MICHAŁ KOWALCZYK

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ACADEMIC DEGREES

Jan. 1991-Aug. 1995

Ph. D., Mathematics, University of Tennessee-Knoxville.

Research Area: singular perturbation problems, phase transition phenomena, dynamics of transition layers, finite dimensional dynamical systems in PDE

Thesis: *Study of the Equilibria of Parabolic Differential Equations With Interfaces Intersecting the Boundary*

Advisor: Professor Nicholas D. Alikakos

Oct. 1983-July 1988

M. S., Mathematics University of Warsaw, Poland

Research Area: dynamical systems, functional differential equations, mathematical ecology

Thesis: *Mean Value Property for the Ecological Models With Time Delay* (in polish)

Advisor: Professor Witold Szlenk

ACADEMIC POSITIONS

July. 2001-present

Assistant Professor, Kent State University

Research: parabolic equations and systems, singular perturbation problems, diffusion mediated transport

Teaching: Methods of Mathematical Modeling, Seminar in Mathematical Modeling

Jan. 2001-June 2001	**Assistant Professor**, University of Nevada-Reno Research: parabolic equations and systems, singular perturbation problems, diffusion mediated transport Teaching: Undergraduate Calculus
Jan. 1999-Dec. 2000	**National Science Foundation Postdoctoral Fellowship** (tenure continued at Carnegie Mellon University) Research: parabolic equations and systems, singular perturbation problems, diffusion mediated transport Teaching: Graduate level ODE, Advanced Calculus, Optimization
Jan. 1998-Dec. 1999	**Postdoctoral Research Associate**, Center of Nonlinear Analysis, Carnegie Mellon University Research: motion of grain boundaries, parabolic equations and systems, singular perturbation problems Teaching: Undergraduate Calculus
Aug. 1997-Dec. 1997	**National Science Foundation Postdoctoral Fellow**, University of Utah Sponsoring Scientist: Paul Fife Research: existence and stability of equilibria in a class of nonlocal models arising in biochemistry, parabolic equations and systems
Sep. 1995-June 1997	**Visiting Assistant Professor**, University of Minnesota, School of Mathematics Research: singular perturbation problems, parabolic equations and systems, existence and dynamics of geometric patterns Teaching: graduate course on special topics in PDE's: *Geometric laws of motion induced by singularly perturbed reaction-diffusion equations*, Undergraduate Calculus and College Algebra

Jan. 1991-Aug. 1995	**Teaching Assistant**, University of Tennessee, Department of Mathematics
	Research: existence of equilibria in singular perturbation problems, finite dimensional dynamics in PDE's
	Teaching: Undergraduate Calculus, Statistics

SHORT TERM POSITIONS

July 1999-June 1999	**Visiting Scholar**, University of Chile, Santiago, Chile
May 1998-June 1998	**Visiting Scholar**, University of Chile, Santiago, Chile
June 1997-Aug. 1997	**Visiting Scholar**, University of Chile, Santiago, Chile

AWARDS

June 1997-	**National Science Foundation Postdoctoral Fellowship DMS-9705972**
June 1996-June 1997	**National Science Foundation Grant DMS-9401333 (supplement)**
Jan. 1992-Aug. 1995	**Science Alliance Grant,** (joint program at the University of Tennessee Centers of Excellence and Oak Ridge National Laboratory)

CONFERENCE TALKS

August 2003	Workshop on Calculus of Variations, The Fields Institute, Toronto
January 2003	Pan-American Advanced Studies Institute 2003, Santiago
November 2002	Workshop Invasion Phenomena in Biology and Ecology, Paris
October 2002	SIAM Conference: Computational Models and Simulation for Intra-Cellular Processes, Washington D.C.
July 2002	Concentration Phenomena in Singular Perturbation Problems, Universidad de Chile, Santiago
August 2001	Segundo Encuentro Nacional de EDP y sus Aplicaciones, Universidad de Chile, http://media.cec.uchile.cl/cmm
July 2001	Workshop on "Nonlinear Elliptic Equations and Transition Phenomena", Newton Institute, Cambridge

