CURRICULUM VITAE

TASSO J. KAPER

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PERSONAL DATA: Born: June 25, 1964; Groningen, The Netherlands
                         Citizenship: United States of America

RESEARCH: Nonlinear dynamical systems, geometric singular perturbation theory.
                         ODEs and PDEs with multiple time scales.
                         Pattern formation in reaction-diffusion equations.
                         Pulse and spot dynamics, interactions, and self-replication.
                         Applications in bubble dynamics and fluid mechanics.
                         Analysis of reduction methods in chemical kinetics.
                         Pattern formation on emrbyos.
                         Analysis of renormalization group methods.
                         Normal form theory for nonautonomous systems.
                         Mathematical biology, neurophysiology. torus canards
                         Operator-splitting methods. Nonlinear Schrödinger equation.
                         Hamiltonian systems and orbits homoclinic to resonance bands.

PRESENT POSITIONS:

since August 2011	Department Chair
since November 2012	Fellow, American Mathematical Society
since July 2009	Fellow, Society for Industrial and Applied Mathematics
since Sept. 2004	Professor of Mathematics (with tenure), Boston University
since 2012	Associate Editor, *SIAM Journal on Applied Dynamical Systems*
2005-2012	Editor in Chief, *SIAM Journal on Applied Dynamical Systems*
since Jan. 2008	Editor, *Advances in Differential Equations*
since Jan. 2008	Editor, *Differential and Integral Equations*

INDIVIDUAL GRANTS:

2011– 2016	National Science Foundation Grant DMS-1109587.
2006 − 2011	National Science Foundation Grant DMS-0606343.
2003 − 2007	National Science Foundation Grant DMS-0306523.
2000 − 2003	National Science Foundation Grant DMS-0072596.
1996 − 2000	National Science Foundation CAREER Award; Grant DMS-9624471.
1995 − 1998	Alfred P. Sloan Foundation Research Fellowship.
1993 − 1996	National Science Foundation Grant DMS-9307074.

Co-PI on GROUP GRANTS:

2006 − 2012	National Science Foundation DMS RTG Grant DMS-0602204. with N.Kopell. C.E. Wayne, and colleagues in Biomed. and Mech. Eng.
2001 − 2007	National Science Foundation Grant DMS-0109427. with N.Kopell and colleagues in Biomed. and Mech. Eng.
2001 − 2007	Burroughs Wellcome Foundation Grant. (with N.Kopell and 11 colleagues in Bio., Biomed. Eng., and Psych.).
1996 − 2001	National Science Foundation Group Infrastructure Grant DMS-9631755.

GROUP GRANTS (CONT.):

2004 − 2007	Department of Education G.A.A.N.N. Grant (with T. Kimura, E. Previato, D. Rohrlich, G. Stevens, C.E. Wayne).
2001 − 2004	Department of Education G.A.A.N.N. Grant P200A010617 (with D. Abramovich, M. Glickman T. Kimura, E. Previato, G. Stevens).
1998 − 2001	Department of Education G.A.A.N.N. Grant P200A80603 (I headed the committee that also wrote this grant; with D. Abramovich, T. Kimura, and G. Stevens.)
1999 − 2000	National Science Foundation SCREMS grant DMS-9977225.

EDUCATION:

Graduate student in Ph.D. program, Sept. 1986 to July 1991, Applied Mathematics Option, California Institute of Technology, Ph.D. completed June 1991, degree granted June, 1992, Advisor: Professor Stephen R. Wiggins. Thesis: "I: On the structure of separatrix–swept regions of slowly–modulated Hamiltonian systems; II: On the quantification of mixing in chaotic Stokes flows – the eccentric journal bearing."

Undergraduate studies, Sept. 1982 to June 1986, University of Chicago, B.Sc. in Mathematics, June, 1986

PREVIOUS POSITIONS:

Director of Graduate Studies, Department of Mathematics and Statistics (2002–2006, 2010-2011)
Founding Member, Center for BioDynamics (1997–2011)
(Founding) Member, Program for Mathematical and Computational Neuroscience (2001–2007)
Co-Chair, Organizing Committee, SIAM 60-th Annual Meeting, July, 2012
Chair and member, J.D. Crawford Prize Selection Committee, SIAM Activities Group on Applications of Dynamical Systems, 2007 and 2009, resp.
Associate Editor, *SIAM Journal on Applied Dynamical Systems* (2001–2005)
Co-Chair, Organizing Committee, SIAM Meeting on Applications of Dynamical Systems (with Mary Pugh), May 27–31, 2003, over 600 attendees
Associate Professor, Department of Mathematics and Statistics, Boston University (Sept. 1998 - Aug. 2004)
Assistant Professor, Department of Mathematics, Boston University (Sept. 1992 - Aug. 1998)
Visiting Assistant Professor, Lefschetz Center for Dynamical Systems, Brown University (A.Y. 1991-1992)

VISITING POSITIONS:

Visiting Scientist, Center for Mathematics and Computer Science (CWI), Amsterdam, NL (June-Aug 2007, March 2008, July 2008, July 2009)
Member, Modeling and Analysis of Biological Systems, Study Section, National Institutes of Health (January 2004–December 2006)
Visiting Scientist, Argonne National Laboratory (June 2001, June 2000, January and June 1999)
Visiting Professor, University of Amsterdam (October 1998)
Visiting Professor, University of Utrecht (June-July 1995)
Scientific Collaborator, Ctr. Nonlin. Studies, Los Alamos Nat. Lab. (Summers 1991, 1992, and 1993)

PAST Ph.D. THESIS ADVISEES:

* Matthew Holzer, Ph.D. in Mathematics, May 2010. Renormalization group methods for singularly perturbed systems, normal forms, anmd stability of traveling waves in a reaction-diffusion-mechanics system. Recipient of an NSF Postdoctoral Research Fellowship, 2010-2013, University of Minnesota.

