

CURRICULUM VITA
PETER W. BATES

Department of Mathematics
Michigan State University
East Lansing, MI 48824
(517)-353-4875
e-mail: bates@math.msu.edu

Citizenship: U.S.

EDUCATION

The University of Utah, PhD in Mathematics, 1976.

PROFESSIONAL EXPERIENCE

- Professor, Michigan State University, January 2002 -- present.
- Research Professor, MSRI, Aug-December, 2015.
- Visiting Professor and Program Leader, IMA, August 2012-June 2013.
- Co-Director, Quantitative Biology Initiative, Michigan State U., 2007 -2011.
- Senior Visitor, University of Auckland, February - May, 2008.
- Senior Visitor, Institute for Mathematics and its Applications, U. Minnesota, September-December, 2007.
- Chair, Department of Mathematics, Michigan State University, January 2002-September 2007.
- Senior Visitor, Research Institute of Mathematical Sciences, Kyoto, May-Aug., 2000.
- Director, Nonlinear Analysis Lab., Brigham Young University, 1996-2000.
- Senior Visitor, The Isaac Newton Institute of Mathematical Sciences, University of Cambridge, U.K., August--December, 1995.
- Chair, Department of Mathematics, Brigham Young University, 1992--1994.
- Full Professor, Brigham Young University, 1988--2004.
- Program Director, Applied Mathematics, National Science Foundation, 1987--1989.
- Associate Professor, Brigham Young University, 1984--1988.
- Associate Professor, Texas A & M University, 1984--1985.
- Visiting Research Fellow, Heriot-Watt Univ., Edinburgh, Scotland, Jan.--July 1982.
- Assistant Professor, Texas A & M University, 1979--1984.
- Visiting Assistant Professor, Texas A & M University, 1978.
- Assistant Professor, Pan American University, 1976--1979.

HONORS and AWARDS

- Elected Fellow of the American Mathematical Society, 2012.
- Distinguished Service Award, NSF, June 1989.
- Karl G. Maeser Excellence in Research and Creative Arts Award, Brigham Young University, 1995.
- One Hour Invited Address: "Invariant Manifolds," AMS Regional Meeting, Notre Dame University, April, 2000.
- One Hour Invited Address: "Invariant Manifolds for Semiflows in Banach Space," SIAM biennial meeting on Dynamical Systems, Snowbird, May, 2001.

PROFESSIONAL SERVICE

- Program Director, SIAM Dynamical Systems Group, 1990-1993.
- SIAM Conference Committee, 1990-1993.
- Member of the Board of Trustees, Meridian School (K-12), 1992-1995.
- Advisory Board, SIAM Dynamical Systems Group, 1996--2000.
- Chair, SIAM subcommittee on international travel grants for ICIAM 99.
- Member, Travel Awards Panel, American Mathematical Society, "Mathematical Challenges of the 21st Century", Spring 2000.
- Committee to develop the State of Michigan's High School Mathematics Content Expectations, 2005-2006.
- Member, PhD Board for The National Centre for Science and Technology, Tbilisi, Georgia, 2008-present.
- Member, Current Directions Committee, American Mathematical Soc., 2005-7.
- Member, Board of Governors, Inst. Math. Appl., U. MN, 2009 -2014.
- Member, Selection Committee, Math. Biosci. Institute, OSU, 2010-present.
- Member of several NSF panels including Postdoctoral Fellowships (Chair), SEES, UBM, FRG, and disciplinary awards.

External Reviews

- Chair, External Review Committee for the Graduate Program at UNLV, March 1993.
- Chair, VIGRE and PhD Program Review Committee, Texas A&M University, April, 2002.
- Member, NSF Site Visit Committee for the Institute of Pure and Applied Mathematics (IPAM), UCLA, November 18-19, 2002.
- Member, NSF Site Visit Committee for the Mathematical Sciences Research Institute (MSRI), UC Berkeley, April 9-11, 2003.
- Member, NSF Site Visit Committee for the Institute for Mathematics and its Applications, Minneapolis, April 28-30, 2003.
- Member, External Review Committee for the Graduate Program in Mathematics at the University of Cincinnati, 2008.
- Member, External Review Committee for the Department of Mathematics, Texas A&M University, 2009.

Editorial Boards

- Memoirs of the American Math. Soc. (2000-2007).
- Transactions of the American Math. Soc. (2000-2007).
- SIAM Journal of Mathematical Analysis, current
- Electronic Journal of Differential Equations, current
- Journal of Discrete and Continuous Dynamical Systems-A, current
- International Journal of Pure and Applied Mathematics, current
- Electronic Journal of Mathematical and Physical Sciences, current
- International Journal of Mathematics and Mathematical Sciences, current
- Boundary Value Problems, 2005-2015
- Tbilisi Mathematical Journal, current
- Guest Editor, special issue of Rocky Mountain Journal of Mathematics, 21, 1991.
- Guest Editor, special issue of DCDS-A in memory of Paul Fife , 2016.

Conferences

- Organizer, Int'l Conf. on Nonlinear Partial Differential Eqts, Provo, Mar. 1987.
- Organizer, NSF-CBMS Conference "Dynamics of Internal Layers and Diffusive Interfaces," Snowbird, UT, May 1987.
- Chair of the Scientific Committee for the US-China Conference on Differential Equations and applications, Hangzhou, PRC, June 1996.
- Member, Scientific Committee for the conference on Differential Equations and Computational Simulations, Sichuan, June, 1999.
- Co-Chair Organizing Committee for the SIAM Pacific Rim Conference on Dynamical Systems, Aug. 2000.
- Co-Chair Scientific Committee, Int'l Conf. on Differential Equations and Dynamical Systems with Applications, July 3-8, 2001, Lhasa, Tibet, P.R.China
- Organizer: Special session "Interfaces with anisotropy", Free Boundary Conference, Trento, June, 5-8, 2002.
- Member, Scientific Committee, Satellite Conference of ICM 2002 on Bifurcation and Chaos, Kunming, PRC, August 8-18, 2002
- Organizer, Workshop on Defects and their Dynamics, BIRS, Banff, CA, Aug. 10 -16, 2003.
- Co-chair, Scientific Committee, Workshop on Bifurcation Theory and Applications of Dynamical Systems, Jinhua, PRC, June 8-12, 2005.
- Member of the Scientific Committee, International Conference on Stochastic and Infinite-Dimensional Dynamical Systems, Chengdu, June 5-10, 2006.
- Chair of Organizing and Scientific Committee, Midwest Conference on Quantitative Biology, Sept 29- Oct 1, 2006.
- Co-Organizer Minisymposium at AMS Meeting, Salt Lake City, Oct 7-8, 2006.
- Organizer (with K. Lu) Minisymposium at the SIAM Conference on Dynamical Systems, Snowbird, May 29, 2007.
- Chair of the Scientific Committee for the VII Americas Conference on Differential Equations, Veracruz, Mexico, October 2009.
- Co-Chair, Scientific Committee Fourth International Conf. on Recent Advances in Applied Dynamical Systems, Jinhua, PRC, June 2010.
- Co-Chair, Scientific Committee Fifth International Conf. on Recent Advances in Applied Dynamical Systems, Shanghai, PRC, June 2011.

- Co-Chair, Scientific Committee for the Sixth International Conference on Recent Advances in Applied Dynamical Systems, Guanzghou, PRC, June, 2012
- Member, Scientific Committee for the Turing Symposium on Morphogenesis, Sendai, Japan, August, 2012.
- Co-Chair, Scientific Committee for the Seventh International Conference on Recent Advances in Applied Dynamical Systems, Shanghai, China, June 8-10, 2013.
- Organizer, Workshop on Nonlinear Elliptic Systems and Infinite-Dimensional and Stochastic Dynamical Systems, MSU, April, 2014.
- Co-Chair, Scientific Committee for the Eighth International Conference on Recent Advances in Applied Dynamical Systems, Guilin, PRC, June, 2014.
- Co-Chair, Scientific Committee for the Ninth International Conference on Recent Advances in Applied Dynamical Systems, Guangzhou, China, June 1-5, 2015.
- Co-Chair, Scientific Committee for the Tenth International Conference on Recent Advances in Applied Dynamical Systems, Xuzhou, China, June 10-12, 2016.

GRANTS while at MSU

NSF (Analysis) PI, Research award (Co-PI, K. Lu), Theory and Applications for Infinite Dimensional Dynamical Systems, \$168,000, July 2002-Aug 2006.

NSF (Education) Co-PI, Math and Science Partnership (PI, J. Ferrini Mundi, four co-PI's), \$35,000,000, September 2003-December 2008.

NSF (Analysis) Co-PI, Research award (with K. Lu), Topics in Infinite Dimensional and Random Dynamical Systems, \$270,000 Sept 2004 - Sept 2009.

NSF (Math/Infrastructure) PI, UBM: Integrated Analysis of Genetic and Cellular Networks, \$905,000 Sept 2005 - Sept 2010.