June 2001	Fourth European Conference on Elliptic and Parabolic Equations, Rolduc, The Netherlands
March 2001	Workshop on "Singular limits of reaction-diffusion equations: interfaces and spikes" Lorentz Center, University of Leiden
November 2000	11th Takeda Science Foundation Symposium on Bioscience (poster presentation)
March 2000	Equations aux Dérivées Partielles Non Linéaires: Frontières libres, Interfaces et Singularités, Université de Paris-Sud
January 2000	USA-Chile Workshop on Nonlinear Analysis, Viña del Mar, Chile
December 1999	Workshop: "Journée d'Analyse non Linéaire", Université de Paris-Sud
November 1999	Workshop: "Singularities arising in nonlinear problems '99", Kyoto, Japan
July 1999	Minisymposium talk at ICIAM 99, Edinbourgh, Scotland
June 1999	Euroconference in Dynamics of Patterns, Crete, Greece
October 1997	Minisymposium talk at the AMS Regional Meeting, Milwaukee
May 1997	Minisymposium talk at the SIAM Conference, Philadelphia
CITIZENSHIP	Polish
IMMIGRATION STATUS	US Permanent Resident
DATE OF BIRTH	11/16/1963

PUBLICATIONS

1. X. Chen, M. Kowalczyk, *Existence of equilibria for the Cahn-Hilliard equation via local minimizers of the perimeter*, Comm. Partial Diff. Eqs. **21**, (1996), 1097–1123.

2. N. Alikakos, G. Fusco, M. Kowalczyk, *Finite dimensional dynamics and interfaces intersecting boundary*, Indiana Univ. Math. Jour., Vol. 45, No. 4 (1996), 1119–1155.

3. M. Kowalczyk, *Exponentially slow dynamics and interfaces intersecting the boundary*, Jour. Diff. Eqs., **138**, No. 1 (1997), 55–85.

4. M. Kowalczyk, *Multiple spike layers in the shadow Gierer-Meinhardt system: existence of equilibria and approximate invariant manifold*, Duke Math. Jour., Vol. 98, No. 1, (1999), 59–111.

5. N. Alikakos and M. Kowalczyk, *Critical points of a singular perturbation problem via reduced energy and local linking*, Jour. Diff. Eqns. **159** (1999), 403–426.

6. P. Fife, M. Kowalczyk, *A class of pattern forming models*, Jour. of Nonlinear Science, Vol. 9 (1999), 641–669.

7. D. Kinderlehrer, M. Kowalczyk, *Remarks about diffusion mediated transport*, Ricerche di Matematica, Vol XLIX (2000), Supplemento, 305–318.

8. X. Chen, M. Kowalczyk, *Slow Dynamics of Interior Spikes in the Shadow Gierer-Meinhardt System*, Advances in Diff. Eqns., Vol 6, No 7, July 2001, 847–872.

9. X. Chen, M. Kowalczyk, *Spike dynamics in the Gierer-Meinhardt system*, SIAM J. Math. Anal. vol. 33 (1) (2001), 172–193.

10. M. del Pino, M. Kowalczyk, X. Chen, *The Gierer & Meinhardt system: the breaking of homoclinics and multi-bump ground states*, Comm. Contemp. Math. 3 (3) (2001), 419–439

11. D. Kinderlehrer, M. Kowalczyk, *Diffusion mediated transport and the flushing ratchet*, Arch. Rat. Mech. Anal., 161 (2002), 149–179.

12. M. del Pino, P. Felmer, M. Kowalczyk, *Boundary spikes in the Gierer-Meinhardt system*, Comm. Pure Appl. Anal. Vol 1, No 4, (2002) 437–456.

13. M. del Pino, M. Kowalczyk, J. Wei, *Multi-bump ground states of the Gierer-Meinhardt system in* $\mathbf{R}^2$*,* Annal. Inst. H. Poincaré Vol 1 (2003) 53–85.

14. D. Heath, D. Kinderlehrer, M. Kowalczyk, *Discrete and continuous ratchets: from coin toss to molecular motor*, Discr. Cont. Dyn. Sys. Vol 2, 2 (2002) 1–15.

15. M. Kowalczyk, *On the existence and Morse index of solutions to the Allen-Cahn equation in two dimensions*, to appear Ann Mat Pura et Aplicata.

16. M. Chipot, D. Kinderlehrer, M. Kowalczyk, *A Variational Principle for Molecular Motors*, Meccanica **38** (2003), 505–518.

17. J. Dolbeault, D. Kinderlehrer, M. Kowalczyk, *The flashing ratchet: long time behavior and dynamical systems interpretation*, submitted.