

JOHN A. PELESKO

EDUCATION

1992 - 1997 New Jersey Institute of Technology Newark, NJ
Ph.D. Mathematical Sciences

- Thesis Title: Diffusive and Wavelike Phenomena in Thermal Processing of Materials
- Thesis Advisor: Gregory A. Kriegsmann

1992 University of Massachusetts Boston, MA
B.S. Pure Mathematics, Cum Laude, Distinction in Pure Mathematics

PROFESSIONAL EXPERIENCE

2002 - Present University of Delaware Newark, DE
Assistant Professor

- Instructor for undergraduate courses in mathematical modeling, differential equations and linear algebra. Founder and director of the MEC Lab (Modeling, Experiment and Computation), an applied mathematics laboratory. Actively pursuing research interests in asymptotic methods, mathematical modeling and scientific computing. Currently studying a variety of problems related to the design and function of microelectromechanical and nanoelectromechanical systems (MEMS and NEMS).

1999 - 2002 Georgia Institute of Technology Atlanta, GA
Assistant Professor

- Instructor for a graduate course in industrial mathematics. Instructor for an undergraduate course in mathematical methods and an undergraduate calculus course. Co-founder of the ACE Lab (Analysis, Computation and Experiment), an applied mathematics laboratory. Actively pursued research interests in asymptotic methods, mathematical modeling and scientific computing. Studied a variety of problems related to the design and function of microelectromechanical and nanoelectromechanical systems (MEMS and NEMS).

1997 - 1999 California Institute of Technology Pasadena, CA
Von Karman Instructor

- Instructor for a year long graduate course in perturbation methods, 1997-1998, and a year long course in methods of applied mathematics, 1998-1999. Actively pursued research interests in asymptotic methods, mathematical modeling and scientific computing. Studied a variety of

problems arising in materials science and materials processing. Began studying MEMS and NEMS devices.

ADDITIONAL EXPERIENCE

New Jersey Institute of Technology, Newark, NJ, Research Assistant and Teaching Assistant

May 1994 - May 1997 Research assistant to Professor Gregory A. Kriegsmann. Modeled and analyzed a sequence of industrial problems arising in the thermal processing of materials.

Summer 1993 Research assistant to Professor Bruce Bukiet. Aided in the development and testing of a new numerical method applicable to first order nonlinear hyperbolic partial differential equations.

September 1992 - May 1994 Teaching assistant in the mathematics department. Conducted weekly recitation sections and tutored students in pre-calculus through advanced calculus in the University Learning Center. Instructor for two terms of undergraduate pre-calculus.

COURSES TAUGHT

University of Delaware – Math 341, Differential Equations with Linear Algebra, Math 810, Asymptotic and Perturbation Methods, Math 351, Engineering Mathematics II, Math 512, Contemporary Applications of Mathematics, Math 243, Calculus II, Math 518, Mathematical Models and Applications, Math 824, Special Topics in Applied Mathematics.

Georgia Institute of Technology - Math 6514, Industrial Mathematics, Math 6515, Industrial Mathematics II, Math 4581, Classical Mathematical Methods in Engineering, Math 1502, Calculus II.

California Institute of Technology - AMa 151, Perturbation Methods, AMa 101, Methods of Applied Mathematics.

New Jersey Institute of Technology - MA 103, University Mathematics, MA 222, Ordinary Differential Equations.

HONORS

Outstanding Alumni Award, New Jersey Institute of Technology, May 2003.

Best Paper in Section, AIChE Student Conference, Bridgewater, NJ, March 1997.

Best Paper in Section, SIAM Student Conference and SEAS Meeting, Clemson, SC, March 1996.

Distinction in Pure Mathematics, University of Massachusetts, Boston, MA, June 1992.