DARPA, (Group award with PI, R. Lenski at MSU, several others nation wide), Senior Investigator, Microstates to Macrodynamics: A New Math. of Biology, MSU budget \$1,800,000 approximately, Sept 2005 - Sept 2010.

NSF (Conference) PI, (Co-PI's Gouwei Wei and Leslie Kuhn), Midwest Conference on Quantitative Biology, \$20,000 Aug 2006 - July 2007. Also supported through proposals submitted to Inst. Math. Appl., U. MN for \$5,000, Math. Bio. Inst., Ohio State U. for \$4,000, and MSU-QBMI/UBM for \$10,000.

NSF (Applied Math) Co-PI, Research (PI, Guowei Wei), Mathematical Modeling of Bio-molecular Surfaces, \$303,310 Aug 2006 - July 2009.

NSF Co-PI, CCLI award (PI, C. Chiu and Co-PI J. Jackson), Development of a New Calculus and Differential Equations Sequence for Undergraduate Life Sciences Majors, \$150,000 May 2008 - April 2011.

NSF (Applied Math) PI, Invariant Manifolds for Multi-scale and stochastic dynamical systems, \$190,000, July 2009-Aug 2012.

NIH R-01 co-PI (PI is G. Wei), Geometric flow approach to implicit solvation modeling, \$1,211,000, Aug 2009- Aug 2013.

NSF INT (Workshop in Mexico City and Veracruz) PI, Pan American Studies Inst. \$75,000. Aug 2009-2010.

NSF (Applied Math) PI "Invariant manifolds for multi-scale and stochastic dynamical systems," \$190,000, July 2009-Aug 2014.

NSF (Applied Math) PI "Topics in Infinite-Dimensional and Stochastic Dynamical Systems," \$215,000, June 2014-May 2017.

PUBLICATIONS, listed by mathematical area

Infinite-Dimensional Dynamical Systems

- (1) (with C. K. R. T. Jones) "Invariant manifold theorems with applications," *Nonlinear Functional Analysis and its Applications* (ed. by S. P. Singh), NATO ASI Series, 173 (1986), 177--186.
- (2) (with C. K. R. T. Jones) "Invariant manifold theorems for semilinear partial differential equations," *Dynamics Reported 2* (1988), 1--38.
- (3) (with N. D. Alikakos) "An invariance principle for a class of monotone systems and application to degenerate parabolic systems," *Rocky Mtn. Math. J.* 18 (1988), 215-244.
- (4) (with C. K. R. T. Jones) "The stability of standing waves for the nonlinear Klein-Gordon Equation," *Proceedings of the Trento Conference on Dynamical Systems, Advanced Topics in the Theory of Dynamical Systems*, Academic Press (1989), 1--9.
- (5) (with S. Zheng) "Inertial Manifolds and Inertial Sets for the Phase Field System," IMA Preprint #806, May 1991.
- (6) (with K. Lu) "The Hartman-Grobman Theorem for the Cahn-Hilliard and phase field equations," *J. Dyn. Diff. Eqts.*, 6 (1994), 101--145.
- (7) (with K. Lu and C. Zeng) "Normally hyperbolic invariant manifold for semiflows in a Banach space," in *US-Chinese Conference on Differential Equations and Applications*, P. W. Bates, S-N. Chow, K. Lu, and X. Pan, Eds., International Press, Cambridge, MA, 1997, pp 22-29.
- (8) (with K. Lu and C. Zeng) "Foliations for semiflows in Banach space near a normally hyperbolic invariant manifold," in *US-Chinese Conference on Differential Equations and Applications*, P. W. Bates, S-N. Chow, K. Lu, and X. Pan, Eds., International Press, Cambridge, MA, 1997, pp 30-40.
- (9) (with K. Lu and C. Zeng) "Existence and persistence of invariant manifolds for semiflows in Banach space," *Memoirs of the AMS*, **135** No. 645 (1998), 129 pages. ("Featured" Math Review).
- (10) (with K. Lu and C. Zeng) "Invariant foliations of overflowing manifolds for semiflows in Banach Space," *BTNA '98 Proceedings*, Chen, Chow, and Li, Eds., Springer-Verlag, New York, 1999, pp 1--12.
- (11) (with K. Lu and C. Zeng) "Invariant foliations near normally hyperbolic invariant manifolds for semiflows," *Transactions of the AMS*, **352** (2000), 4641-4676.
- (12) (with K. Lu and C. Zeng) "Persistence of C_k normally hyperbolic invariant manifolds for infinite dimensional dynamical systems," *Proc. First International Congress of Chinese Mathematicians* (Beijing, 1998), 403--410, *AMS/IP Stud. Adv. Math.*, 20, Amer. Math. Soc., Providence, RI, 2001.
- (13) (with K. Lu and C. Zeng) "Persistence of overflowing manifolds for semiflows" *Comm. Pure and Appl. Math.*, **52** (1999), 983--1046.
- (14) (with K. Lu and B. Wang) "Attractors for lattice dynamical systems," *Int. J. Bifurcation and Chaos. Appl. Sci. Engrg.* 11 (2001), 143--153.
- (15) (with K. Lu and C. Zeng) "Approximate invariant manifolds," in *Diff. Eqts. and Comput. Simulations*, P.W. Bates, S-N. Chow, K. Lu, and D. Xu, Eds., World Sci., Singapore, 2000, pp 26-30.
- (17) (with student C. Zhang) "Traveling Pulses for the Klein-Gordon Equation on a Lattice

or Continuum with Long-range Interaction," *J. Discrete Continuous Dynamical Systems-A*, **16** (2006), 235--252.

(18) (with K. Lu and C. Zeng) "Approximately Invariant Manifolds and Global Dynamics of Spike States," *Inventiones Mathematicae*, 174 (2008), 355-433.

(20) "Normally Hyperbolic Invariant Manifolds: Existence, Persistence, Approximation, and Their Applications," 14 hours of lectures in 9 parts, IMA Video Archives, 2012.

(21) (with student Hong Lu, Jie Xin, and postdoc Mingji Zhang) "Asymptotic behavior of stochastic fractional power dissipative equations on \mathbb{R}_n ," *Nonlinear Anal.* 128 (2015), 176-198.

Mathematical Biology

(22) (with I. Aranson, student Z. Jia, and D. Karpeev) "Simulation Studies of Self-Organization of Microtubules and Molecular Motors," *Phys. Rev. E*. 77 No 5, (2008), 051905- 1 --8. Also selected for publication in *Virtual Journal of Biological Physics Research* 15 Issue 10 (2008).

(23) (with A. W. Shingleton and Christen Mirth, both Zoologists) "Developmental Model of Static Allometry in Holometabolous Insects," *Proc. Royal Soc. B.*, 275 (2008), 1875-1885.

(24) (with Zhan Chen, Yuhui Sun, G. W. Wei, and Shan Zhao) "Geometric and potential driving formation and evolution of biomolecular surfaces," *Journal of Mathematical Biology*, 59 Number 2, (2009), 193-231.

(25) (with G. Zhao) "Existence, Uniqueness and Stability of the Stationary Solution to a Nonlocal Evolution Equation Arising in Population Dispersal," *J. Math. Anal. Appl.*, 332 (2007) 428-440.

(26) (with Z. Jia) "Neck-Linker tension and the locomotion of Kinesin along microtubules", *Canadian Applied Mathematics Quarterly* 18 (2010), 229-252.

(27) (with Fengxin Chen) "Structure of principal eigenvectors and genetic diversity," *Nonlinear Analysis*, . 74 (2011), no. 18, 7285-7295.

(28) (with Zhan Chen, Shan Zhao, Nathan Baker, and Guo-Wei Wei) "Variational approach for nonpolar solvation analysis," *J. Chemical Physics*, **137** #8 (2012).

(29) (with student Yu Liang, and Alexander Shingleton) "Growth Regulation and the Insulin Signaling Pathway," *J. Networks, Heterogeneous Media*, 8 #1 (2013), 65-78.

(30) (with Weishi Liu, student Hong Lu, and postdoc Mingji Zhang) "Ion size and valence effects on ionic flows via Poisson-Nernst-Planck models," to appear, *Comm. Mathematical Sciences*. 20 pages.

(31) (with Yusheng Jia, Guojian Lin, student Hong Lu and postdoc Mingji Zhang) "Individual flux study via steady-state Poisson-Nernst-Planck systems: Effects from boundary conditions," to appear, *SIAM J. on Applied Dynamical Systems*. 24 pages.

Matrix Analysis

(32) (with N. D. Alikakos) "Estimates for the eigenvalues of the Jordan Product of Hermitian matrices," *Lin. Alg. & Appl.* 57 (1984), 41--56.

Nonlinear Analysis

- (33) (with I. Ekeland) "A Saddle-Point Theorem," *Differential Equations*, Ahmad, Keener & Lazer, Eds., Academic Press, New York, (1980), 123--126.
- (34) "A Variational Approach to Solving Semilinear Equations at Resonance," *Nonlinear Phenomena in Mathematical Sciences*, V. Lakshmikantham, Ed. Academic Press, New York, (1982), 103--112.
- (35) "Reduction Theorems for Semilinear Equations at Resonance," *Proc. Amer. Math. Soc.*, 84 (1982), 73--78.
- (36) (with A. Castro) "Necessary and sufficient Conditions for Existence of Solutions to Equations with Noninvertible Linear Part," *Revista Colombiana XV* (1981), 7--24.