* Oleg Mikittchenko (co-advised by C.E. Wayne), Application of resolution of singularities to asymptotic analysis of differential equations. Instructor of Mathematics, Connecticut College

* Margaret Beck, Ph.D. in Mathematics, May 2006 (coadvised by C.E. Wayne). Topics in stability theory for partial differential equations. NSF Postdoc Research Fellowship, U. Surrey, UK, and Brown U., 2006–2009. Assistant Professor, Boston University.

* Marina Bevzushenko, Ph.D. in Mathematics, Dec 2006. Mathematical modeling of an integro-differential equation arising in neuroscience. Instructor of Mathematics, Boston College.

PAST Ph.D. THESIS ADVISEES (continued):

* Antonios Zagaris, Ph.D. in Mathematics, May 2005 (co-advised by H. Kaper). Analysis of reduction methods for multiscale phenomena. Postdoc (U. Amsterdam, and the CWI Amsterdam, NL), Assistant Professor University of Twente, NL.

* David Morgan, Ph.D. in Mathematics, 2001. On the existence and stability of spatial patterns in an activator-inhibitor system that exhibits self-replication. Research Postdoctoral Fellow at the Naval Research Laboratory in Maryland (2001–2005), presently a staff scientist, Harvard University, BW Hospital.

* Stephanie R. Jones, Ph.D. in Mathematics, 2001 (coadvised by N. Kopell). Rhythms in the neocortex and in CPG networks: dynamical systems analyses. Presently a staff scientist at Mass. General Hospital.

* Kinya Ono, Ph.D. in Mathematics, December 2000. Analytical methods for reaction-diffusion equations: critical wave speeds and axisymmetric phenomena. Presently a staff scientist at Khimetrics, Inc.

* Anthony Harkin, Ph.D. in Mathematics, 2001 (coadvised by A. Nadim, Mech. Eng.). Nonlinear dynamics of gas bubbles in liquids. Presently a tenure-track Assistant Professor of Mathematics at Rochester Institute of Technology. Recipient of an National Science Foundation Postdoctoral Fellow at Harvard University (2001-2005).

* Michael G. Hayes, Ph.D. in Mathematics, July 1999. Geometric analysis of delayed bifurcations. Presently a transport planner and financial consultant, W.S. Atkins, Ltd., Surrey, U.K.

* Georgiy S. Medvedev, Ph.D. in Mathematics, May 1999 (coadvised by N. Kopell). Problems on oscillations and pattern formation in mathematical biology. A Veblen Instructor in Mathematics at Princeton University 1999-2002. Presently a tenure-track Assistant Professor of Mathematics at Drexel University.

* Cristina Soto-Treviño, Ph.D. in Mathematics, July 1997 (coadvised by N. Kopell). Geometric methods for periodic orbits in singularly perturbed systems. Presently visiting the University of Arizona.

* Steven P. Weibel, Ph.D. in Mechanical Engineering (principal advisor J. Baillieul) May 1997. Applications of qualitative methods in the nonlinear control of superarticulated systems. Presently a senior staff scientist at Raytheon Corporation.

PRESENT Ph.D. THESIS ADVISEES:

* Nick Benes (joint with Gene Wayne)

REFEREED, ORIGINAL RESEARCH, ARCHIVAL JOURNAL PUBLICATIONS

1. "Calculating Fourier transforms of long–tailed functions," 1987, *SIAM Journal on Scientific and Statistical Computing*, **8**, 1005, J. N. Lyness and T.J. Kaper.

2. "A commentary 'On the periodic solutions of a forced second order equation' by SP Hastings and JB McLeod," 1991, *Journal of Nonlinear Science*, **1**, 247–253, T.J. Kaper and S. Wiggins.

3. "Lobe area in adiabatic Hamiltonian systems," 1991, *Physica D*, **51**, 205–212, T.J. Kaper and S. Wiggins.

4. "On the structure of separatrix–swept regions in singularly–perturbed Hamiltonian systems," November 1992, *Journal of Differential and Integral Equations*, **5**, 1363–1381, T.J. Kaper and S. Wiggins.

5. "An analytical study of transport in Stokes flows exhibiting large–scale chaos between eccentric cylinders," 1993, *Journal of Fluid Mechanics*, **253**, 211–243, T.J. Kaper and S. Wiggins.

6. "A geometric criterion for adiabatic chaos," 1994, *Journal of Mathematical Physics*, **35**, 1202–1218, T.J. Kaper and G. Kovacic.

7. "A simple model of chaotic advection and scattering," 1995, *Chaos*, **5**, no. 4, 671–686, G. Stolovitzky, T.J. Kaper, and L. Sirovich.