JOURNAL PUBLICATIONS

- B. Bukiet, J.A. Pelesko, X.L. Li and P.L. Sachdev, "A Characteristic Based Numerical Method with Tracking for Nonlinear Wave Equations," *Computers and Mathematics with Applications*, v. 31, no. 7, pp. 75-99, 1996.
- J.A. Pelesko and G.A. Kriegsmann, "Microwave Heating of Ceramic Laminates," *The Journal of Engineering Mathematics*, v. 32, pp. 1-18, 1997.
- P. Guidotti and J.A. Pelesko, "Transient Instability in Case II Diffusion," *Journal of Polymer Science, Part B*, v. 36, pp. 2941-2947, 1998.
- J.A. Pelesko, "Nonlinear Stability Considerations in Thermoelastic Contact," *ASME Journal of Applied Mechanics*, v. 66, pp. 109-116, 1999.
- J.A. Pelesko and G.A. Kriegsmann, "Microwave Heating of Ceramic Composites," *IMA Journal of Applied Mathematics*, v. 64, pp. 39-50, 2000.
- J.A. Pelesko, "Nonlinear Stability, Thermoelastic Contact and the Barber Condition," *ASME Journal of Applied Mechanics*, v. 68, pp. 28-33, 2001.
- J.A. Pelesko and A.A. Triolo, "Nonlocal Problems in MEMS Device Control," *Journal of Engineering Mathematics*, v. 41, pp. 345-366, 2001.
- D.D. Quinn and J.A. Pelesko, "Generic Unfolding of the Thermoelastic Contact Instability," *International Journal of Solids and Structures*, v. 39, pp. 145-157, 2002.
- J.A. Pelesko, "Mathematical Modeling of Electrostatic MEMS with Tailored Dielectric Properties," *SIAM Journal on Applied Mathematics*, v. 62, pp. 888-908, 2002.
- J.A. Pelesko and X.Y. Chen, "Electrostatically Deflected Circular Elastic Membranes," *Journal of Electrostatics*, v. 57, pp. 1-12, 2003.
- S. Ai and J.A. Pelesko, "Periodic Solutions of a Canonical MEMS/NEMS Model," *Discrete and Continuous Dynamical Systems*, in press.
- J.L. Jordan, J.A. Pelesko, and N.N. Thadani, "A Predictive Kinetics-Based Model for Solid State Reaction Synthesis of Ti_3SiC_2 ," *Journal of Materials Research*, in press.
- J.A. Pelesko, "Generalizing the Conway-Hofstadter $\$10,000$ Sequence," *Journal of Integer Sequences*, v. 7, Article 04.3.5, 2004.
- J.A. Pelesko and G. Goldsztein, "Modeling Constrained Capacitive Systems," invited contribution to *Journal of Computational and Theoretical Nanoscience*, in press.

J.A. Pelesko, M. Cesky, and S. Huertas, "Lenz's Law and Dimensional Analysis," *American Journal of Physics*, v. 73, p. 37, 2005.

J.A. Pelesko and T.A. Driscoll, "Approximations in Canonical Electrostatic MEMS Models," *Journal of Engineering Mathematics*, submitted October 2004.

BOOKS AND BOOK CHAPTERS

J.A. Pelesko and D.H. Bernstein, *Modeling MEMS and NEMS*, CRC Press, November 2002.

J.A. Pelesko, "Electrostatics in MEMS and NEMS," an invited contribution to *Trends in Nanoscale Mechanics: Analysis of Nanostructured Materials and Multi-Scale Modeling*, Kluwer, 2003.

J.A. Pelesko, "Modeling MEMS and NEMS," an invited contribution to *The Electrical Engineering Handbook*, CRC Press, 2004.

REFERRED PROCEEDINGS

J.A. Pelesko and G.A. Kriegsmann, "Microwave Heating of Ceramic Laminates," *Materials Research Society Symposium Proceedings*, Pittsburgh, P.A., pp. 184-189, Materials Research Society, April 1996.

D. Bernstein, P. Guidotti and J.A. Pelesko, "Mathematical Analysis of Electrostatically Actuated MEMS Devices," *Proceedings of MSM 2000*, San Diego, CA, pp. 489-492, 2000.