Numerical Analysis

- (37) "Projection Methods for Nonlinear Nodal Problems," Ph.D. Dissertation, The University of Utah, 1976.
- (38) (with G. B. Gustafson) "Projection Methods for Nonlinear Nodal Problems," *Rocky Mtn. J. Math.* 7 3 (1977), 569--608.
- (39) (with X. Chen and student X. Deng) "A numerical scheme for the two phase Mullins-Sekerka problem," *Electr. J. Differential Equations*, 1995,11(1995), 1--27.
- (40) (with student S. Brown) "A numerical scheme for the Mullins-Sekerka evolution in three space dimensions," in *Diff. Eqts. and Comput. Simulations*, P.W. Bates, S-N. Chow, K. Lu, and D. Xu, Eds., World Sci., Singapore, 2000, pp 11--25.
- (41) (with Gouwei Wei, and Shan Zhao) "Minimal molecular surfaces and their applications," *J. Comp. Chem.* 29 (2008), 380-391.
- (42) (with S. Brown and J. Han; "Numerical analysis for a nonlocal Allen-Cahn equation," *International Journal of Numerical Analysis and Modeling* 6 (2009), 33--49.
- (43) (with student H. Lu, W. Chen, and postdoc M. Zhang) "The spectral collocation method for efficiently solving PDEs with fractional Laplacian," in revision, *Advances in Computational Mathematics*, (2017).

Ordinary Differential Equations

- (44) (with G. B. Gustafson) "Green's Function Inequalities for Two-Point Boundary Value Problems," *Pacific J. Math.* 59 2 (1975), 327--343.
- (45) (with G. B. Gustafson) "Maximization of Green's Problems," *SIAM J. Math. Analysis* 76 (1976), 858--871.
- (46) (with J. R. Ward) "Periodic Solutions of Higher Order Systems," *Pacific J. Math.* 84 (1979), 275--282.
- (47) (with N. D. Alikakos and G. Fusco) "Solutions to the Nonautonomous Bistable Equation with Specified Morse Index," *Trans. Amer. Math. Soc.* 340 (1993), 641--654.
- (48) (with postdoc X. Ren) "Heteroclinic orbits for a higher order phase transition problem," *European J. Appl. Math.*, 8 (1997), 149--163.

Partial Differential Equations

- (49) "Hilbert Space Methods for Nonlinear Elliptic Equations," *J. Diff. Eqs* **32** (1979), 250--257.
- (50) (with A. Castro) "Existence and Uniqueness for a Variational Hyperbolic System Without Resonance," *J. of Nonlinear Analysis* **4** (1980), 1151--1156.
- (51) "Solutions of Nonlinear Elliptic Systems with Meshed Spectra," *J. Nonlinear Analysis* **4** (1980), 1023--1030.
- (52) (with D. L. Barrow) "Bifurcation and Stability of Periodic Traveling Waves for a Reaction-Diffusion System," *J. Differential Equations* **50** (1983), 218--233.
- (53) (with D. L. Barrow) "Bifurcation of periodic travelling waves for a reaction-diffusion system," *Ordinary and Partial Differential Equations*, W. N. Everitt and B. D. Sleeman, Eds., *Lecture Notes in Math.* 964 Springer-Verlag, NY (1982), 69--76.
- (54) (with D. L. Barrow) "Bifurcation from collinear solutions to a reaction-diffusion system," *Nonlinear Partial Differential Equations* J. Smoller, Ed., *Contemporary Mathematics* **17**, American Math. Soc., (1983), 179--188.
- (55) (with K. J. Brown) "Convergence to equilibrium in a reaction-diffusion system," *Nonlinear Analysis* **8** (1984), 227--235.
- (56) "Containment for Weakly Coupled Parabolic Systems," *Houston J. Math.* Vol. **11** (1985), 151--158.
- (57) "Travelling waves in radially symmetric reaction-diffusion systems," *Proc. Roy. Soc. Edin.* **99A** (1985), 269--275.
- (58) "Existence and containment of solutions to parabolic systems," in *Nonlinear Functional Analysis and its Applications*, F. Browder, Ed., *Proc. Symp. Pure Math.* **45**, Amer. Math. Soc., 1986, 103--108.
- (59) "Containment of solutions to strongly coupled parabolic systems," *Trends in the Theory and Practice of Nonlinear Analysis* North Holland Amsterdam (1985), 45--54.
- (60) "Invariant manifolds for perturbations of nonlinear parabolic systems with symmetry," *Amer. Math. Soc., Lectures in Applied Math.* **23** (1986), 209--217.
- (61) (with N. D. Alikakos) "Stabilization of solutions for a class of degenerate equation in divergence form in one space dimension," *J. Diff. Eqs* **73** (1988), 363--393.
- (62) (with N. D. Alikakos and C. P. Grant) "Blow up for a diffusion-advection equation," *Proc. Royal Soc. Edin.* **113A** (1989), 181--190.
- (63) (with S. Zheng) "Inertial Manifolds and Inertial Sets for the Phase-Field System," *J. Dyn. Diff. Eqs.* **4** (1992), 375--397.
- (64) (with postdoc X. Ren) "Transition layer solutions of a higher order equation in an infinite tube," *Comm. PDE's*, **21** (1996), 195--220.
- (65) (with P. Fife, R. Gardner and C. Jones) "The existence of travelling wave solutions of a generalized phase-field model," *SIAM J. Math. Analysis*, **28**, (1997), 60--93.
- (66) (with N. Alikakos and X. Chen) "Periodic traveling waves and locating oscillating patterns in multidimensional domains," *Trans. AMS.*, **351**, (1999), 2777-2805.
- (67) (with students F. Chen and J. Wang) "Global existence and uniqueness of solutions to a nonlocal phase-field system," in *US-Chinese Conference on Differential Equations and Applications*, P. W. Bates, S-N. Chow, K. Lu, and X. Pan, Eds., International Press, Cambridge, MA, 1997, pp 14-21.
- (68) (with student F. Chen, and P. Wang) "Existence of global solution for a differential system with initial data in L_p ," *Internat. J. Math. Math. Sci.*, **22** (1999), 823-834.

- (69) (with F. Chen) "Periodic traveling waves for a nonlocal integro-differential model," *Electronic J. Diff. Eqs.* 1999 No. 26 (1999), 1--19.
- (70) (with F. Chen) "Spectral analysis of traveling waves for nonlocal evolution equations," *SIAM J. Math. Analysis*, **38**, (2006), 116--126.

Nonlinear Partial Differential Equations and Applications

- (71) (with P. C. Fife) "A comparison principle for spectra of the Cahn-Hilliard equation, and time scales for the coarsening process," *Physica D.* 43 (1990), 335--348.
- (72) "Interface dynamics for the Cahn-Hilliard equation," in *Analysis of Nonlinear Phenomena and its Applications*, T. Nishida, Ed., Research Institute for Math. Sci., Kyoto (1992), 1--3.
- (73) "Coarsening and nucleation in the Cahn-Hilliard equation," in *Free boundary problems involving solids*, J. M. Chadam and H. Rasmussen, Eds., Pitman Research Notes in Math. 281 Longman Sci. & Tech., Harlow, (1993), 220-225.
- (74) (with P. C. Fife) "The Dynamics of Nucleation for the Cahn-Hilliard Equation," *SIAM J. Appl. Math.* 53 (1993), 990--1008.
- (75) (with P. Fife, X. Ren and X. Wang) "Traveling waves in a convolution model for phase transitions," *Archive for Rational Mechanics and Analysis*, 138, (1997), 105-136.
- (76) (with P. Fife, R. Gardner and C. Jones) "Phase field models for hypercooled solidification," *Physica D*, 104 (1997), 1-31.
- (77) "The Mathematics of Phase Transitions," *Postgraduate Lecture Notes in Math.*, Universidad Nacional de Colombia, October, 1998, 47 pages.
- (78) (with G. Fusco) "Multi-spike states of the Cahn-Hilliard model for phase transitions," *Lecture Notes Japan Math. Soc. School on Concentration Phenomena*, 1998.
- (79) (with A. Chmaj) "An integrodifferential model for phase transitions: Stationary solutions in higher space dimensions," *J. Statistical Physics*, 95 (1999), 1119--1139.
- (80) (with A. Chmaj) "On a discrete convolution model for phase transitions," *Arch. Rat. Mech. Anal.*, 150 (1999), 281--305.
- (81) (with F. Chen) "Traveling waves for a nonlocal phase-field system," *Interfaces and Free Boundaries* 4 (2002), no. 3, 227--238.
- (82) (with X. Chen and A. Chmaj) "Equilibria and traveling waves for bistable equations with non-local and discrete dissipation," *Nonlinear Diffusive Systems--Dynamics and Asymptotics*, E. Yanagida and Y. Morita, Eds., pp 48-71, RIMS Kokyuroku 1178, Kyoto University Press, 2000.
- (83) (with F. Chen) "Spectral analysis and multidimensional stability of traveling waves for nonlocal Allen-Cahn equation," *J. Math. Anal. Appl.* 273 (2002), no. 1, 45--57.
- (84) (with X. Chen and A. Chmaj) "Traveling Waves of Bistable Dynamics on a Lattice," *Soc. Indust. Appl. Math. J. on Math. Analysis*, 35 (2003), 520 --546.
- (85) (with J. Han) "The Neumann boundary problem for a nonlocal Cahn-Hilliard equation," *J. Diff. Eq.*, 212 (2005), no. 2, 235--277.
- (86) (with J. Han) "The Dirichlet boundary problem for a nonlocal Cahn-Hilliard equation," *J. Math. Anal. Appl.*, 311 (2005), no. 1, 289--312.
- (87) (with J. Han and G. Zhao) "On a Nonlocal Phase-Field System," *J. Nonlin. Analysis*, 64 (2006), no. 10, 2251--2278.
- (88) (with X. Chen and A. Chmaj) "Heteroclinic solutions of a Van der Waals model with