8. "Wave-number transport: Scattering of small–scale internal waves by large–scale near–inertial wavepackets," 1995, *Journal of Fluid Mechanics*, **289**, 379–405, D.L. Bruhwiler and T.J. Kaper.

9. "$N-$th order operator splitting schemes and nonreversible systems." 1996, *SIAM Journal on Numerical Analysis*, **33**, no. 1, 349–367, D. Goldman and T.J. Kaper.

10. "Tracking invariant manifolds up to exponentially small errors," 1996, *SIAM Journal on Mathematical Analysis*, **27**, no. 2, 558–577, C. Jones, T.J. Kaper, and N. Kopell.

11. "Multi-bump orbits homoclinic to resonance bands," 1996, *Transactions of the American Mathematical Society*, **348**, 3835–3887, T.J. Kaper and G. Kovacic.

12. "Higher–order Melnikov theory for adiabatic systems," 1996, *Journal of Mathematical Physics*, **37**, 6220–6249, C. Soto–Treviño and T.J. Kaper.

13. "Global dynamics of a rapidly forced cart and pendulum," 1997, *Nonlinear Dynamics*, **13**, 131–170, with S. Weibel and J. Baillieul.

14. "Pattern formation in the 1–D Gray–Scott model," 1997, *Nonlinearity*, **10**, pages 523-563, A. Doelman, T.J. Kaper, and P. Zegeling.

15. "Stability analysis of singular patterns in the 1-D Gray-Scott model," 1998, *PhysicaD*, **122**, pages 1–36, A. Doelman, R. Gardner, and T.J. Kaper.

16. "On the application of geometric singular perturbation theory to some classical two point boundary value problems," 1998, *International Journal of Bifurcation and Chaos*, **8**, pages 189-209, M.G. Hayes, T.J. Kaper, N. Kopell and K. Ono.

17. "On acoustic cavitation of slightly subcritical bubbles," 1999, *Physics of Fluids*, **11**, pages 274–287, A. Harkin, T.J. Kaper, and A. Nadim.

18. "A reaction-diffusion equation with periodic front dynamics," 2000, *SIAM Journal on Applied Mathematics*, **60**, pages 1601–1638 G. Medvedev, T.J. Kaper, and N. Kopell.

19. "On axi-symmetric traveling waves and radial solutions of semi-linear elliptic equations," 2000, *Natural Resource Modeling*, **13**, pages 339–388, K. Ono, T. Witelski, and T.J. Kaper.

20. "Stationary periodic patterns in the 1-D Gray-Scott model," 2000, *Methods and Applications of Analysis*, **7**, 105–150, D.S. Morgan, A. Doelman, T.J. Kaper.

21. "Alpha-frequency rhythms desynchronize over long cortical distances: a modeling study," 2000, *J. Computational Neuroscience*, **9(3)**, 271–291, S.R. Jones, D. Pinto, T.J. Kaper, and N. Kopell.

22. "Large stable pulse solutions in reaction-diffusion equations," 2001, *Indiana University Mathematics Journal*, **50 (1)**, 443–507, A. Doelman, R. Gardner, T.J. Kaper.

23. "Critical wave speeds for a family of reaction-diffusion equations," 2001, *Applied Mathematics Letters*, **14(1)**, 65–73, K. Ono, T.J. Kaper, and T. Witelski.

24. "Slowly-modulating two pulse solutions in the Gray-Scott model, Part I: Asymptotic construction and stability," 2001, *SIAM Journal of Applied Mathematics*, **61(3)**, 1080–1102, A. Doelman, W. Eckhaus, and T.J. Kaper.

25. "Slowly-modulating two pulse solutions in the Gray-Scott model, Part II: geometric theory, bifurcations, and splitting dynamics," 2001, *SIAM Journal of Applied Mathematics*, **61(6)**, 2036–2062, A. Doelman, W. Eckhaus, T.J. Kaper.

26. "An unfolding theory approach to bursting in fast-slow systems," 2001, *Global Analysis of Dynamical Systems*, H. Broer, B. Krauskopf, and G. Vegter, eds., IOP Pub., 277-308, M. Golubitsky, K. Josic, T.J. Kaper.

27. "Spatially periodic and aperiodic multi-pulse patterns in the one-dimensional Gierer-Meinhardt equations," 2001, *Methods and Applications of Analysis*, **8**, 387-414, A. Doelman, H. v.d. Ploeg, T.J. Kaper.

28. "Coupled pulsation and translation of two gas bubbles in a liquid," 2001, *Journal of Fluid Mechanics*, **445**, 377-411, Anthony Harkin, T. J. Kaper, and Ali Nadim.

29. "Blowup in the nonlinear Schrödinger equation near critical dimension," 2002, *Journal of Mathematical Analysis and Applications*, **268**, 517-549, V. Rottschäfer and T.J. Kaper.

30. A stability index analysis of 1-D patterns in the Gray-Scott model," 2002, *Memoirs of the American Mathematical Society*, Number 737, published by the American Mathematical Society, Providence, RI, ISSN 0065-9266, A. Doelman, R.A. Gardner, and T.J. Kaper (a 64 page book).

31. "Asymptotic analysis of two reduction methods for systems of chemical reactions," 2002, *PhysicaD*, **165**, 66-93, H.G. Kaper and T.J. Kaper.