J.A. Pelesko and A.A. Triolo, "Nonlocal Problems in MEMS Device Control," *Proceedings of MSM 2000*, San Diego, CA, pp. 509-512, 2000.

J.A. Pelesko, "Multiple Solutions in Electrostatic MEMS," *Proceedings of MSM 2001*, Hilton Head, SC, pp. 290-293, 2001.

J.A. Pelesko, "Electrostatic Field Approximations and Implications for MEMS Devices," *ESA 2001 Proceedings*, pp. 126-137.

J.A. Pelesko, D.H. Bernstein, and J. McCuan, "Symmetry and Symmetry Breaking in Electrostatic MEMS," *Proceedings of MSM 2003*, pp. 304-307, 2003.

G. Flores, G.A. Mercado, and J.A. Pelesko, "Dynamics and Touchdown in Electrostatic MEMS," *Transactions of ASME 2003*, pp. 1-8, 2003.

J.A. Pelesko and G. Goldsztein, "Electrostatic Deflection of Volume Constrained MEMS," *Proceedings of ICMENS 2003*, pp. 76-80, 2003.

G. Flores, G.A. Mercado, and J.A. Pelesko, "Dynamics and Touchdown in Electrostatic MEMS," *Proceedings of ICMENS 2003*, pp. 182-187, 2003.

J.A. Pelesko, "A Self-Organizing Bucket Brigade," *Proceedings of ICMENS 2004*, pp 212-217, 2004.

OTHER PUBLICATIONS

A. Crowe, K. Gurski, J.A. Pelesko and J. Spencer, "Improved Estimation of the Heat Transfer Characteristics of a Power Condenser," *Claremont Colleges Mathematics Modeling Workshop Proceedings*, Claremont, C.A., pp. 59-80, June, 1994.

M. Booty, M. DeBonis, D.A. Edwards, D.A. French, A. Fitt, P. Howell, J. King and J.A. Pelesko, "Thermomechanical Models of Air Gap Nucleation During Pure Metal Solidification on Moving Molds with Periodic Surface Topographies," *Fourteenth Annual Workshop on Mathematical Problems in Industry Proceedings*, Troy, N.Y., June, 1998.

D.A. French, J.A. Pelesko and R. Braun, "Mathematical Model for Epitaxial Semiconductor Crystal Growth from the Vapor Phase on a Masked Substrate," *Fifteenth Annual Workshop on Mathematical Problems in Industry Proceedings*, Newark, D.E., June 1999.

A.A. Lacey et.al., "Corning: Inverse Problems for Glass," *Sixteenth Annual Workshop on Mathematical Problems in Industry Proceedings*, Newark, D.E., June 2000.

C. Please, J.A. Pelesko, et. al., "Optimal Wear for a Laying Pipe," *Nineteenth Annual Workshop on Mathematical Problems in Industry Proceedings*, Worcester, M.A., June 2003.

R. Braun, R. Wilson, J.A. Pelesko, et. al., "A Network Model of Alcoholism and Alcohol Policy," *Twentieth Annual Workshop on Mathematical Problems in Industry Proceedings*, Newark, D.E., June 2004.

RECENT SCIENTIFIC ACTIVITIES

"Electrostatic Deflections," talk presented at Berkeley, December 2004.

"Dynamics in Electrostatic MEMS," talk presented at Virginia Tech, October 2004.

“MEMS, Random Packing and Self Assembly,” talk presented at University of Georgia, September 2004.

“MEMS, Random Packing and Self Assembly,” talk presented at Georgia Tech, September 2004.

“A Self-Organizing Bucket Brigade,” talk ICMENS 2004, Banff, Canada.

“Random packing from Newark to Boston to Cork and back,” talk presented at MEC Lab Brown Bag Seminar, April 2004.

