postdoctoral Fellowship	USD \$24,500/year
1993-94	NATO Postdoctoral Fellowship	USD \$40,000
1992-93	National Science Foundation Postdoctoral Fellowship	USD \$9,500

Plenary/Invited (funded) Talks

2015

July	20-24	Invited speaker, IMA workshop on Biological Charge Transport, Minneapolis, MN
July	12-18	Banff International Research Station, co-organizer of research in teams event, “Analysis and Computation of Functionalized Cahn-Hilliard equations with applications to amphiphilic materials”, Banff, Alberta Canada.
June	8-12	UCLA workshop on Materials for a Sustainable Energy Future, Lake Arrowhead, CA.
March	9-10	Brown University Applied Mathematics Colloquium, Providence RI.

2014

Oct	18-19	Principle Speaker 74th MidWest PDE, Univ. of Illinois
May	26-29	Invited Speaker: Nankai Conference on Modeling and Computation of Complex Biological Systems, China
Apr	7	Penn State Department Colloquium

2013

Nov	18-19	Applied Mathematics Colloquium, Duke University, Durham, NC
Nov	12-13	Applied Mathematics Seminar, University of Massachusetts, Amherst, MA
Oct	3-4	Invited Speaker Water Phenomena in PEM, NTNU, Trondheim, Norway
Fall 2013		Plenary Speaker and Senior Fellow at Institute for Pure and Applied Mathematics (IPAM), Materials for a Sustainable Energy Future Sept-Dec 2013, UCLA.
Aug	25-29	Principle Speaker CMS Summer School, Microstructure: Evolution and Dynamics, Technion Institute, Haifa, Israel

- March **Plenary Speaker** International Conference Planet Earth, Mathematics of Energy and Climate Change 2013, Lisbon, Portugal
- 2012**
- Nov 19 IAM-PIMS Distinguished Colloquium Speaker, Institute of Applied Mathematics, University of British Columbia.
- July 9-13 **Plenary Speaker** SIAM Annual General Meeting, Minneapolis MN
- May 18-20 **Plenary Speaker** Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology
- March 8 MIT joint Mathematics-Chemical Engineering Seminar
- March 7 Joint Mathematics Seminar: Brown University and Boston University
- March 5 Department of Molecular Biophysics & Physiology Colloquiums, Rush University Medical Center
- Feb 20-23 Invited Speaker, WPI Advanced Institute for Materials Research: 2012 Annual Conference, Sendai Japan
- Feb 18-19 Invited Speaker, Mathematical Approaches to Emerging Topics in Materials Science, Tohoku University
- Jan 20 Mathematics Department Colloquium, Carnegie Mellon University
- 2011**
- Sept 12-21 Invited Speaker, 4th Mathematics Society of Japan Seasonal Institute: Nonlinear Dynamics in Partial Differential Equations, Fukuoka University, Kyushu, Japan.
- Feb 15-20 Invited Speaker, American Association for Advancement of Science, Annual Meeting, Washington DC.
- July 24-29 Invited Speaker, Banff International Research Station, Localized multi-dimensional patterns in dissipative systems
- 2010**
- Dec 7-15 **Principle Lecturer**, Winter School: Evolution Equations in an Applied Context, University of Twente, the Netherlands (taught a 10 hour course).
- Oct 12-15 Research Corporation's 1st Annual Scialog Conference, Biosphere II, Tucson AZ.
- Aug 21-27 Lorentz Center, Poly and polymer electrolytes for energy conversion (organizer), Leiden Netherlands.
- May **Kloosterman Professor**, University of Leiden, May 10 - June 20, 2010. Distinguished visiting professorship. See <http://www.math.leidenuniv.nl/en/kloosterman/>
- Apr 28-31 Invited Speaker, Materials Research Society, semi-annual meeting, Boston MA.
- Feb 3-5 University of California, Santa Barbara, Department of Mathematics
- Jan 25-27 University of Tennessee, Department of Chemical and Biological Engineering
- 2009**
- Nov 28-31 Invited Speaker, Materials Research Society, semi-annual meeting, Boston, MA
- Nov 11-15 Invited Speaker, NRC Institute for Fuel Cells, Vancouver BC
- Aug 27-29 Invited Speaker, Workshop on Energy-Driven Systems, Carnegie Mellon University
- Aug 9-14 Banff International Research Station, Analysis of nonlinear wave equations
- 2008**
- Jun 23-26 CNDA Workshop on Complex and Nanostructured Materials for Energy Applications.
- May 12-16 AIM workshop on Ferroelectric phenomena in soft matter systems.