32. "Semi-strong pulse interactions in a class of coupled reaction-diffusion equations," 2003, *SIAM Journal on Applied Dynamical Systems,* **2**, 53-96, A. Doelman and T.J. Kaper.

33. "Coordination of central pattern-generating circuits that control limb movements: the sources of stable differences in intersegmental phases," 2003, *Journal of Neuroscience,* **23(8)**, 3457-3469, S.R. Jones, T.J. Kaper, N. Kopell, and B. Mulloney.

34. "Geometric theory for multi-bump, self-similar, blowup solutions of the cubic nonlinear Schrödinger equations," 2003, *Nonlinearity*, **16**, 929-961, V. Rottschäfer and T.J. Kaper.

35. "Analysis of state-dependent transitions in frequency and long-distance coordination in a model oscillatory cortical circuit," 2003, *Journal of Computational Neuroscience*, **15**, 283–298, D. Pinto, S.R. Jones, T.J. Kaper, and N. Kopell.

36. "Axisymmetric ring solutions of the 2-D Gray-Scott model and their destabilization into spots," 2004, *PhysicaD*, **192**, 33–62, D.S. Morgan and T.J. Kaper.

37. "Analysis of the CSP reduction method for chemical kinetics," 2004, *Journal of Nonlinear Science,* **14**, 59–91, A. Zagaris, H.G. Kaper, T.J. Kaper.

38. "Fast and slow dynamics of the Computational Singular Perturbation method," 2004, *SIAM Journal on Multiscale Modeling and Simulation*, **2**, 613–638, A. Zagaris, H.G. Kaper, T.J. Kaper.

39. "Two perspectives on reduction of ordinary differential equations," 2005, *Mathematische Nachrichten*, **278**, 1629–1642, A. Zagaris, H.G. Kaper, T.J. Kaper.

40. "Projecting to a slow manifold: singularly perturbed systems and legacy codes," 2005, *SIAM Journal on Applied Dynamical Systems*, **4**, 711–731, C.W. Gear, T.J. Kaper, Y. Kevrekidis, and A. Zagaris.

41. "Rigorous asymptotics for critical wave speeds in a family of reaction-diffusion equations," 2006, *Journal of Dynamics and Differential Equations*, **18**, 103–139, N. Popovic and T.J. Kaper.

42. "A geometric construction of traveling waves in a bioremediation model," 2006, *Journal of Nonlinear Science*, **16**, 329–349, M.A. Beck, A. Doelman, and T.J. Kaper.

43. "Homoclinic bifurcations at the onset of pulse self-replication," 2006, *Journal of Differential Equations*, **231**, 359–423, A. Doelman, T.J. Kaper, and L.A. Peletier.

44. "The asymptotic critical wave speed in a family of scalar reaction-diffusion equations," 2007, *Journal of Mathematical Analysis and Applications*, **326**, 1007-1023, F. Dumortier, N. Popovic, and T.J. Kaper.

45. "The critical wave speed for the FKPP equation with cutoff," 2007, *Nonlinearity*, **20**, 855-877, F. Dumortier, N. Popovic, and T.J. Kaper.

46. "Nonlinear asymptotic stability of the semi-strong pulse dynamics in a regularized Gierer-Meinhart model," 2007, *SIAM Journal on Mathematical Analysis*, **38**, 1760–1787, A. Doelman, T.J. Kaper, and K. Promislow.

47. "Reduction for the Michaelis-Menten-Henri mechanism in the presence of diffusion," 2007, *Electronic Journal of Differential Equations*, **C 16**, L. Kalachev, H. Kaper, T.J. Kaper, N. Popovic, and A. Zagaris.

48. "Analysis of a renormalization group method and normal form theory for perturbed ordinary differential equations," 2008, *Physica D*, **237**, 1029–1052, with R.E.L. DeVille, A. Harkin, M. Holzer, and K. Josic.

49. "Pulse dynamics in a three-component system: stability and bifurcations," 2008, *PhysicaD*, **237**, 3335-3368, with P. van Heijster and A. Doelman. doi:10.1016/j.physd.2008.07.014

50. "Pulse dynamics in a three-component system: existence analysis," 2009, *Journal of Dynamics and Differential Equations*, **21**, 73–116, with A. Doelman and P. van Heijster.

51. "Analysis of the accuracy and convergence of equation-free projection to a slow manifold," 2009, *Modelisation Mathematiques et Analyse Numerique,* **43**, 757–784, with A. Zagaris, C.W. Gear, and I.G. Kevrekidis.

52. "Canards and bifurcation delays of spatially homogeneous and inhomogeneous types in reaction-diffusion equations," 2009, *Advances in Differential Equations*, **14**, 943–962, with P. de Maesschalck and N. Popovic.

53. "Front interactions in a three-component system," 2010, *SIAM Journal on Applied Dynamical Systems*, **9**, 292–332, with A. Doelman, P. van Heijster, and K. Promislow.

54. "A geometric approach to bistable front propagation in scalar reaction-diffusion equations with cut-off," *Physica D*, **239**, 1984–1999, with F. Dumortier and N. Popovic.

55. "Pinned fronts in heterogeneous media of jump type," 2011, *Nonlinearity*, **24**, 127–157, with P. van Heijster, A. Doelman, Y. Nishiura, and K.-I. Ueda.

