

Ishani Roy

Division of Applied Mathematics
Brown University

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EDUCATION

Brown University, Division of Applied Mathematics

- Ph.D, Applied Mathematics 2007- Present
- Master of Science, Applied Mathematics 2006-2007

Thesis: WENO Method in Computational Cosmology

Advisor: Professor Chi-Wang Shu

Expected date of graduation - May 2010

University of Massachusetts at Amherst

2004 - 2006

Master of Science, Applied Mathematics

University of Colorado at Boulder

2000 - 2003

Bachelor of Science, Applied Mathematics

RESEARCH INTERESTS

High order numerical methods for conservation laws such as essentially non-oscillatory methods, discontinuous Galerkin and spectral methods with applications in

- Computational Cosmology
- Computational Fluid Dynamics

RESEARCH

Brown University, Division of Applied Mathematics

2007 - Present

WENO Methods in Computational Cosmology

- A numerical algorithm to solve an integral differential equation describing the transport of photons during the formation of the first generation stars in 'early universe'
- Method constructed in high order to obtain maximum resolution

Los Alamos National Laboratory, Center for Nonlinear Studies

Summer 2005 and 2006

University of Massachusetts at Amherst

2005 - 2006

Numerical Solution of Φ^4 Field Theory

- Researched different discretizations of the Φ^4 field theory by comparing properties of the fundamental solutions such as the nature of kink type solitary waves

University of Colorado at Boulder, Department of Physics

Fall 2003

Analysis of Rare Decay(s) of B Meson

- Worked in high Energy physics with particle physics group in collaboration with Stanford Linear Accelerator Center (SLAC). Used Monte Carlo simulations to reconstruct branching fraction of a decay chain

- Developed QR algorithm for representation of functions and operators in a multi-resolution analysis, and manipulation using wavelet decomposition and reconstruction techniques

PUBLICATIONS

I. Roy, C.-W. Shu and L.-Z. Fang, Resonant Scattering and Ly α Damping Wing of Neutral Hydrogen Halos, *in preparation*

I. Roy, W. Xu, J.-M. Qiu, C.-W. Shu and L.-Z. Fang, Wouthuysen-Field Coupling in 21 cm Region Around High Redshift Sources, *The Astrophysical Journal* 706 pp 1992 - 2003 (2009)

I. Roy, W. Xu, J.-M. Qiu, C.-W. Shu and L.-Z. Fang, Time Evolution of Wouthuysen-Field Coupling, *The Astrophysical Journal*, 694 pp 1121-1130 (2009)

I. Roy, J.-M. Qiu, C.-W. Shu and L.-Z. Fang, A WENO Algorithm for Radiative Transfer with Resonant Scattering: The Time Scale of the Wouthuysen-Field Coupling, *New Astronomy* 14, pp 513-520 (2009)

I. Roy, S. Dmitriev, P. G. Kevrekidis, A. Saxena, Comparative Study of Different Discretizations of the Φ^4 Model, *Physical Review E* 76, 026601 (2007)

OTHER ACTIVITIES

“Challenges of Mathematical Modeling and Computation in Finance” - International colloquium on financial mathematics

Brown University, Providence

September 2009

- Awarded grant by the Office of International Affairs at Brown University to organize a colloquium on financial mathematics
- Colloquium featured talks by experts from financial industry and academia, in the field of Mathematics and Economics, addressing the problems in the quantitative models that lead up to the current financial crisis

PRESENTATIONS

SIAM Annual Meeting, Denver

July 2009

Mini-symposium on Advanced Numerical Methods for Kinetic Equations

University of New Mexico, Los Alamos

July 2006

Los Alamos Student Symposium

Los Alamos National Laboratory

July 2005 and 2006

Center for Nonlinear Studies Colloquium

University of Colorado at Boulder, Department of Applied Mathematics

July 2002

4th Annual VIGRE Symposium

TEACHING

- Brown University** 2007 - 2008
Graduate Teaching Assistant
Taught recitations in Introduction to Ordinary Differential Equations
- University of Massachusetts at Amherst** 2004 – 2006
Graduate Teaching Assistant
Taught recitations in Introduction to Statistics and Probability, Introduction to Numerical Analysis
- University of Colorado at Boulder**
- Science, Technology, Engineering and Mathematics, Teacher Preparation Fall 2003
NSF supported Teaching Assistant in Calculus for Engineers
 - Upward Bound Program, Teaching Assistant Summer 2003
Taught pre-calculus and calculus to gifted minority high school students

HONORS

- Graduate Fellowship, Brown University 2006 - 2007
Undergraduate Research Opportunity Program, Scholarship Summer 2003
J Ranald Fox Scholarship, University of Colorado 2002 - 2003
Md. Zaborie Scholarship, University of Colorado 2001 - 2002