# An Overview of the Mathematical Research of

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## Areas of Expertise

- Mathematical Modeling
- Ordinary Differential Equations
- Partial Differential Equations
- Numerical Analysis
- Scientific and Parallel Computation
- Computer Algebra



## Current Projects

- Interface Problems
- Mathematical Biology
- Computational Number Theory
- Computer Algebra



## Interface Problems

- Electromagnetic Scattering on Unbounded Domains [PDF]
  - Funding
    - NSF (1994-1997)
  - Collaborators
    - Andrew Peterson (ECE, Georgia Tech)
    - Kevin Webb (ECE, Purdue)
  - Student
    - Catherine Piellusch-Castle (M.S., Math, USC, 1996)

## Interface Problems

- Gravitational Forces in Electrostatics
  - Funding
    - USC R & PS (in preparation)
  - Collaborators
    - Timir Datta (Physics, USC)
    - Ruslan Prozorov (Physics, USC)
  - Student
    - Arpana Desai (M.S., Math, USC, current)



## Mathematical Biology

- Nonlinear Diffusion Models
  - Collaborator
    - Fabio Milner (Math, Purdue)
- Vaccination Models [PDF]
  - Funding
    - SC EPSCoR (summer 2001)
  - Student
    - Katie Spurrier (B.S., Math, USC, current)



## Computational Number Theory

- Factorization Algorithms for Lacunary Polynomials [PDF] [Maple]
  - Funding
    - NSF (submitted)
    - NSA (submitted)
  - Collaborator
    - Michael Filaseta (Math, USC)
  - Student
    - Jonathan Mason (B.S., Math, USC, current)



## Computer Algebra

- Maple Application Center
  - ODE PowerTool
  - Shooting Method for 2-Point BVPs
  - Hankel Functions
- Book
  - Engineer's Toolkit: Maple V for Engineers (with Etan Bourkoff), AWL, 1998
- Textbook Supplements
  - Calculus
  - Linear Algebra
  - Differential Equations
- Training Workshops