56. "An elementary model of torus canards," 2011, *CHAOS*, **21**, 023131, with G.N. Benes, A.M. Barry, M.A. Kramer, and J. Burke.

57. "Stability and stabilization of the constrained runs schemes for equation-free projection to a slow manifold," 2012, *Discrete and Continuous Dynamical Systems A*, **32(8)**, 2759–2803, with A. Zagaris, C. Vandekerckhove, C.W. Gear, and I.G. Kevrekidis.

58. "Wave speeds for pushed fronts in scalar reaction-diffusion equations with cut-off," 2012, *RIMS Kokyuroku Bessatsu,* **B31**, 117–134, with F. Dumortier.

59. "Canards of mixed type in a neural burster," 2012, *Physical Review E*, **85**, article 021920, with M. Desroches, J. Burke, and M. A. Kramer.

60. "A showcase of torus canards in neuronal bursters," 2012, *Journal of Mathematical Neuroscience*, **2(3)**, with J. Burke, M. Desroches, A. M. Barry, and M. A. Kramer.

61. "Existence and stability of traveling pulses in a reaction-diffusion-mechanics system," 2012, *Journal of Nonlinear Science* **23**, 129–177, with M. Holzer and A. Doelman.

62. "Adiabatic stability under semi-strong interactions: the weakly damped regime," 2013, *Indiana University Mathematics Journal*, with T. Bellsky, A. Doelman, and K. Promislow.

63. "The dynamics of hybrid metabolic-genetic oscillators," 2013, *Chaos*, **23**, 013132, with E. Reznik and D. Segre.

64. "Energy transfer between the shape and volume modes of a nonspherical bubble," 2013, *Physics of Fluids A*, **25**, 062101, with A. Harkin and A. Nadim.

REFEREED JOURNAL MANUSCRIPTS IN PRESS:

65. "Geometric desingularization of a cusp singularity in slow-fast systems with applications to Zeeman's examples," in press *J. Dynamics and Differential Equations*, with H. Broer and M. Krupa.

66. "An analysis of the renormalization group method for asymptotic expansions with logarithmic switchback terms," in press, *Differential and Integral Equations*, with Matt Holzer.

REFEREED JOURNAL MANUSCRIPTS SUBMITTED:

"Wave speeds for the FKPP equation with enhancements of the reaction function," submitted to *Zeitschrift fur Angewandte und Mathematische Physik*, with Freddy Dumortier.

"Mixed-mode bursting oscillations: dynamics created by a slow passage through spike-adding canard explosions in a square-wave burster," submitted to *Chaos*, with Mathieu Desroches and Martin Krupa.

INVITED and REFEREED CHAPTERS IN BOOKS:

BC1. "Periodic orbits in singularly–perturbed systems," in *Nonlinear dynamics and pattern formation in the natural environment,* (A. Doelman and A van Harten, editors), Pitman Research Notes in Mathematics, 1995, pp.295–314, with C. Soto–Treviño.

BC2. "An introduction to geometric methods and dynamical systems theory for singular perturbation problems," in Analyzing Multiscale Phenomena Using Singular Perturbation Methods, Proceedings in Symposia on Applied Mathematics, volume **56**, editors R.E. O'Malley, Jr. and J. Cronin-Scanlon, pages 85–131 (American Mathematical Society, Providence, RI, 1999).

BC3. "Two-pulse solutions in the 1-D Gray-Scott model," with A. Doelman and W. Eckhaus, EquaDiff 99, B. Fiedler, ed. (World Scientific, Singapore, 2000).

BC4. "A primer on the Exchange Lemma for fast-slow systems," in *Multiple Time Scale Dynamical Systems*, *IMA Volumes on Mathematics and Its Applications*, volume **122**, C.K.R.T. Jones and A. Khibnik, eds., pages 65–88, (Springer-Verlag, New York, 2000) with C.K.R.T. Jones.

INVITED COLLOQUIA, SEMINARS and TALKS:

2012 tnd 2013 alks need to be listed here

Front interactions in systems with three time scales, International workshop on Localized mulit-dimensional patterns in rection-diffusion systems, Banff International Research Station, Canada, July 24-29, 2011.

Model reduction for large systems of chemical reactions, International Congress of Industrial and Applied Mathematics, Vancouver, Canada, July 17-21, 2011.

Transitions from spiking to bursting in neuronal oscillators: on the central role played by torus canards, SIAM DS11, Snowbird UT, May 22-26, 2011.

Transitions from spiking to bursting in neuronal oscillators: on the central role played by torus canards, MBI, Ohio State U, March 22-26, 2011.

Incorporating fluctuations in continuous models of fronts using cut-offs, International Conference on Far-From-Equilibrium Dynamics, RIMS, Kyoto University, Kyoto, Japan, January 4–8, 2011.

Dynamically-evolving fronts via a renormalization group approach, SIAM NW10, Philadelphia, PA, August 16-19, 2010.

Patterns in autocatalytic reactions and mathematical theory for far-from-equilibrium structures, International Workshop on Nanoscale Patterns in Physics, Genoa, Italy, July 26-27, 2010.

Front interactions in a three-component system, Joint Partial Differential Equations and Dynamical Systems Meeting, Catalonian Mathematical Society, Mathematical Society of Spain, and SIAM, Polytechnic University of Catalunya (Catalonia), Barcelona, Spain, May 31–June 4, 2010.