- indefinite nonlocal interactions," *J. Calc. Variations, PDEs*, 24 (2005), 261-281.
- (89) "On some nonlocal evolution equations arising in materials science," *Fields Inst. Comm.*, 48, "Nonlinear Dynamics and Evolution Equations," Edited by: H. Brunner and X-Q. Zhao, The American Mathematical Society, Providence, RI, 2006, pp 13-52.
- (90) (with N. D. Alikakos, J. W. Cahn, P.C. Fife, G. Fusco, and G.B. Tanoglu) "Analysis of a corner layer problem in anisotropic interfaces," *Discrete Cont. Dyn. Syst. B*, 6 (2006), 237--255.
- (91) (with Giorgio Fusco and Panyotis Smyrnellis) "Entire solutions with six-fold junctions to elliptic systems with triangle symmetry," *Advanced Nonlinear Studies*, **13** (2013), 1-12.
- (92) (with student Hong Lu, Shujuan Lü, and postdoc Mingji Zhang) "Dynamics of the 3-D fractional complex Ginzburg-Landau equation", *J. Diff. Equations* **259** (2015), no. 10, 5276–5301.

Singular Perturbations

- (93) (with N. D. Alikakos) "On the singular limit in a phase field model of phase transition," *Ann. Inst. Henri Poincare* 5 (1988), 141--178.
- (94) (with N. D. Alikakos and G. Fusco) "Slow motion manifolds for the Cahn-Hilliard equation in one space dimension," *J. Differential Equations* 90 (1991), 81--135.
- (95) (with N. D. Alikakos and G. Fusco) "Slow motion manifolds for a class of singular perturbation problems: the linearized equations," in *Differential Equations and Math. Physics*, C. Bennewitz, Eds., Math. Sci. Eng. 186 Academic Press, Boston, (1992), 1--24.
- (96) (with J-P Xun) "Metastable Patterns for the Cahn-Hilliard Equation: Part I," *J. Differential Equations*, 111 (1994), 421--457.
- (97) (with N. D. Alikakos and X. Chen) "Convergence of Cahn-Hilliard to Hele-Shaw Dynamics," *Arch. Rat. Mech. Analysis*, 128 (1994), 165--205. ("Featured" Math Review).
- (98) (with N. Alikakos and X. Chen) "Asymptotics of the Cahn-Hilliard flow," in "Curvature Flows and Related Topics," A. Damlanian, J. Spruck, A. Visintin, Eds., p13--24, *Gatuko International Series*, Gakkotosho, Tokyo, Japan, 1995.
- (99) (with J-P Xun) "Metastable patterns for the Cahn-Hilliard Equation: Part II, Layer dynamics and slow invariant manifold," *J. Diff. Eqs.* 116, (1995), 165--216.
- (100) (with G. Fusco) "Equilibria with many nuclei for the Cahn-Hilliard equation," *J. Diff. Eqs.*, **160** (2000), 283-356.
- (101) "Convergence of level sets for solutions to the Cahn-Hilliard equation to the Mullins-Sekerka flow," *MSRI Lecture Notes and Streaming Video*, (1999) <http://msri.org/publications/ln/msri/1999/materials/pwbates/1/title.html>
- (102) (with E. N. Dancer and J. Shi) "Multi-spike stationary solutions of the Cahn-Hilliard equation in higher dimension and instability," *Advances in Diff. Eqts.* **4** (1999), 1-69.
- (103) (with N. Alikakos, X. Chen, and G. Fusco) "Mullins-Sekerka motion of small droplets on a fixed boundary," *J. Geom. Anal.*, **10** (2000), 575-596.
- (104) (with J. Shi) "Existence and Instability of Spike Layer Solutions to Singular Perturbation Problems," *J. Functional Analysis*, **196** (2002), no. 2, 211-264.
- (105) (with X. Pan) "Nucleation of instability of the Meissner state of 3-dimensional

superconductors," *Comm. Math. Phys.* **276** (2007), no. 3, 571--610.

(106)(with K. Lu and C. Zeng) "Global Dynamics of Particles Driven by a Nonlinear Reaction-Diffusion Equation," *RIMS Kôkyûroku Bessatsu*, **31** (2012), 1-12.

(107)(with student Jiayin Jin) "Global dynamics of boundary droplets," *J. Discrete and Continuous Dynamical Systems-A*, **34** (2014), no.1, 1-17.

(108)(with G. Fusco and student J. Jin) "Invariant manifolds of Interior Multi-Spike States for the Cahn-Hilliard Equation in Higher Space Dimensions," to appear, *Transactions of the AMS*, 37 pages. Accepted May 29, 2015. Published electronically: November 16, 2016

Random and Stochastic Differential Equations

(109) (with H. Lisei and K. Lu) "Attractors for Stochastic Lattice Dynamical Systems," *J. Stochastics and Dynamics*, **6** (2006), 1--21.

(110) (with K. Lu and B. Wang) "Random Attractors for Stochastic Reaction-Diffusion Equations on Unbounded Domains," *J. Differential Equations* **246** (2009) 845- 869.

(111)(with K. Lu and J. Li) "Normally Hyperbolic Invariant Manifolds for Random Dynamical Systems: Part I – Persistence," *Transactions Amer. Math. Soc.* **365** (2013), 5933-5966.

(112)(with K. Lu and B. Wang) "Tempered Random Attractors for Parabolic Equations in Weighted Spaces," *J. Math. Physics*, **54**, (2013), 081505 (26 pages)

(113)(with Ji Li and Kening Lu) "Invariant Foliations for Random Dynamical Systems," *J. Discr. Cont. Dynamical Systems-A* **34**, No. 9, (2014), 1-27.

(114) (with K. Lu and B. Wang) "Attractors of non-autonomous stochastic lattice systems in weighted spaces," *Physica D.*, **289**, 15 December (2014), 32–50.

(115) (with student Hong Lu, Shujuan Lü, and postdoc Mingji Zhang) Dynamics of the 3D fractional Ginzburg-Landau equation with multiplicative noise on an unbounded domain. *Comm. Math. Sci.*, **14** (2016), no. 1, 273–295.

(116) (with Antonopoulou, D. C., Blömker, D., and Karali, G. D.) Motion of a droplet for the stochastic mass-conserving Allen-Cahn equation. *SIAM J. Math. Anal.* **48** (2016), no. 1, 670–708.

(117) (with postdocs Ji Li and Mingji Zhang) "Singular fold with real noise," *Discrete and Continuous Dynamical Systems-B*, **21**, (2016), no. 7, 2091 – 2107.

LECTURE SERIES

- Three one-hour talks: Brown University, "Persistence of invariant manifolds," February 4-14, 1996.
- Five one-hour talks: "The Mathematics of Phase Transition," Taller de Ecuaciones Diferenciales y Aplicaciones, National University of Colombia, Medellin, July 21-24, 1998.
- Eight hours: "Multi-spike solutions to the Cahn-Hilliard Equation," the Mathematics Society of Japan Workshop on Concentration Phenomena, Sendai, August 3-11, 1998.
- Six hours: "Nonlocal evolution equations", U. Cartagena, July, 2003.
- Three one-hour lectures: "PDE Methods for Materials Science," The National University of Colombia, Bogota, August 4-7, 2008.

- Three Lectures ‘Higher order models in the theory of phase transition,’ SISSA Workshop on Higher Order Equations in Geometry and Physics, Trieste, May 30- June 2, 2011
- 14 hours of lectures in 9 parts, “Normally Hyperbolic Invariant Manifolds: Existence, Persistence, Approximation, and Their Applications,” IMA Video Archives, <http://ima.umn.edu/videos/#nd> June, 2011.
- 6 hours, “Approximate Invariant Manifolds and Applications,” Program on infinite-dimensional and stochastic dynamical systems, Sichuan University, September 14-20, 2015.

