RACHEL A. KUSKE

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RESEARCH INTERESTS

General interests: Mathematical modeling, stochastic processes and nonlinear dynamics, asymptotics and semi-analytic approximations, mathematics in industry
Specific interests: Noise sensitivity, heterogeneity, and localization in nonlinear systems, primarily focusing on structures, lasers, cell dynamics, and reaction-diffusion systems
Free boundary problems in mathematical finance

APPOINTMENTS

9/00 -	Associate Professor of Mathematics, University of Minnesota
9/01 -	Associate Director, Minnesota Center for Industrial Mathematics, University of Minnesota
9/97 - 8/00	Assistant Professor of Mathematics, University of Minnesota
9/96 - 8/97	Assistant Professor of Mathematics, Tufts University
7/92-5/93,7/94-5/96	National Science Foundation Postdoctoral Research Fellowship Host Scientist: Joseph B. Keller, Stanford University
1992-93,94-95	Szegö Assistant Professorship at Stanford University
7/93-6/94	NSF-NATO Postdoctoral Fellowship in Science and Engineering Host Scientist: Wiktor Eckhaus, University of Utrecht

PUBLICATIONS

R. Kuske and S. Baer, "Asymptotic analysis of noise sensitivity in a neuronal burster", *Bull. Math. Bio.*, to appear.

J.D. Evans, R. Kuske, and J.B. Keller,"American options on assests with dividends near expiry", *Math. Finance*, to appear.

C.J. Budd, G.W. Hunt, R. Kuske," Asymptotics of cellular buckling close to the Maxwell load", *Proc. Royal Soc.*, **457** 2001, 2935-2964.

R. Kuske, "Asymptotic analysis of noise-amplified oscillations for subcritical delays", *Differential Equations and Dynamical Systems*, to appear.

R. Kuske and J.B. Keller, "Rate of convergence to a stable law", *SIAM J. Appl. Math*, **61** (2000), 1308-1323.

R. Kuske, "Gradient particle solutions of Fokker-Planck equations for noisy delay bifurcations", *SIAM J. Sci. Comp.*, **22** (2000), 351-367.

R. Kuske, "Probability densities for noisy delay bifurcations", *J. Stat. Phys.* **96** (1999), 797-816.

R. Kuske and P. Milewski, "Modulated two-dimensional patterns in reaction-diffusion systems", *Euro. J. Appl. Math.* **10** (1999), 157-184 .

R. Kuske and J. B. Keller, "Optimal exercise boundary for an American put option", *Applied Mathematical Finance* **5** (1998), 107-116.

R. Kuske and G. Papanicolaou, "The invariant density of a chaotic dynamical system with small noise", *Physica D* **120** (1998), 255-272.

R. Kuske and T. Erneux, "Bifurcations of localized oscillations", *Euro. J. Appl. Math.* **8** (1997), 389-402.

R. Kuske and T. Erneux, "Localized synchronization of two coupled solid state lasers", *Optics Communications*, **139** (1997), 125-131.

R. Kuske and J.B. Keller, "Large deviation theory for stochastic difference equations", *Euro. J. Appl. Math.*, **98** (1997),567-580.

W. Eckhaus and R. Kuske, "Pattern formation in systems with slowly varying geometry", *SIAM J. Appl. Math.* **57** (1997), 112-152.

A.J. Bernoff, R. Kuske, B.J. Matkowsky, and V. Volpert, "Mean field effects for traveling wave solutions of reaction-diffusion equations", *SIAM J. Appl. Math* **55** (1995), 485-519.

R. Kuske and B.J. Matkowsky, "Two dimensional cellular burner-stabilized flames", *Quarterly of Appl. Math.*, **52** (1994), 665-688.

R. Kuske and B.J. Matkowsky, "On roll, square, and hexagonal cellular flames", *Euro. J. Appl. Math.*, **5** (1994), 65-93.

R. Kuske, Z. Schuss, I. Goldhirsch, S.H. Noskowicz, "Schrödinger's equation on a one dimensional lattice with weak disorder", *SIAM J. Appl. Math*, **53** (1993), 1210-1252.

R. Kuske, "Wave localization in a one dimensional random medium", *Random and Computational Dynamics* **1** (1992), 147-196.