Pulses in the playground of the extended FitzHugh-Nagumo system, Frontiers in Applied and Computational Mathematics, May 21-23, 2010, NJIT.

Two talks on model reduction in chemistry and on renormalization group methods, SIAM Dyn. Sys. meeting, May 17–21, 2009

"Front dynamics using an RG method in three-component systems," Oberwolfach Mathematics Institute, Germany, Dec 14–20, 2008

"Front interactions in three-component systems," SIAM meeting on Nonlinear Waves and Coherent Structures, Rome, Italy, July 21–25, 2008

"Wave speeds in R-D equations with cutoffs," North Carolina State University, Feb 22, 2008

"Existence and stability of pulses in a three-component system," BU Dynamics seminar, November 26, 2007

"Existence and stability of pulses in a three-component system," SIAM meeting on Analysis of PDEs, Mesa, AZ, Dec 10-12, 2007

"The one higher-order lemma: A result at the heart of the ODE reduction methods," University of Leicester, Workshop on Reduction and Coarse Graining, Aug. 28–30, 2007.

"Wave speeds for reaction-diffusion equations with cutoffs," Center for Mathematics and Computer Science (CWI), Amsterdam, NL August 21, 2007

"Wave speeds for reaction-diffusion equations with cutoffs," Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, May 14–16, 2007

"Wave speeds for reaction-diffusion equations with cutoffs," International Conference on Dynamical Systems in honor of the 60-th birthday of Freddy Dumortier, University of Hasselt, Belgium, April 23–27, 2007

"A hierarchy of homoclinic bifurcations at the onset of self-replication," Semester on Dynamical Systems, MSRI, Berkeley, CA, January 27, 2007

"A hierarchy of homoclinic bifurcations at the onset of self-replication," SIAM Conference on Nonlinear Waves and Coherent Structures, Seattle, WA, September 11, 2006

"A hierarchy of homoclinic bifurcations at the onset of self-replication," SIAM Annual Meeting, Boston, MA, July 11, 2006

"Geometric desingularization and asymptotic analysis," International Workship on Limit Problems in Analysis, Lorentz Center, Leiden University, NL, May 4, 2006

"On the analysis of a certain renormalization group approach for ordinary differential equations with multiple scales," Dynamics of Nonlinear Waves Conference, University of Groningen, NL, April 24, 2006

"Pulse interactions and self-replication in activator-inhibitor type reaction-diffusion systems," Colloquium, Department of Mathematical Sciences, University of Montana, Missoula, February 24, 2006

"Analysis of the Chen-Goldenfeld-Oono renormalization group method for ordinary differential equations with multiple scales," August 24–27, 2005, International Workshop on Model Reduction and Coarse Graining for Multiscale Phenomena, Leicester, UK.

"Critical wave speeds for traveling waves," July 25, 2005 Mathematical Society of Japan, Tohoku University, Sendai, Japan.

"Analysis of the Chen-Goldenfeld-Oono renormalization group method for ordinary differential equations with multiple scales," July 24, 2005 Mathematical Society of Japan, Tohoku University, Sendai, Japan.

"Pulse dynamics in activator-inhibitor systems: an overview," July 21, 2005, Kyushu University, Fukuoka, Japan.

"On the dynamics of gas bubbles in Newtonian liquids," December 14, 2004, Center for Mathematics and Information Science (CWI), Amsterdam, the Netherlands.

"Self-similar, blow-up solutions of the Nonlinear Schrodinger equation," November 29, 2004, Lefschetz Center on Dynamical Systems Seminar, Brown University.

"Self-similar, blow-up solutions of the Nonlinear Schrodinger equation," October, 2004, CIRM (Centre International de la Recherche Mathematique) Luminy, France.

"Pulse interactions and self-replication in coupled reaction-diffusion systems," April 20, 2004 Applied Mathematics Seminar, University of Delaware. "An analysis of the CSP reduction method," August 26–29, 2003, International Workshop on Invariance and Model Reduction for Multiscale Phenomena, ETH Zurich, Switzerland.

"Semi-strong pulse interactions," August 9–16, 2003 Banff International Research Station, Alberta, Canada.

"Pulse dynamics in coupled reaction-diffusion equations," May 13, 2003 Applied Mathematics Colloquium, University of Massachusetts, Amherst.

"Semi-strong pulse interactions in a class of reaction-diffusion equations," January 21, 2003, Mathematische Forschungsinstitut Oberwolfach, Germany.

"Semi-strong pulse interactions in a class of reaction-diffusion equations," November 26, 2002, Research Institute for the Mathematical Sciences, Kyoto University, Kyoto, Japan.

"Pulse dynamics in coupled reaction-diffusion equations," Brown University special workshop organized by C.K.R.T. Jones, June 2002

"The dynamics of the irreversible Gray-Scott model," Boston University, Dynamics Seminar, September, 17, 2001.

"Nonlinear dynamics of the irreversible Gray-Scott model," August 30–September 7, 2001, Lorentz Center, University of Leiden, NL.

"Mildly strong pulse interaction in coupled reaction-diffusion equations," SIAM Dynamical Systems meeting, May 2001.

"Pulse dynamics in coupled reaction-diffusion equations," AMS Sectional Meeting # 966, April 28-29, 2001.

"Annular rings: existence and stability," AMS Sectional Meeting # 966, April 28-29, 2001.