May	7-10	UCLA Applied Math Seminar
Mar	4-7	Colorado State University, PDE Seminar
		University of Wyoming, Mathematics of Energy Science Colloquium
Feb	21-22	Pennsylvania State University, PDE Seminar
2007		
Dec	10-12	Plenary Speaker , SIAM Conf on Analysis of PDE, Mesa AZ
May	14-16	Frontiers in Applied and Computational Mathematics, NJIT
Mar	20	Carnegie Mellon PDE seminar
2006		
Sept.	17-21	Modeling and Simulation of Fuel Cells, WIAS Berlin
July	9-13	Plenary Speaker , 7 th International Conf. on Electrical, Transport, and Optical Properties of Inhomogeneous Media, (ETOPIM), Sydney, Australia (Declined)
May	10-12	Numerical and Mathematical Analysis of Hydrogen Fuel Cells, Fields Institute, Ottawa, Canada
April	24-28	Dynamics of Nonlinear Waves, Gronigen, Neatherlands
Mar	6	Northwestern University Applied Math Seminar
2005		
May	15-21	Stability Criteria for Multi-Dimensional Waves and Patterns, American Institute of Mathematics, Stanford USA
Mar	19-23	Banff International Research Center, Computational Fuel Cell Dynamics,
2004		
Dec	15-16	Nonlinearity in Amsterdam, CWI Amsterdam, Neatherlands
June	8-9	Mathematics of Information Technology and Complex Systems (MITACS) Annual General Meeting, Halifax Canada,
June	23-28	International Conference on Numerical and Applied PDEs, Changchun, China
2003		
Jan	18-25	Dynamics of Nonlinear Waves, Mathematisches Forschungsinstitut Oberwolfach, Germany
Apr	19-24	Computational Fuel Cell Dynamics, Banff International Research station, Canada
2002		
Dec	8-14	International Conference on Nonlinear Waves, Osaka, Japan
Oct	2-5	Challenges in Scientific Computing, WIAS Berlin, Germany

Unfunded Talks and Seminars 2007-2013

2013

Dec 7-10 SIAM Analysis of PDE, Lake Buena Vista, Orlando FL
 Nov 2 Applied Math Seminar, University of California, Irvine
 July 10-12 SIAM Annual General Meeting, San Diego, CA
 May 14-16 Electrochemical Society Meeting, Toronto, ON, Canada

2012

Oct 20-21 AMS meeting in Akron, OH
 Oct 7-12 Invited Speaker at the Annual Electrochemical Society Meeting, Honolulu, HI
 June 12-16 SIAM Nonlinear Waves, Seattle, WA

2011

July 18-22 ICIAM, Vancouver, Canada
 May 22-26 SIAM Snowbird, Park City, Utah
 May 1-6 Electrochemical Society, Montreal, Canada
 Apr 4-6 IMACS: Nonlinear Waves, Athenes GA.

2010

May 23-26 SIAM Material Science, Philadelphia PA
 Feb 8-12 IPAM, Los Angles, CA

2009

Dec 7-11 IMA, Minnesota, MN
 Oct 12-16 IMA, Minnesota, MN
 June 10-13 CIAMS Annual Meeting, London, Ontario, Canada
 May 17-25 SIAM Dynamical Systems, Snowbird, UT
 Mar 22-25 ICIAM Nonlinear Waves, Athens, GA
 Jan 5-8 AMS-MMA-SIAM Joint Meeting, Washington DC

2008

July 23-25 SIAM Nonlinear Waves, Rome, IT
 Jan 6-9 AMS Annual Meeting, San Diego CA

2007

Oct 26 University of Michigan, Control Seminar
 Apr 13-15 AMS Regional Meeting, Hoboken, NJ
 May 28-1 SIAM Conf. on Dyanmical Systems, Snowbird UT