ADDRESSES (last 20 years)

Colloquium: “Dynamics in nonlocal and higher order models of phase transition,” University of Chicago, February 4, 1997.

Invited talk: “Nonlocal and higher order models for phase transitions,” SIAM Conference on Material Science, Philadelphia, May 13, 1997.

Colloquium: “The gradient theory of phase transitions,” University of Athens, Greece, June 5, 1997.

Invited Talk: “Invariant manifolds and foliations for semiflows in Banach space,” AMS Conference, Atlanta, October 18, 1997.

Invited Talk: “Multi-peaked solutions to the Cahn-Hilliard equation,” AMS Conference, Milwaukee, October 24, 1997.

Invited Talk: “Encounters with Mathematics,” Meridian School, November 5, 1997.

Invited Talk: “Multi-peaked solutions to the Cahn-Hilliard equation,” Mexican Math. Soc. Conference, Oaxaca, December 8, 1997.

Invited Talk: “Multi-peaked solutions to the Cahn-Hilliard equation,” Canadian Math. Soc. Annual Meeting, December 16, 1997.

Seminar: “Multi-peaked solutions to the Cahn-Hilliard equation,” Courant Institute, NYU, April 2, 1998.

Colloquium: “Invariant manifolds for semiflows in Banach space,” IIMAS, UNAM, Mexico City, May 6, 1998.

Colloquium: “The Mathematics of Phase Transitions,” IIMAS, UNAM, Mexico City, May 7, 1998.

Colloquium: “Spinodal Decomposition, Nucleation, and Slow Motion for the Cahn-Hilliard Equation,” The Chinese University of Hong Kong, June 9, 1998.

Plenary Talk: “Pinning of Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions,” Conference on Phase Transitions and Free Boundary Problems, Hangzhou, PRC, June 17, 1998.

Plenary Talk: “Equilibria and dynamics associated with a nonlocal model of phase transitions,” International Conference of Lattice Dynamical System, National Chiao Tung University, Taiwan, June 26, 1998.

Colloquium: “Spinodal Decomposition, Nucleation, and Slow Motion for the Cahn-Hilliard Equation,” The Central University of Caracas, July 8, 1998.

Seminar: “A numerical scheme for the Hele-Shaw ow,” The Central University of Caracas, July 9, 1998.

Invited Talk: “Robust Oscillating Patterns for a Periodic Bistable Equation,” Taller sobre

Problemas Fisicos y Matematicos de la Dinamica de Fluidos," Universidad de Los Andes, Merida, Venezuela, July 15, 1998.

Colloquium: "Traveling waves in a lattice dynamical system with long-range interaction," University of Hokkaido, August 12, 1998.

Plenary Talk: "Multi-spike solutions to the Cahn-Hilliard Equation," Third Americas Conference on Differential Equations, Atlanta, September 8-12, 1998.

Invited Talk: "Pinning of interfaces for the nonlocal Allen-Cahn equation in higher space dimensions," Phase Field Models and Surface Effects, Cortona, Sept. 14-18, 1998.

Invited Talk: "Multi-peaked solutions to the Cahn-Hilliard equation," Conference in honor of Alan Lazer's 60th birthday, Miami, Jan 8-9, 1999.

Colloquium: "Traveling waves for higher order and nonlocal equations of phase transition," Utah State University, Jan 28, 1999.

Invited Talk: "Convergence of level sets for solutions to the Cahn-Hilliard equation to the Mullins-Sekerka flow," Self-Assembling Geometric Structures in Materials Science: The Geometry of Interfaces in Mesoscopic Materials, MSRI, April 12-14, 1999.

Invited Talk: "A discrete convolution model for phase transitions," SIAM Dynamical Systems Conference, Snowbird, May 24, 1999.

Invited Talk: "Multi-spike solutions to the Cahn-Hilliard Equation," SIAM Dynamical Systems Conference, Snowbird, May 26, 1999.

Plenary Talk: "The motion of phase interfaces in binary alloys," Internat. Conf. Differential Eqs. and Computational Simulations, Chengdu, China, June 13-18, 1999.

Plenary Talks: "Nonlocal and discrete models for phase transition: Propagation and pinning of interfaces," Euroconference: Dynamics of Patterns, Anogia, Crete, June 22 and June 24, 1999.

Colloquium "Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions," Georgia Tech., Sept. 27, 1999.

Plenary Talk: "Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions," Free Boundary Problems '99, Chiba, Japan, Nov 8-13, 1999.

Plenary Talk: "Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions," IMS conf. Reaction-Diffusion Systems, Hong Kong, Dec. 5-10, 1999.

Invited Talk: "Periodic Traveling Waves for a Nonlocal Reaction-Diffusion Equation," Special Session of the Annual Meeting of the AMS, Jan. 19-22, 2000.

Colloquium: "Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions," University of Colorado, Feb. 25, 2000.

Colloquium: "Interfaces for the Nonlocal Allen-Cahn Equation in Higher Space Dimensions," North Carolina State University, Mar. 1, 2000.

Colloquium: "Invariant manifolds for semiflows in Banach space" University of North Carolina, Mar. 2, 2000.

One Hour Invited Address: "Invariant Manifolds," AMS Regional Meeting, Notre Dame University, April 7-9, 2000.

Invited Talks: "Discrete and Nonlocal Dispersive Equations, I and II," Nonlinear Diffusive Systems -- Dynamics and Asymptotics, RIMS, Kyoto, May 30-June 2, 2000.

Colloquium: "Multi-Spike Solutions to the Cahn-Hilliard Equation," University of Hiroshima, June 19, 2000.

Invited Talk: "Oscillating Patterns and Periodic Traveling Waves for a Bistable Reaction-Diffusion Equation," Workshop on Evolution Equations, University of Hokkaido, Sapporo, June 28-29, 2000.

Colloquium: "Invariant Manifolds and Foliations," Tohoku Univ., Sendai, July 24, 2000.
Colloquium: "Periodic Traveling Waves," University of Tokyo, July 27, 2000.
Invited talk: "Waves in a bistable lattice with strong interaction which is mildly indefinite" Lorentz Center (U. Leiden) Workshop on "Front propagation in discrete and periodic media", October 4-6, 2000.
Seminar: "Traveling Waves in a Bistable Lattice System", Boston U., October 23, 2000.
Invited talk: "Traveling Waves in a Bistable Lattice System", "Evolution equations 2000", Levico, Oct 30-Nov 4, 2000.
Invited talk: "Traveling waves in lattice systems", SW Regional Dynamics Workshop, USC, November 19, 2000.
Colloquium: "The Mathematics of Phase Transition", Lehigh University, Dec. 13, 2000.
Colloquium: "The Mathematics of Phase Transition", Mich. State Univ., March, 2001.
Invited talk: AMS Conference, "Stability of multidimensional traveling waves for a nonlocal Allen-Cahn equation," UNLV, April, 2001.
Plenary talk: "Invariant manifolds for semiflows in Banach space," Fifth Mississippi State Conf. on Differential Equations and Computational Simulations, May 18-19, 2001
Plenary talk: "Invariant manifolds for semiflows in Banach space," Sixth SIAM Conf. on Applications of Dynamical Systems, Snowbird, Utah, May 20-24, 2001.
Invited talk: "Traveling waves in lattice systems," Workshop on phase transitions," University of Athens, May, 2001.
Invited talk: "Existence and Morse Index of Multi-Spike Solutions to Singularly Perturbed Elliptic Equations," Isaac Newton Institute, Cambridge, UK, June 2001.
Plenary talk: "Invariant manifolds for semiflows in Banach space," Lhasa, Tibet, June 2001.
Invited talk: "Traveling waves in lattice systems," Workshop on Generalized Traveling Waves, Kobe, Japan, October, 2001.
Invited talk: "Spike Solutions to Singularly Perturbed Elliptic Equations and their Morse Indices," Kyoto, November, 2001.
Invited talk: "Multispikes solutions to nonlinear elliptic equations," University of Michigan, April 10, 2002
Invited talk: "Waves for Bistable Equations with Non-Local Mexican Hat Interaction," Boston University, April 16, 2002
Invited talk: "Spike Solutions and Morse Indices," Fourth International Conference on Dynamical Systems and Differential Equations, Wilmington NC, May 24-27, 2002.
Invited talk: "Waves for Bistable Equations with Non-Local Mexican Hat Interaction," Fourth International Conference on Dynamical Systems and Differential Equations, Wilmington NC, May 24-27, 2002.
Invited talk: "Waves for Bistable Equations with Non-Local Mexican Hat Interaction," Univ. Rome III, June 10, 2002.
Invited talk: "Multispikes solutions to nonlinear elliptic equations," joint meeting of AMS and UMI, Pisa, June 12 - 16, 2002.
Invited talk: "Spike layer solutions and Lyapunov-Schmidt reduction," 5th Americas conference on differential equations and nonlinear dynamics, Edmonton, July 7-12, 2002.
Invited talk: "Multispikes solutions to nonlinear elliptic equations," XIII ELAM, Cartagena, July 30-Aug 3, 2002.
Plenary talk: "Traveling waves for a bistable equation with nonlocal and indefinite interaction," Satellite Conf. ICM 2002 on Bifurc. and Chaos, Kunming, PRC, Aug., 2002.