"Annular rings and their destabilization into spots in the 2-D Gray-Scott model," March 20, 2001, Lorentz Center, University of Leiden, NL

"Time-periodic front dynamics in a model of Proteus mirabilis colonies," Nonlinearity in Amsterdam, Free University of Amsterdam, March 23, 2001.

"Pulses in pattern formation: existence, stability, and self-replication," Applied Math. Colloquium, University of Arizona, Tucson, February 16, 2001.

"Analysis and asymptotics of self-replicating patterns," Mathematics Colloquium, University of Houston, February 1, 2001.

"Strong pulse interactions in activator-inhibitor systems," Mathematics Colloquium, Worcester Polytechnic Institute, Dec. 1, 2000

"Reductions for coupled reaction-diffusion equations," Argonne National Lab., June 26, 2000.

"Strong pulse interactions in coupled reaction-diffusion systems," University of Notre Dame, AMS Sectional Meeting # 953, April 8-9, 2000.

"Strong pulse interactions in coupled reaction-diffusion systems," Department of Mathematics, Duke University, January 24, 2000.

"Slowly-modulated two-pulse solutions and pulse-splitting in the 1-D Gray-Scott model," Applied Analysis Seminar, Indiana University, November 1999.

"Modulated two-pulse solutions and pulse splitting," International Conference on Differential Equations, Berlin, Germany, August 1-7, 1999.

"Yannacopolous, *et al.*, revisited," Reduced Mechanisms and Turbulent Combustion Workshop, Argonne National Laboratory, June 2-4, 1999.

"Pulse splitting bifurcations in the 1-D Gray-Scott model," Reaction-Diffusion Workshop, Division of Applied Mathematics, Brown University, February 26, 1999.

"Singular perturbation theory for reduced manifolds," Division of Mathematics and Computer Science, Argonne National Laboratory, January, 1999.

"An overview of pattern formation in the 1-D Gray-Scott model," Department of Aerospace and Mechanical Engineering, Boston University, December 7, 1998.

"Slowly-modulated two pulse solutions," P.D.E. Seminar, Brown University, November 3, 1998.

"Periodic front dynamics in a reaction-diffusion system," Korteweg-deVries Institute, University of Amsterdam, the Netherlands, October, 1998.

"Singular solutions, modulating pulses, and pulse replication in the 1-D Gray-Scott model," Conference on Asymptotics for Ordinary Differential Equations, Centre International de Rencontres Mathematiques, Luminy, France, June 8-12, 1998.

"Stability of large-amplitude pulse solutions in the 1-D Gray-Scott model: matched asymptotic and Evans function approaches," Conference on Recent Advances in Stability Theory of Nonlinear Waves, Compton, Rhode Island, May 18-20, 1998.

"Geometry of singular solutions and self-replicating pulses in the 1-D Gray-Scott model," Manhattan, KS, March 27-28, 1998.

"Turing patterns and pulse-replication in the 1-D Gray-Scott model," Applied Analysis Seminar, University of Utrecht, March, 1998.

"Geometric methods for singular perturbation problems," Annual Meeting of the American Mathematical Society, Baltimore, MD, January 1998.

"Existence and stability of patterns in the 1-D Gray-Scott model," Mathematics Colloquium, University of Pittsburgh, December 12, 1997.

"New results on the Exchange Lemma," International Conference on Singular Perturbation Theory, Institute for Mathematics and Its Applications, Minneapolis, MN, October 27-31, 1997.

"Existence and formal stability for some singular solutions in the 1-D Gray-Scott model," International Conference on Multibump Solutions, Leiden, the Netherlands, October 6-8, 1997.

"Turing patterns in the Gray-Scott system: stable pulses and self-replication," Dynamics Seminar, Boston University, September 29, 1997.

"Stability of singular solutions in the one–dimensional Gray–Scott model," SIAM Dynamical Systems Meeting, Snowbird, Utah, May 18-22, 1997.

"Stationary patterns in the 1-D Gray-Scott model," Mathematics Colloquium, New Jersey Institute of Technology, March 14, 1997.

"Pattern formation in the one–dimensional Gray–Scott model," SIAM Annual Meeting, Kansas City, MO, July 22–26, 1996.

"Stationary and traveling patterns in the one–dimensional Gray-Scott model," Symposium on Current and Future Directions in Applied Mathematics, University of Notre Dame, South Bend, IN, April 18–21, 1996.

"Split–operator methods and dynamical systems theory," and "Periodic orbits in singularly–perturbed systems," (**2** talks) International Dynamical Systems Conference in honour of Johan Bernoulli, Groningen, the Neth., December 11–15, 1995

"On the Broutman and Young model for scattering of small-scale oceanic internal waves by large-scale wavepackets," Mechanical Engineering Seminar, M.I.T., November 14, 1995.

"Multi-bump homoclinic orbits in perturbed $N-$degree-of-freedom Hamiltonian systems," Mathematics Department Colloquium, Virginia Polytechnical University, November 10, 1995.

"Travelling waves in a pair of coupled reaction-diffusion equations," Applied Analysis Colloquium, University of Massachusetts at Amherst, November 7, 1995.

"Hyperbolicity in near–integrable N degree-of-freedom Hamiltonian systems," AMS Regional Meeting # 903, Boston, MA October 7–8, 1995.