“Asymptotics, MEMS, and NEMS,” invited keynote presentation to be presented at HAMSA 2004, University of Cork, Cork, Ireland, March 2004.

“Modeling Electrostatic MEMS and NEMS,” invited talk presented at UMBC, October 2003.

“Dynamics of Pull-in in Electrostatic MEMS,” talk presented at ASME IDETC 2003, Chicago, IL.

“Electrostatic Deflections of Volume Constrained MEMS,” talk presented at ICMENS 2003, July 2003, Banff, Canada.

“Modeling Electrostatic MEMS and NEMS”, invited talk presented in the EE Department, Univ. of Delaware, May, 2003.

Session co-organizer - "Electrostatics in micro- and nanoscale science," for ICMENS 2003, July 2003.

Session co-organizer - "Fundamentals in Microsystems," for MSM 2003, San Francisco, February 2003.

“Electrostatic Deflections in MEMS and NEMS”, invited talk presented at UNAM, Mexico, November, 2003.

“What little I know about self-assembly, but why I think it’s really cool,” talk presented in the University of Delaware Applied Mathematics Brown Bag Seminar, September 2002.

“An Introduction to Electrostatic MEMS,” invited guest lecture in NJIT’s applied mathematics laboratory course, September 2002.

“Electrostatics, MEMS, and NEMS,” invited talk presented at the University of Arizona Applied Mathematics Colloquium, September 2002.

“Bundt Pans, Soap Films, and Symmetry,” talk presented at ESA 2002, June 2002.

Session co-organizer - "Fundamentals in Microsystems," for session held at MSM 2002, Puerto Rico, April 2002.

Session organizer - "MEMS and Minimal Surfaces," for session held at AMS/MAA Joint Sectional Meeting, Georgia Institute of Technology, March 2002.

"MEMS and Minimal Surfaces," talk presented at the AMS/MAA Joint Sectional Meeting, Georgia Institute of Technology, March 2002.

"Mathematical Modeling of Microsystems," invited talk presented at the University of Delaware Applied Mathematics Seminar, February 2002.

"Introducing the ACE Lab," talk presented in the CDSNS/ACE Brown Bag Seminar Series, Georgia Institute of Technology, October 2001.

"Electrostatic Field Approximations and Implications for MEMS Devices," invited talk presented at ESA 2001, June 2001.

"Mathematical Modeling of Electrostatic MEMS," talk presented in mini-symposium (below) at SIAM 2001 annual meeting, San Diego, CA 2001.

Mini-symposium co-organizer (with David A. Edwards, University of Delaware) - "Perturbation Methods in Modern Applied Problems" for mini-symposium held at SIAM 2001 annual meeting, San Diego, CA 2001.

"Multiple Solutions in Electrostatic MEMS," talk presented at MSM 2001, Hilton Head, SC, March 2001.

"Mathematical Modeling of Electrostatic MEMS," talk presented in the Dynamics Seminar for the School of Mathematics at the Georgia Institute of Technology, January 2001.

"Mathematical Modeling of Electrostatic MEMS," invited talk presented at the NJIT Mathematics Department Colloquium, November 10, 2000.

"Mathematical Modeling of Electrostatic MEMS - An Overview," talk presented to the MEMS Research Group in the Woodruff School of Mechanical Engineering, Georgia Tech, September 11, 2000.

Mini-symposium organizer - "Dynamics of Micro and Nanoscale Devices and Materials" for mini-symposium held at the SIAM Pacific Rim Dynamics meeting, August 2000.

"Mathematical Problems on Small Scales," talk presented in the above mini-symposium.

"Local and Nonlocal Problems in Mathematical Models of MEMS Devices," poster presented at Nonlinear Analysis 2000, Courant Institute, May 2000.

"A Mathematical Model of Microwave Joining with Thermoelastic Effects," poster presented at the Microwave and Radio Frequency World Congress, Orlando, March 2000.

"Local and Nonlocal Problems in Modeling of MEMS Devices," invited talk presented at the School of Engineering Colloquium, University of Akron, Akron, O.H., November 1999.