Colloquium: "A new class of evolution equations suggested by phase transition in materials," University of Virginia, September 26, 2002.

Colloquium: "A new class of evolution equations suggested by phase transition in materials," College of William and Mary, September 27, 2002.

Colloquium: "A new class of evolution equations suggested by phase transition in materials," Calvin College, October 24, 2002.

Invited talk "Traveling waves in bistable media with nonlocal indefinite interaction", Invasion Phenomena in Biology and Ecology, Inst. Henri Poincare, Paris, Nov. 4-8, 2002.

Colloquium: "Patterns and waves in mathematical material science," BYU, Dec., 2002.

Invited talk "Mathematics of material science," Grad Seminar, BYU, March 3, 2003.

Invited talk "Patterns and waves for discrete and continuum bistable equations with indefinite interaction," Mathematical Biology Institute, Columbus, OH, March 6-8, 2003.

Invited talk "Patterns and waves for discrete and continuum bistable equation with nonlocal and indefinite interaction," University of Michigan, April 11, 2003.

Invited talk "Traveling waves for a bistable equation with nonlocal and indefinite interaction," SIAM conference on Dynamical Systems, Snowbird, UT, May 26-31, 2003.

Invited talk: "Patterns and waves for discrete and continuum bistable equation with indefinite interaction," BIRS, August 11, 2003.

Invited talk: "Patterns and waves for nonlocal bistable equation with indefinite interaction," Indiana University, September 29, 2003.

Plenary talk: "Patterns and waves for nonlocal bistable equation with indefinite interaction," Workshop on Dynamical System and Its application to Biology, National Center for Theoretical Sciences, Taiwan, November 24 - 28, 2003.

Plenary talk: "Patterns and waves for nonlocal bistable equation with indefinite interaction," International Conference on New Directions in Dynamics and Evolution Equations, Changsha, PRC, Dec 17-20, 2003.

Invited talk: "Evaluating Teacher Education Programs," TEEM-UP for K-12, American Society for Mechanical Engineers, Clearwater, FL, March 4-5, 2004.

Participant: Workshop Assessing Students' Mathematics Learning: Issues, Costs and Benefits, MSRI, Berkeley, CA, March 7- 10, 2004

Invited talk: "Heteroclinic solutions to a nonlocal bistable equation with indefinite interaction," New developments on variational methods and their applications, Banff International Research Station, Canada, May 15 - 20, 2004

Plenary talk: "Attractors for Stochastic Lattice Dynamical Systems," Nonlinear Dynamics and Stochastic Partial Differential Equations, Academia Sinica, Beijing, China during May 27--31, 2004.

Plenary talk: "Nonlocal Evolution Equations," 2004 Free Boundary Problems Conference, Montecatini, 10-12 June 2004.

Plenary talk: "Nonlocal Evolution Equations," AIMS' Fifth International Conference on Dynamical Systems and Differential Equations, Pomona, CA, June 16 - 19, 2004.

Invited talk: "The Nonlocal Cahn-Hilliard Equation," special session Mathematical Models and Methods in Phase Transitions, AIMS' Fifth Int'l Conference on Dynamical Systems and Differential Equations, Pomona, CA, June 16 - 19, 2004.

Plenary talk: "Attractors for Stochastic Lattice Dynamical Systems," NCTS International Conference on Dynamical Systems, National Tsing Hua University, Taiwan, June 23-28, 2004.

Plenary talk: "Nonlocal Evolution Equations," International Conference on Nonlinear

Dynamics and Evolution Equations, Memorial Univ. of Newfoundland, July 6-10, 2004.

Professional Presentations: "Analysis of attempted solutions to a word problem typical of students at varying grade levels" and "A student's discovery of a novel method to determine the formula for the area of a circle" PROM/SE Summer Institutes, Cincinnati, Aug. 10, Cleveland, Aug. 11, and East Lansing, Aug. 12, 2004.

Plenary talk: "Nonlocal Evolution Equations: Basic Theory and Waves," INdAM workshop on Dissipative Models in Phase Transitions, Cortona (Italy), Sept. 5-11, 2004.

Undergraduate Colloquium: "Mathematics and Material Science," Albion College, MI, Sept. 23, 2004.

Participant: Modeling of Soft Matter, IMA, Minneapolis, Sept 27-October 1, 2004.

Interdisciplinary Seminar: "Mathematics and Material Science," Institute for Electronic and Information Science, Hokkaido University, October 14, 2004.

Colloquium "Nonlocal Evolution Equations," University of Kansas, Nov. 12, 2004.

Invited talk: "Nonlocal Evolution Equations," Pan American Advanced Studies Institute, Santiago, Chile, Jan 17, 2005.

Seminar talk: Working Group on Rimming in Fuel for High Burnup Light Water Reactors, Sapporo, Mar 2-12, 2005.

Colloquium: "Nonlocal Evolution Equations," Arizona State University, Mar. 21, 2005.

Colloquium: "Nonlocal Evolution Equations," Boston University, April 19, 2005.

Colloquium: "Nonlocal Evolution Equations," University of Pittsburgh, April 22, 2005.

Invited talk: "Fronts and Pulses in Media with Nonlocal Interaction," Special Session, SIAM, Snowbird, May 25, 2005.

Invited talk: "Attractors for Lattice Random Dynamical Systems," Special Session, SIAM, Snowbird, May 26, 2005.

Invited talk: "Patterns and Waves for Nonlocal Equations," Workshop on Bifurcation Theory and Applications of Dynamical Systems, Jinhua, June 12, 2005.

Invited talk: "Patterns and Waves for Nonlocal Equations," ECNU Workshop on Nonlinear Partial Differential Equations, Shanghai, June 15, 2005.

Invited talk: "Patterns and Waves for Nonlocal Equations," Sichuan University Summer School in Stochastic Equations and PDEs, Chengdu, June 17, 2005.

Invited talk: "Analysis of a Corner Layer in Anisotropic Interfaces," International Conference on Dynamical Systems, Huangshan, June 20, 2005.

Invited talk: "Traveling Kinks and Pulses for Nonlocal Evolution Equations," Workshop on Infinite-Dimensional Dynamical Systems, CIRM, Luminy, France, July 6, 2005.

Plenary talk: "Traveling Kinks and Pulses for Nonlocal Evolution Equations," Workshop on Dynamical Problems in Mathematical Materials Science, CSIM, Edinburgh, July 21, 2005.

Invited Talk: "Mathematical Ideas and Biological Sciences," DARPA workshop on Fundamental Problems in Biology, Princeton September 22, 2005.

Colloquium: "Nonlocal evolution equations arising in materials science," Illinois Institute of Technology, December 5, 2005.

Colloquium: "Nonlocal evolution equations arising in the biological and physical sciences," U. Cal. Irvine, April 14, 2006.

90 min talk: "Attractors for Lattice Random Dynamical Systems," Advanced graduate summer school, Chengdu, June 5, 2006.

Plenary talk "Nonlocal evolution equations arising in the biological and physical sciences,"

International Conference on Stochastic and Infinite-Dimensional Dynamical Systems, Chengdu, June 5-10, 2006.

Invited Talk: "Attractors for Lattice Random Dynamical Systems," Workshop on Nonlinear PDE's, East China Normal University, Shanghai, June 10-11, 2006.

Invited Talk: "Invariant Manifolds of Spikes," Recent Advances in Nonlinear Partial Differential Equations, Armidale, Australia, July 16-21, 2006.

Invited Talk: "Invariant Manifolds of Spikes," AMS Regional Meeting, Salt Lake City, Oct 7-8, 2006.

Plenary talk: "Invariant Manifolds of Spikes," 26th Annual SEARCDE conference, North Carolina, October 27-28, 2006.

Undergraduate Colloquium: "Nonlocal evolution equations arising in the biological and physical sciences," Virginia Union University, March 20, 2007.

Invited Talk: "The onset of instability of the Meissner state for 3-D superconductors," International Conference on Superconductors and Liquid Crystals, East China Normal University, May 2007.

Invited Talk: "Invariant Manifolds of Spikes," SIAM Conference on Dynamical Systems, Snowbird, May 29, 2007.

Plenary Talk: "Invariant Manifolds of Spike-like Solutions to Nonlinear Parabolic Equations," Americas Conference on Differential Equations, Catagena, Colombia, July 26, 2007.

Applied Math Seminar: "Patterns and waves in media with nonlocal interaction," University of Minnesota, September, 2007.

Invited Talk: "Invariant Manifolds of Spikes," Recent Developments in Nonlinear Elliptic and Parabolic Equations, BIRS, October 8-13, 2007.

Math Club Seminar: "Mathematics and materials science," U. Minnesota, October 2007.

PDE seminar: "The onset of instability of the Meissner state for 3-D superconductors," University of Minnesota, October 17, 2007.