"Multi-bump orbits homoclinic to resonance bands," Third International Congress on Industrial and Applied Mathematics, Hamburg, Germany, July 3-7, 1995.

"Scattering of oceanic internal waves," Physics Department Seminar, University of Utrecht, The Netherlands, June 8, 1995.

"Periodic orbits in singularly-perturbed Hamiltonian systems," Third SIAM Dynamical Systems Conference, Snowbird, Utah, May 21-25, 1995.

"Multiple-pulse solutions in singularly-perturbed systems," AMS Regional Meeting (# 898), Hartford, Connecticut, March 3-5, 1995.

"A blinking vortex-uniform stream flow," Seminar, Center for Physics and Biology, Rockefeller University, New York City, December 1, 1994.

"Matched asymptotic and geometric approaches to singular perturbation problems," Colloquium, Department of Mathematical Sciences, University of Wisconsin, Milwaukee, November 21, 1994.

"$N-$th order operator splitting schemes and nonreversible systems," Mathematics Colloquium, Rensselaer Polytechnic Institute, October 24, 1994.

"Dynamics in and transverse to resonances in coupled oscillators," Dynamics Seminar, Boston University, October 17, 1994.

"Tracking invariant manifolds," SIAM National meeting, San Diego, California, July 25-29, 1994.

"Multiple pulse homoclinic orbits in perturbed Hamiltonian systems," International Conference on Nonlinear Dynamics and Pattern Formation, The Netherlands, July 4-7, 1994.

"Multi-bump orbits homoclinic to resonance bands in near-intergable Hamiltonian systems," Northeast Dynamics meeting, Stony Brook, New York, April 22-24, 1994.

"A blinking vortex-uniform stream flow," Fluids Mechanics Seminar, Brown University, February 15, 1994.

"Scattering of small-scale oceanic internal waves by near-inertial wavepackets," Applied Mathematics Seminar, Boston University, September 29, 1993.

"Scattering of small-scale oceanic internal waves by near-inertial wavepackets," Colloquium, C.N.L.S., Los Alamos National Lab., New Mexico, August 17, 1993.

"The exchange lemma and singular perturbations," Differential Equations Conference, Ohio University, Athens, Ohio, August 3-7, 1993.

"On the geometry of chaos in adiabatic Hamiltonian systems," Differential Equations Seminar, University of Connecticut, October 23, 1992.

"EXSEL and multiple fast jump homoclinic orbits," Second SIAM Dynamical Systems Conference, Snowbird, Utah, October 15-19, 1992.

"An analytical study of mixing in low Reynolds number flows: the eccentric journal bearing," Fluid Mechanics Seminar, Mechanical and Aeronautical Engineering, Boston University, October 6, 1992.

"On the geometry of chaos in adiabatic Hamiltonian systems," Dynamics Seminar, Tufts University, September 25, 1992.

"Singularly-perturbed dynamical systems theory applied to flows exhibiting large-scale chaos," SIAM National meeting, Los Angeles, California, July 20-24, 1992.

"On the geometry of separatrix-swept regions of singularly-perturbed Hamiltonian systems," International Conference on Hamiltonian Systems, Cincinnati, Ohio March 25-28, 1992.

"On the geometry of chaos in adiabatic Hamiltonian systems," Dynamics Seminar, Boston University, February 7, 1992.

"Large-scale chaotic mixing in a Stokes flow: the eccentric journal bearing," Fluid Mechanics Seminar, Brown University, November 1991.

"On the geometry of separatrix-swept regions of singularly-perturbed Hamiltonian systems," Dynamics Seminar, Lefschetz Center, Brown University, September 16, 1991.

"Lobe area in perturbed Hamiltonian systems," Colloquium, C.N.L.S., Los Alamos National Lab., New Mexico, July 1991.

"Lobe area in adiabatic Hamiltonian systems," Nonlinear Science: The Next Decade Conference, Los Alamos, New Mexico, May 21-25, 1990.

"On the geometry of separatrix-swept regions of singularly-perturbed Hamiltonian systems," Colorado Days, University of Colorado, Boulder, Colorado, April 1990.

PROFESSIONAL: Referee for manuscripts submitted to the archival journals: *Journal of Mathematical Biology, Bulletin of Mathematical Biology, Journal of Nonlinear Science, Journal of Fluid Mechanics, Journal of Theoretical Biology, Physica D, Nonlinearity, SIAM Journal on Applied Mathematics, SIAM Journal on Mathematical Analysis, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, SIAM Review, Journal of Nonlinear Science, Methods and Applications of Analysis, Journal of Differential Equations, Journal of Dynamics and Differential Equations, Physics of Fluids, Physical Review Letters, Physical Review E, Physics Letters A, Zeitschrift fur Angewandte Mathematik und Physik, Dynamics Reported, Chaos, London Mathematical Society, Journal of Atmospheres and Oceans, Journal of Applied Mechanics, Quarterly of Applied Mathematics, Nonlinear Dynamics, Differential and Integral Equations, IMA Journal on Applied Mathematics, Journal of the American Optics Society B, IEEE Circuits and Systems, Computers and Mathematics.*

Fellow of the American Mathematical Society (AMS), Member of the American Physical Society (APS), and Fellow of the Society for Industrial and Applied Mathematics (SIAM)

August, 2013