Major Conferences/Workshops Organized

- 2015 **Banff research in Teams** workshop: *Analysis and Computation of the multicomponent Functionalized Cahn-Hilliard equation, with applications to amphiphilic materials*, July 12-18, Banff International Research Station, Alberta, CA.
Primary Organizer of AMS sectional meeting held March 14-15 at Michigan State University, over 700 participants and 40 parallel sessions.
- 2013 **IPAM Long Program: Materials for Sustainability**, Sept 1 - Dec 7, Los Angeles, CA, co-organizer (with Graeme Henkelman UT Austin).
SIAM Analysis of Partial Differential Equations, co-organizer (with Suncica Canic U. Houston) of Annual meeting, Dec. 7-10, Orlando FL.
- 2012 **ICERM Topical Workshop: Bridging Scales in Computational Polymer Chemistry**, August 6-10, Providence, RI, principle organizer.
- 2010 **Lorentz Center**, University of Leiden, *Poly- and Polymer Electrolytes for Energy Conversion: Ab initio, Molecular, and Continuum models*, August 23-27. Funded by Lorentz Center, Dutch NSF, and US NSF. Principle organizer
- 2008 MCIAM Annual Workshop *Multiscale and Stochastic Modeling, Analysis, and Computation*, East Lansing, MI, Oct 10-11.
 CNDA Summer Workshop on Complex and nanostructured materials for energy applications, June 22-26.
- 2005 Banff International Research Station
Computational Fuel Cell Dynamics III, March 19-24, 2005.
- 2003 Banff International Research Station
Computational Fuel Cell Dynamics II, April 19-24, 2003.
- 2001 PIMS-MITACS *Workshop on Computational Fuel Cell Dynamics*, June 4-8, 2001 at Simon Fraser University.
- 2001 PIMS Undergraduate Mathematical Modeling Workshop
Served as mentor and organizer
- 2000 The Graduate Industrial Mathematics Modeling Camp, May 23-27 at Simon Fraser University.
- 1999 *Droplet Migration and Condensation in Teflonated Porous Medium*, Simon Fraser University and University of British Columbia, May 17-28.
- 1998 The First PIMS Graduate Industrial Mathematics Modeling Workshop, May 25-29 at Simon Fraser University, The first industrial math modeling workshop for graduate students in Canada. Principle organizer.

Mini-Symposium Organized since 2006

- 2015 SIAM Dynamical Systems, Snowbird UT, May 18-22
AMS Sectional meeting, MSU, March 14-15.
- 2013 SIAM Analysis of PDE, Dec 7-10, Orlando, FL
- 2012 SIAM AGM, July 9-13, Minneapolis, MN
Frontiers in Applied and Computational Mathematics, May 18-20, NJIT
- 2011 SIAM Conf. on Dynamical Systems, Park City Utah May 22-26.
ICIAM Conf on Nonlinear Waves, U. of Georgia, April 3-6.
- 2009 Joint AMS-MMA-SIAM annual meeting, Washington DC, Jan 5-8.
- 2007 AMS Hoboken meeting, NJ
SIAM PDE, Mesa AZ
- 2006 SIAM AGM Boston
SIAM Nonlinear Waves and Coherent Structures

Supervision of Postdoctoral Fellows

Fellow	Dates	Current Posn.	Rank
Qiliang Wu	8/13 –	Current	
Shibin Dai	8/11 – 8/13	New Mexico State Univ.	Asst. Prof.
Zhengfu Xu	8/10 – 8/11	Michigan Tech. Institute	Assoc. Prof.
Nir Gavish	1/10–9/12	Technion Institute	Senior Lecturer
Albert Cohen	9/07–9/10	MSU Actuarial Program	
Hang Zhang	9/07–6/08	Finance	
Igor Nazarov	9/04–8/07	Actuarial Industry	
Richard Moore	1/02–12/03	New Jersey Inst. Tech	Assoc. Prof.
Peter Berg	9/01–8/04	Norwegian Univ. Sci. Tech.	Assoc. Prof.
Arian Novruzi	9/00–8/02	Univ. Ottawa	Assoc. Prof.
Ricardo Carretero	9/99–8/01	San Diego State	Assoc. Prof.
Radu Bradean	9/99–8/01	Ballard Power Systems	Senior Research Scientist
John Stockie	9/98–8/00	Simon Fraser Univ.	Prof.

Supervision of Graduate Students

Student	Degree	Defense	Thesis Area/Title
Noa Kraitzman	PhD	6/15	TBD
Yang Li	PhD	5/13	Existence of Homoclinic connections corresponding to bi-layer structures in amphiphilic polymer systems
Greg Hayrapetyan	PhD	8/11	Geometric Evolutoin of Single-Layer Interfaces in the Functionalized Cahn-Hilliard Equation
Tom Bellsky	PhD	5/11	Existence and dynamics of N-pulse solutions in slow-fast reaction-diffusion systems
Mohar Guha	PhD	4/07	Front propagation in nonsmooth, noisy, excitable media
Paul Chang	PhD	12/03	A Renormalization Group Approach to Stability of Oscillatory pulses in the Parametrically forced nonlinear Schrodinger equations.
Leslie Fairbarne	MSc	4/03	Gas dynamics in the electrode of a PEM Fuel cell
Paul Chang	MSc	7/01	Modulational stability of pulse solutions of the parametrically forced NLS equation
John F. Williams	MSc	8/00	The optical parametric oscillator: Saturating blow-up in the large detuning limit.
Meharban Sandhu	MSc	10/01	Dynamics of solitons in optical traps