Invited Talk: "Pattern formation with microtubules mediated with molecular motors," Midwest workshop on quantitative biology, October, 2007.

Invited Talk: "Invariant Manifolds of Spike-like Solutions to Nonlinear Parabolic Equations," Conference in Honor of Avner Friedman's 75th Birthday, Mathematical Biology Institute, Ohio State University, November 15-18, 2007.

Invited Talk: "Invariant Manifolds of Spikes," CBMS Regional Conference, San Antonio Texas, December 2007.

Invited Talk: "Pattern formation with microtubules mediated with molecular motors," DARPA meeting on Fundamental Problems in Biology, San Francisco, Jan. 8-11, 2008.

Undergraduate Colloquium: "Complexity in Biological Processes: Playground for Mathematicians," Brigham Young University, January 15, 2008.

Plenary Talk: "Invariant Manifolds of Spikes," ICMC-Summer Meeting on Differential Equations in honor of Jack Hale's 80th Birthday, Sao Carlos, Brazil, Jan. 28- Feb 1, 2008.

Applied Math Seminar: "Vortex and aster patterns mediated through molecular motors in families of microtubules," University of Auckland, February 28, 2008.

PDE seminar: "The onset of instability of the Meissner state for 3-D superconductors," University of Sydney, May 2008.

Invited talk: "The onset of instability of the Meissner state for 3-D superconductors," Conference on Analysis and PDEs, University of Athens, Greece, May 14-17, 2008.

Colloquium: "Invariant Manifolds of Spikes," University of Crete, May 21, 2008.

PDE seminar: "Invariant Manifolds of Spikes," Univ. Athens, June 7, 2008.

PDE seminar: "The onset of instability of the Meissner state for 3-D superconductors," University of Rome II, June 10, 2008.

PDE seminar: "Invariant Manifolds of Spikes," University of L'Aquila, June 11, 2008.

Invited talk: "Vortex and aster patterns mediated through molecular motors in families of microtubules," CIRM workshop on Mathematical Biology, Luminy, June 16, 2008.

Presentation: "Invariant Manifolds of Spikes," Conference on Elasticity and PDEs in honor of John Ball's 60th birthday, Edinburgh, Scotland, June 23 -27, 2008.

Invited talk: "Invariant Manifolds of Spike-Like Solutions to Nonlinear Parabolic Equations," International Conference on Infinite-Dimensional Dynamical Systems, Fields Institute, Sept. 24-28, 2008.

Plenary talk: "Mathematical Excursions Inspired by Materials Science," Harvey Mudd Conference on Nonlinear Analysis, Claremont, CA, October 25, 2008.

Colloquium: "Mathematical Problems Arising in Materials Science," University of Alabama, November 21, 2008.

Principal Speaker "The Motion of Particles Driven Surface Energy on the Boundary of a Smooth Domain: Peak-like Solutions to Nonlinear Parabolic Equations," GCOE conference 'Weaving Science Web beyond Particle-Matter Hierarchy', Tohuko University, March 5-7, 2009.

Seminar: "A derivation of the Cahn-Hilliard equation," BYU, March 11, 2009.

Colloquium: "Pattern formation of microtubules mediated by molecular motors," Calvin College, March 19, 2009.

Seminar: "The motion of particles driven by Allen-Cahn dynamics on the boundary of a smooth domain," George Mason Univ., April 17, 2009.

Plenary Talk: "Invariant Manifolds for PDEs and the motion of particles driven by Allen-Cahn dynamics," 8th Conference on Differential Equations and Computational Simulations, Mississippi State University, May 7-9, 2009.

Invited Talk: "Global Dynamics of Spike Solutions to the Allen-Cahn Equation and Invariant Manifolds from Approximations," Workshop Topological and Variational Methods for Partial Differential Equations, Oberwolfach, May 16- 23, 2009.

Invited Talk: "Random attractors for stochastic reaction-diffusion equations on unbounded domains," Sichuan University Summer School in Stochastic Differential Equations, Chengdu, May 31, 2009.

Invited Talk: "Invariant Manifolds for PDEs and the motion of particles driven by Allen-Cahn dynamics," Sichuan University, Chengdu, June 1-6, 2009.

Invited Talk: "Random attractors for stochastic reaction diffusion equations on unbounded domains," Workshop on Random Dynamical Systems, SS Chern Institute, Nankai University, June 8-13, 2009.

Invited Talk: "The motion of particles driven by Allen-Cahn dynamics on the boundary of a smooth domain," Mathematical challenges motivated by multiphase materials: Analytical, stochastic and discrete aspects, Anogia, Crete, June 21-28, 2009.

Invited Talk: "Kinesin-Microtubule Interactions: Transport and Spindle Formation," Multiscale Analysis of Self-Organization in Biology, Banff, July 12-18, 2009.

Invited Talk: "True Invariant Manifolds from Approximations," INDAM Meeting : Theoretical and computational methods in nonlinear differential equations, Bertinoro, Italy, Sept 12-19, 2009.

Invited Talk: "The motion of particles driven by Allen-Cahn dynamics on the boundary of a

smooth domain," VIII Americas Conference on Differential Equations and Applications, Veracruz, Mexico, Oct 19-23, 2009.

2011

- Opening Talk: 'Global dynamics of particles driven by Allen-Cahn dynamics on the boundary of a smooth domain,' Conference on Far-From-Equilibrium Dynamics, RIMS, Kyoto, Japan, Jan 4-8, 2011.
- Seminar: 'Locomotion of molecular motors and pattern formation with microtubules,' University of Rome, Tor Vergata, Feb 6, 2011.
- Seminar: 'Approximate invariant manifolds,' University L'Acquila, Feb 7, 2011.
- Plenary Talk: 'Hierarchy of solutions to gradient elliptic systems with symmetry,' International Conference on Recent Advances in Differential Equations, Shanghai, May 18, 2011.
- Invited Talk, 'Neck-Linker Tension and the Locomotion of Kinesin along Microtubules,' SIAM Dynamical Systems, Snowbird Utah, May 23, 2011.
- Principal Speaker: Three Lectures 'Higher order models in the theory of phase transition,' SISSA Workshop on Higher Order Equations in Geometry and Physics, Trieste, May 30- June 2, 2011
- Plenary Talk, 'True Invariant Manifolds from Approximations and Traveling Spike States,' International Conference on Differential and Difference Equations, Ponta Delgado, Azores, July 3-8, 2011.
- Seminar Talk, 'Persistence of Normally Hyperbolic Invariant Manifolds Under Stochastic Perturbation,' University of Athens, July 19, 2011.
- Invited Talk, 'True invariant manifolds from approximations,' Equadiff2011, Loughborough, UK, August 1, 2011.
- Invited Talk: 'Walk This Way: The Locomotion of Kinesin Along Microtubules,' The Society of Natural Philosophy, Sept 9, 2011.
- Invited Talk: 'Persistence of Normally Hyperbolic Invariant Manifolds Under Stochastic Perturbation,' Conference on Geometric Methods for Infinite-Dimensional Dynamical Systems, Brown University, Nov. 4-6, 2011.
- Invited Talk: 'Persistence of Normally Hyperbolic Invariant Manifolds Under Stochastic Perturbation,' Workshop on Nonlinear Differential Equations, Pienza, Italy, Nov. 7-11, 2011.
- Invited Talk, 'Hierarchy of solutions to gradient elliptic systems with symmetry,' in Special Session on recent Developments in Potential Theory, Harmonic Analysis, and PDEs, SIAM conference, San Diego, Nov 14-17, 2011.

2012

- Invited Talk: 'Persistence of Normally Hyperbolic Invariant Manifolds Under Stochastic Perturbation,' Americas Conference on Differential Equations, Trujillo, Peru, January 8, 2012.
- Invited Talk: 'Growth Regulation and the Insulin Signaling Pathway,' Special Session on Self-organization Phenomena in Reaction Diffusion Equations, AMS Sectional meeting, Washington D.C., March 17-18, 2012.

- Plenary Talk: 'The motion of particles driven by Allen-Cahn dynamics on the boundary of a smooth domain,' Workshop on Hyperbolic Conservation Laws and Infinite-Dimensional Dynamical Systems" Univ. Pittsburgh, March 30 - April 1, 2012
- Seminar Talk: 'Global Invariant Manifolds of Spike States,' Stanford University, April 12, 2012.
- Plenary Talks: 'Growth Regulation and the Insulin Signaling Pathway,' and 'Equivariant solutions to elliptic gradient systems with symmetry,' at the International workshop on Nonlinear Analysis, Bogata, June 27-30, 2012.
- Plenary Talk: 'Equivariant solutions to elliptic gradient systems with symmetry,' at The 9th East China Partial Differential Equations Conference & Shanxi International Conference on Partial Differential Equations, July 16-19, 2012.
- Invited Talk: 'Turing Patterns for Nonlocal Equations,' Turing Symposium on Morphogenesis, Sendai, Japan, August 27-31, 2012.
- Tutorial: 'Basic Tools for Finite and Infinite-Dimensional Dynamical Systems,' 4.5 hrs, Sept 17-18, 2012.
- Colloquium: 'Seeking to Understand the Processes of Life through Mathematics,' Claremont Colleges, October 18, 2012.
- Colloquium: 'Seeking to Understand the Processes of Life through Mathematics,' Dickinson College, PA, October 30, 2012.
- Applied Math Seminar: 'Growth and the Insulin Signaling Pathway,' UCLA, Nov 28, 2012.
- Poster: 'Spectral Convergence and the Turing Instability for Nonlocal Systems,' Workshop on Lattice and Nonlocal Dynamical Systems and Applications, IMA, December 03-07, 2012
- Seminar: 'Spectral convergence and Turing Patterns for Nonlocal Systems,' University of Athens, December 10, 2012.

