

# Katharine Fortune Gurski

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**Objective** Modeling physical and industrial problems using analytical and computational techniques.

**Education** **Ph.D.** in Applied Mathematics, August 1999, University of Maryland, College Park  
Thesis Title: Decay Rates of Internal Waves in Viscous Near-Critical Fluids  
Advisor: Professor Robert Pego  
**M.S.** in Applied Mathematics, August 1991, University of Illinois at Urbana-Champaign  
**M.S.** in Physics, January 1989, University of Illinois at Urbana-Champaign  
**B.S.** in Physics, Summa Cum Laude, May 1987, Emory University, Atlanta, Georgia

**Experience** **National Research Council Research Associate** at NIST; Gaithersburg, Maryland:  
Studying the effect of anisotropic surface energy on the Rayleigh instability with applications to nanowires and other rods. Modeling three-dimensional dendritic crystal growth using axisymmetric boundary integral method and iterative solvers.  
January 2001 - present

**Postdoctoral Fellow** at NASA Goddard Space Flight Center; Greenbelt, Maryland:  
Developed an approximate Riemann solver for ideal magnetohydrodynamics (MHD) based on the HLLC method for gas dynamics. Extended analytical results of internal gravity wave mode studies for general stratified fluids for 1-D (and 3-D) viscous stratified fluid in a layer (closed container).  
Contracting agencies: 11/2000 - 12/2000 University of Maryland, Baltimore County,  
10/2000 Caelum Research Corporation, 8/1999 - 9/2000 Universities Space Research Association

**Graduate Research Assistant** at University of Maryland; College Park, Maryland:  
Modeled decay rates of internal waves in density stratified viscous critical fluids using asymptotic analysis and numerical computation. Proved the existence of zero damping modes and determined that the internal waves are strongly damped as the fluid approaches the critical temperature.  
May 1998 - August 1998, May 1997 - December 1997, June 1996 - August 1996

**Industrial Mathematical Modeling Workshop;** Institute for Mathematics and Its Applications, University of Minnesota:  
Determined the necessary addition rates of silver and bromide solutions in a double jet reactor for the growth of uniform silver halide crystals for improved film quality.  
July 22-31, 1998

**Industrial Mathematical Modeling Workshop;** North Carolina State University, Center for Research in Scientific Computation:  
Studied the effect of noise and bias on an inverse problem pertaining to the extraction of meteorological data from a GPS measured projectile trajectory.  
August 3-13, 1997

**Mathematical Modeling Workshop;** Claremont Graduate School, California:  
Modeled the condensation process in an effort to improve the efficiency of heat transfer in power condenser designs.  
June 5-15, 1994

**Graduate Teaching Assistant** at University of Maryland; College Park, Maryland:  
Taught Finite Mathematics as principal instructor. Led recitations for Business Calculus I, Calculus I, and Linear Algebra. Used cooperative learning to teach Calculus II. Graded the undergraduate courses for Business Calculus II, Differential Equations, Analysis I, Computational Methods, and PDEs. Graded the graduate courses for Methods and Models in Applied Mathematics, Numerical Analysis I and II.  
August 1991 - May 1997

## Katharine Fortune Gurski: Page 2 of 2

### Experience

**C Programmer** at Cooperative Extension Service; Urbana, Illinois:  
Developed RDB database for Illinois Dial-Up Extension Access (IDEA); developed multi-user menu driven interface.  
May 1992 - August 1992, May 1990 - August 1991

**Graduate Research Assistant** at University of Illinois; Urbana, Illinois:  
Designed and implemented software in FORTRAN to detect equipment failures in trigger of the Stanford Linear Detector (SLD); translated SLD electronics environment monitor code from 8051 ASSEMBLER into C.  
January 1989 - May 1990, June 1988 - August 1988

**Graduate Teaching Assistant** at University of Illinois; Urbana, Illinois:  
Taught recitation and laboratory for Introduction to Modern Physics and Senior Modern Physics Laboratory.  
August 1988 - December 1988, August 1987 - May 1988

### Course work

Numerical Analysis, PDEs (Classical, Modern, and Numerical), ODEs, Computational Methods for Applied Mathematics and Physics, Mechanics (Classical, Continuum, and Quantum), Mathematical Methods for Physics, Real Analysis, Nonlinear Waves, Electromagnetics, etc.

### Computer

Programming experience in C, FORTRAN, BASIC, QuickBASIC, 8051 ASSEMBLER, FASTBUS, Mathematica, MATLAB, IDL, DCL, and RDB using UNIX, VMS, Windows, and MacIntosh operating systems. Experience with HTML and LaTeX.

### Publications

- *The Effect of Contact Lines on the Rayleigh Instability with Anisotropic Surface Energy*, (with G.B. McFadden), in preparation.
- *Slow Damping of Internal Waves in Stably Stratified Fluid*, (with R. Kollar and R. L. Pego), in preparation.
- *The Effect of Anisotropic Surface Energy on the Rayleigh Instability*, (with G.B. McFadden), submitted.
- *An HLLC-type Approximate Riemann Solver for Ideal Magnetohydrodynamics*, submitted.
- *Normal Modes for a Stratified Viscous Fluid Layer*, (with R. L. Pego), Royal Society of Edinburgh, 132A, pp. 1-15, 2002.
- *Hints for Finding Non-Academic Research Positions (Postdoctoral and Permanent)*, Association for Women in Mathematics Newsletter, Vol. 31, No. 5, September-October 2001, pp.17-19.
- *Decay Rates of Internal Waves in Viscous Near-Critical Fluids*, (with R. L. Pego), Physical Review E, July 1, 2000, Volume 62, Number 1, pp. 517-524.
- *Decay Rates of Internal Waves in Viscous Near-Critical Fluids*, Ph. D. thesis, June 1999.
- *Determining Addition Rates for the Growth of Uniform Silver Halide Crystals*, (with D. Ambrose, C. Gerads Fournelle, D. Peng, V. Shekhar, and V. Varghese), Proceedings for the Mathematical Modeling in Industry Workshop for Graduate Students, Institute for Mathematics and Its Applications, July 22-31 1998.
- *Extracting Meteorological Data from a Projectile Trajectory*, (with P. Hagerty, M. Hasson, M. Moisan, and C. Perez), Proceedings for the Industrial Mathematics Modeling Workshop for Graduate Students, Editor J. Scroggs, Center for Research in Scientific Computation, August 3-13, 1997.
- *Improved Estimation of Heat Transfer Characteristics of a Power Condenser*, (with A. Crowe, J. Pelesko, and J. Spencer), Proceedings for the Claremont Colleges Mathematics Modeling Workshop for Graduate Students, June 5-15, 1994.

### Honors

Phi Beta Kappa, Phi Sigma Iota, Phi Sigma Tau.

### Professional Memberships

Society for Industrial and Applied Mathematics, American Mathematical Society, American Physical Society, Association for Women in Mathematics.

### Additional

U.S. Citizen. References available upon request.