Supervision of Undergraduate Students

Student	Position	Dates	Description
David Tacia	Prof. Asst.	2011-12	Normal forms for functionalized energies
Ryan Goh	Research Assoc.	2010-2011	Dye sensitized solar cells
Ryan Goh	Prof. Asst.	2008-10	Bistability in nonsmooth maps

PhD Committee Membership at MSU

Student	Defense	Advisor	Department
Zhe Jia	2014	G. Baker	Chemistry
Wen Yuan	2013	G. Baker	Chemistry
Dan Olds	2012	P. Duxbury	Physics
Jaylan Jones	2012	A. Christlieb	Mathematics
Yi Huang	2010	P. Peng	Electical Engineering
Ayten Ay	2010	Greg Swain	Chemistry
Vernon Swopes	2010	Greg Swain	Chemistry

Committee Work/Service to MSU

- 2014-15 Chair, Department of Mathematics
- 2013-14 Member Personnel Committee, Hiring Committee, Chair Search Committee
- 2012-13 Chair, Advisory Committee, member Personnel Committee
- 2011-12 co-Chair, Advisory Committee
- 2010-15 member CORE-CM guidance committee
- 2010-11 Hiring Committee
Personnel Committee
Organized Applied Math Seminar
- 2009-10 Sabbatical
- 2008-09 CNS Tenure and Promotion Committee
Mathematics Personnel Committee (Co-Chair)
Advisory Committee, CORE Complex Materials Initiative
- 2007-08 CNS Faculty Advisory Committee (Chair)
Promotion and Tenure Committee
Undergraduate Advisor
- 2006-07 Dean Search and Rating Committee
CNS Faculty Advisory Committee (Chair)
Mathematics Advisory Committee
Undergraduate Advisor
- 2005-06 CNS Faculty Advisory Committee (Chair)
Mathematics Chair Advisory Committee
Organized Applied Math Seminar (Fall 05)
Organized Complex Materials Seminar (Fall 05)
Undergraduate Advisor
- 2004-05 CNS Faculty Advisory Committee (Chair)
Hiring Committee
Colloquium Chair
Applied Math Seminar organizer
K-8 Curriculum Committee (re-wrote math standards for MEAP tests)

Courses Taught at MSU

Sem.	Course	Title	Enrol.	Instr. Eval/4
Spr-14	M941	Applied Analysis II		
	M254H	Honors Calculus III		
Fall-13		At IPAM		
Spr-13	M254H	Honors Calculus III		
	M943	Methods of Applied Analysis II		
Fall-12	M942	Methods of Applied Analysis I		
Spr-12	M942	Applied Analysis II	5	
	M849	Partial Differential Equations	19	
Fall-11	M421	Analysis II	28	
Spr-11	M943	Methods of Applied Analysis II	9	
Fall-10	M942	Methods of Applied Analysis I	5	
Spr-10		Sabbatical		
Fall-09		Sabbatical		
Spr-09	M943	Methods of Applied Analysis II	10	
Fall-08	M942	Methods of Applied Analysis I	10	
Spr-08	M890	Stability of Nonlinear Waves (reading)	5	NA
Spr-08	M941	Applied Analysis II	7	
Fall-07	M942	Foundations Applied Math	11	4.00
	M421	Analysis II	27	3.27
Spr-07	M941	Applied Analysis II	3	
	M844	ProMSc Class		
Fall-06	M421	Analysis II	31	3.40
	M496	Capstone: Nonlinear Dynamics and Bifurcation	13	3.59
Spr-06	M849	PDE	18	3.60
Fall-05	–	Buy-out		
Spr-05	M496-2	Capstone: Nonlinear Dynamics and Bifurcation	17	3.53
	M941	Applied Analysis II	5	4.00
Fall-04	M940	Applied Analysis I	8	3.86
Spr-04	M421	Analysis II	16	3.07
	M844	ProMSc Class		
Fall-03	M251	Differential Eqs.	25	2.96

Outreach

- 2011** Plenary speaker: Michigan Mathematics Prize Competition, Saginaw Valley State University, Feb 26.
- 2010** Invited speaker Grand Valley State University, Sept 15
Featured speaker: MSU “Science University” development program, April 16.
NSF MPSAC Energy Mini-Workshop, March 15.
- 2009** Invited Speaker: Michigan Forum/ Institute for Public Utilities, Kellogg Center, Jan 30, 2009
- 2007** Invited Speaker: Western NY Alumni Club, Buffalo NY

Service to Academic Community

- 2012-current Associate Editor: SIAM Journal on Mathematical Analysis
Associate Editor: SIAM Journal on Dynamical Systems
- 2007-current Editor: Physica D
- 2003-2010 Associate Editor: IMA Journal Applied Mathematics
Journal Referee, NSF Panelist