"Singular Perturbations in MEMS and Microwave Heating," talk presented at the Singular Perturbations at the Turning Point of the Millennium Conference, RPI, Troy, N.Y., October 1999.

"Simple Models - Serious Problems: Mathematical Modeling of MEMS Devices," talk presented for the Applied Mathematics Seminar at the Georgia Institute of Technology, October 1999.

FUNDING HISTORY

NSF #0071474 Mathematical Modeling of MEMS Devices, 2000-2003, \$82,335

NSF #0135290 Vertical Integration of Research and Education, 2002-2005, (Co-PI) – VIGRE - \$2,125,81

IMA Participating Institutions Conference Grant (Co-Pi) - \$4000

Georgia Tech Technology Fee Fund Grant (Co-PI) - \$30,000

University of Delaware Research Fund Grant - \$29,000

NSF #0305234 Mathematical Modeling of MEMS and NEMS - \$128,000
Center for Teaching Effectiveness Grant 2003, Univ. of Delaware (Co-PI) - \$20,000

Center for Teaching Effectiveness Grant 2004, Univ. of Delaware (Co-PI) - \$20,000

University of Delaware Research Fund Undergraduate Research Supplement - \$3,500

SERVICE AT LARGE

Reviewer for SIAM Journal on Applied Mathematics, SIAM Review

Reviewer for Journal of Microelectromechanical Systems

Reviewer for International Journal of Solids and Structures

Reviewer for IMA Journal of Applied Mathematics

Reviewer for Journal of Engineering Mathematics

Reviewer for Harcourt Academic Press

Reviewer for Metallurgical and Materials Transactions

Reviewer for Proceedings of the Royal Society

Reviewer for Journal of Differential Equations

Reviewer for Oxford University Press

Reviewer for Prentice Hall

Reviewer for Sensors and Actuators A

Reviewer for Proceedings of the National Academy of Sciences

Organizing Committee - Mathematical Problems in Industry 2001

Organizing Committee - Southeastern Conference on Applied Mathematics

Technical Program Committee – ICMENS 2004

NSF Panel Member, November 2003
Technical Chair - Electrostatics Society of America, 2005 Annual Meeting

SERVICE WITHIN GEORGIA TECH

Organizer for Applied Mathematics Seminar, Dynamics Seminar
Co-founder of the ACE Lab
Member of the Center for Dynamical Systems and Nonlinear Studies
Member of Chair Search Committee, Fall 2001 – Spring 2002
Member of Oral Exam Committee for V. Morales, S. Day
Member of Thesis Committee for J. Jordan, Materials Science
Member of Thesis Committee for J. Wei, Chemical Engineering
Member of Thesis Committee for T. Fan, Mechanical Engineering

SERVICE WITHIN THE UNIVERSITY OF DELAWARE AND COMMUNITY

Founder and Director of the MEC Lab
Member of the Undergraduate Committee, Fall 2002 – Spring 2004
Member of the VIGRE Committee, Fall 2002 – Spring 2004
Judge for Charter School of Wilmington Science Fair, 2003, 2004
Focus Presenter for GEAR UP Program, Spring 2003
Board of Senior Thesis Readers, Fall 2003-Present
Presenter for Decision Days, Spring 2003
Organizer of the MEC Lab Brown Bag Seminar, Fall 2002 – Present
Supervisor for Undergraduate Research Experiences, (Lauren Roberts, Matthew Seiders, Jirar Helou, Michael Cesky, Sharon Huertas, Oren Breslouer, Patrick Zulkowski, Lauren Rossi, Janine Janoski, Kathryn Sharpe, Daniel Cargill)
Organizer and Presenter for Charter School of Wilmington Faculty Workshop, Fall 2004
Center for Teaching Effectiveness Faculty Advisory Board, Fall 2004-Present
Learning Lunch Presenter at the Charter School of Wilmington, April, 2004