2013

- Invited Talk: 'The Dynamics of Boundary Droplets Mass-Conserving Allen-Cahn Equation with Noise,' First International Conference on Dynamics of Differential Equations, GA Tech, Mar 17, 2013
- Seminar Talk: "The Dynamics of Boundary Droplets for the Mass-Conserving Allen-Cahn Equation With Noise," Tamkang University, Taiwan, April 9, 2013.
- Invited Talk: "Turing Patterns for Nonlocal Diffusive Systems," SIAM Conference on Dynamical Systems, Snowbird, May 22, 2013.
- Invited Talk: "The dynamics of boundary droplets for the mass-conserving Allen-Cahn equation with noise," Workshop on Kinetic Description of Multiscale Phenomena, June 18, 2013, Heraklion, Greece.
- Invited Talk: "Spectral convergence and Turing patterns with nonlocal diffusion," Workshop on Kinetic Description of Multiscale Phenomena, June 20, 2013, Heraklion, Greece.
- Invited Talk: "The dynamics of boundary droplets for the mass-conserving Allen-Cahn equation with noise" The Third International Conference on Random Dynamical Systems, July 14-18, 2013, Chern Institute, Tianjin, PRC.
- Invited Talk: "Turing Patterns for Nonlocal Diffusive Systems," Workshop on Differential Equations, Sichuan University, July 22, 2013.

- Invited Talk: “The dynamics of boundary droplets for the mass-conserving Allen-Cahn equation with noise” Workshop on Differential Equations, Sichuan University, July 22, 2013.
- Invited Talk: “Spectral convergence and Turing patterns for nonlocal diffusive systems,” Joint AMS-MMS conference, Guanajuato, Aug 4-8, 2013.

2014

- Invited Talk: “Spectral convergence and Turing patterns with nonlocal diffusion,” Workshop on Nonlinear DE’s, Claremont College, Apr. 2014.
- Invited Talk: “Multispikes solutions for the Cahn-Hilliard equation,” Department of Mathematics, Sichuan University, Aug. 6, 2014.
- Invited Talk: “Invariant manifolds of interior multi-spike states for the Cahn-Hilliard equation,” Mathematical Approaches to Pattern Formation, Tohoku University, Japan, 28-31 October, 2014.

2015

- Invited Talk: “Spectral Convergence and Bifurcation of Solutions to Nonlocal Diffusion Equations,” Americas X Conference on Differential Equations, Buenos Aires, February 19, 2015.
- Invited Talk: “Dynamics of the 3-D Fractional Complex Ginzburg-Landau equation,” Special Session on Fractional Calculus and Nonlocal Operators, AMS Sectional Meeting, MSU, March 15, 2015.
- Grad Student Recruiting Talk: “The dynamics of spikes,” MSU, March 21, 2015.
- Colloquium: “Walk This Way: The Locomotion of Kinesin Along Microtubules,” Central Michigan University, May 5, 2015.
- Plenary Talk: “Spectral Convergence and Bifurcation of Solutions to Nonlocal Diffusion Equations,” International Conference on Differential & Difference Equations and Applications, Lisbon, May 22 2015.
- Seminar: “Invariant Manifolds of Multi-Spike States for the Cahn-Hilliard Equation,” University of Athens, May 29, 2015.
- Plenary Talk: “The regulation of plasticity of organ growth in the insulin-signaling pathway” Workshop on Mathematical Modeling in Life Sciences, Harbin Normal University, August 1, 2, 2015.
- Colloquium: “Dynamics of Multi-spike States for the Cahn-Hilliard Equation,” Department of Mathematics, Harbin Engineering University, Aug 3, 2015.
- Invited Talk: “Spectral Convergence and Turing Patterns with Nonlocal Diffusion,” International Symposium on Application of Nonlinear Partial Differential Equations in Life Science, Chern Institute, Aug 4-7, 2015.
- Seminar: “Invariant manifolds for infinite-dimensional dynamical systems and instability of solutions to the Klein-Gordon equation,” Graduate seminar, MSRI, September 3, 2015.
- Seminar: “Show and Tell,” MSRI Research seminar, September 9, 2015.
- Colloquium “How should a drop of liquid on a smooth curved surface move in zero gravity?” Department of Mathematics, UC Berkeley, October 8, 2015.

- Invited Talk: “Gradient dynamics: motion near a manifold of quasi-equilibria” ICMMA2015, Meiji University, October 26-29, 2015.
- Seminar: “How should a drop of liquid on a smooth curved surface move in zero gravity?” Department of Mathematics, U. of Tokyo, October 30, 2015.

2016

- Invited Talk: “Motion of a droplet for the stochastic mass-conserving Allen-Cahn equation” Special Session on Infinite Dimensional and Stochastic Dynamical Systems, AMS Sectional Meeting, Salt Lake City, April 9, 2016.
- Invited Talk: “Gradient dynamics: motion near a manifold of quasi-equilibria,” KUMU meeting in honor of Yuri Latushkin, Columbia, Missouri, April 23, 2016.
- Invited Talk: “Bifurcation and Spectral Convergence in Nonlinear Nonlocal Diffusion Equations,” Conference on Nonlocal PDEs, Fields Inst. June 6, 2016.
- Invited Talk: “Gradient dynamics: motion near a manifold of quasi-equilibria,” Sichuan University, Chengdu, PRC, June 16, 2016.
- Invited Talk: “The motion of a small droplet subject to noise and attached to the inside of a cell membrane,” Workshop on Analysis and Quantification of Noisy Effects in Biological Systems, Wuhan, PRC, Jun 19, 2016.
- East Lake Mathematics Talk: “Perspectives and Insights in Mathematics by one who could have known better,” Mathematics Institute, Huazhong University of Science and Technology, Wuhan, PRC, June 20, 2016.
- Seminar: “Nonlocal PDEs arising from materials science” Zhejiang University, Hangzhou, PRC, June 21, 2016.
- Invited Talk: “Pattern Formation in Nonlinear Nonlocal Diffusion Equations,” Workshop on Patterns and Waves, Hokkaido Univ., Sapporo, Japan, Aug 3, 2016.
- Invited Talk: “Multi-phase stationary solutions to the vector Allen-Cahn equation,” Workshop on the Mathematics of Pattern Formation, Banach Center, Bedlewo, Poland, Sept. 16, 2016.
- Plenary Talk: “Multi-phase stationary solutions to the vector Allen-Cahn equation” S.E. Atlantic Reg. Conf. DEs--Fort Myers, Nov. 5, 2016.

UNDERGRADUATE THESES SUPERVISED

Nathan Kleinman, Patrick Schone, Melissa Kemmerle, Michael Higley.

M.S. STUDENTS

Christopher Grant, Patrick Schone, David Smith, Jie Liu, Ximing Zhou, Cindy Deng, Sarah Brown, Gina Thompson.

PH.D. STUDENTS with employment status

P. J. Xun (1994)- Intel,
 Chongchun Zeng (1997)- Sloan and CAREER awards, NYU (3yr postdoc), U. VA (tenured), GaTech (Full Professor)
 Junping Shi (1998)- Tulane, William and Mary (Full Professor)
 Junping Wang (1998)- Edifecs, Washington.
 Fengxin Chen (1999)- U. Texas San Antonio (Assoc. Prof.)

Sarah Brown (2004)- S. Utah Univ. (tenured),
Jianlong Han (2005)- S. Utah Univ. (tenured),
Guangyu Zhao (2005) - N Texas State U., U. Cincinnati, U. Miami, U. West Indies.,
MSU.
Chunlei Zhang (2006)- S. Utah Univ.,
Zhiyuan Jia (2009)- UC Irvine, U. TX Health Science Center at Houston
Jennifer Wei (2012) Nevada Energy
Jiayin Jin (2015, Postdoc GATech)
Hong Lu (2015, Assist. Prof. Shandong University, PRC).
Yu Liang (2016, not seeking employment for family reasons.)

Postdocs Supervised

Xiaofeng Ren (Full Prof. George Washington U.)
Adam Chmaj (Warsaw, Poland)
Toshi Ogawa (Osaka U.)
Bixiang Wang (New Mexico Tech.)
Isamu Ohnishi (Tokyo)
Christos Sourdis (University of Turin)
Mingji Zhang (Assist Prof. NMTech.)
Ji Li (Full Prof., Huazhong U. S&T., PRC)