A. Bayliss, R. Kuske, and B.J. Matkowsky, "A two-dimensional adaptive pseudo-spectral method", *Journal of Computational Physics*, **91** (1990), 174-196.

Preprints

R. Kuske and S. Baer, "Asymptotic analysis of noise sensitivity in a neuronal burster", in review.

R. Kuske, T. Erneux, B. Forsmann, and M. Möller , "Enhanced localized synchronization of two coupled lasers", 1999.

In Preparation:

R. Kuske and M. Ward,"Stochastic differential equations for noisy metastable interface dynamics".

R. Kuske and M. Klosek, "Noise-induced transitions in delay-differential equations".

Conference papers:

A. Doelman, W. Eckhaus, R. Kuske, R. Schielen, "Pattern formation in systems on spatially periodic domains", in *Nonlinear Dynamics and Pattern Formation in the Natural Environment*, A Doelman and A. van Harten, eds., Longman,1995. *ICPF '94 Proceedings.*

R. Kuske and T. Erneux, "Localization in systems of non-identical oscillators" in *ICIAM95 Proceedings*, K. Kirchgaessner, O. Mahrenholtz and R Mennicken, eds., Mathematical Research, Akademie Verlag Berlin,1996.

T. Erneux, R. Kuske, T. W. Carr, "Mathematical studies of coupled lasers", in *Laser Optics'95: Nonlinear Dynamics in Lasers*, N.B. Abraham, Y.I. Khanin, eds., Proc. SPIE 2792, 1996.

R. Kuske, D. Lyder, J. Samuel, C. Soteros, D. Wolfe, "VisionSmart: The Egg Candling Problem", Proceedings for PIMS Industrial Workshop, Calgary, Alberta, Canada, 1998.

Working paper:

R. Kuske and J. Michalek, "Application of the optimal control theory for an analysis of meat quality in pork production", Working Paper, Dept. of Agr. Econ, Univ. of Kiel, Kiel, Germany, 1995.

AWARDS AND GRANTS

5/97-6/03	National Science Foundation Grant in Applied Mathematics
5/01	Office of University Women - Special Grant
1/00	National Security Agency - IMA Mathematical Modeling in Industry Workshop
1/98	McKnight Land Grant Professorship
1/97	Tufts University Mellon Grant Research Semester Fellowship
11/96	Tufts University Faculty Research Summer Grant 1997
6/95	Harold M. Bacon Memorial Teaching Award, Department of Math, Stanford University
9/91-5/92	Alfred P. Sloan Doctoral Dissertation Fellowship
9/88-8/91	National Science Foundation Graduate Fellowship

OTHER PROFESSIONAL EXPERIENCE

2001-	Coordinator: Association for Women in Math Mentor Network
1997-	Minnesota Center for Industrial Mathematics activities: Supervising graduate students and postdocs on mathematical research in industrial problems.
2000-2001	Supervisor for Research Experience for Undergraduates (5 students)
1998, 2000	Advisor for Math Modeling and Industrial Problems Workshops, Pacific Institute for Mathematics, Vancouver, Canada
2001	Course Revision: Mathematics of Industrial Problems
1998-2000	Complete Course Revision *Elementary PDE's*, Applied PDE course for engineering graduate and undergraduate students
1998-1999	Course Revision: Mathematical Modeling

Co-organizer of workshops/minisymposia on:

2000 IMA Math Modeling in Industry

1999 *Noise-sensitive dynamical systems* and *Dynamics and Nonlinear ODEs in Industrial Applications* SIAM DS99, Snowbird, Utah

1997 *Noisy Dynamical Systems*, SIAM Annual Meeting, Stanford

1996 *Stochastic Phenomena in Physics and Chemistry*, SIAM Annual Meeting, Kansas City

1994 *Reaction-Diffusion Equations and Applications*: ICPF '94, Noordwijkerhout, The Netherlands

EDUCATION

Department of Engineering Sciences and Applied Mathematics
Northwestern University, Evanston, Illinois 60208
Ph. D. awarded 6/92
University of Wisconsin, Green Bay
B.S. in mathematics awarded 5/87, Summa Cum Laude

PERSONAL INFORMATIION

US Citizen