

## E. McKay Hyde

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### Education

California Institute of Technology	Applied and Computational Mathematics	PhD 2003 (Thesis defended 8/2002) (GPA=4.2) <i>Thesis Title</i> : "Fast, high-order methods for scattering by inhomogeneous media" <i>Advisor</i> : Oscar P. Bruno
University of Utah	Mathematics	Honors BA 1997 (Magna Cum Laude, Honors Baccalaureate Scholarship, GPA=3.96) <i>Honors Thesis Title</i> : "Random walks and their relationship to Brownian motion" <i>Advisor</i> : Davar Khoshnevisan
University of Utah	Physics	BA 1997 (Magna Cum Laude, GPA=3.96)

### Appointments

2002-2005	NSF Mathematical Sciences Postdoctoral Research Fellow at University of Minnesota, Twin Cities
2001-2002	Teaching Assistant, Caltech (6 months)
2000	Summer Intern, Lawrence Livermore National Laboratory (3 months)
1999-2002	DOE Computational Science Graduate Fellow, Caltech
1998-2002	ARCS Foundation Fellow, Caltech
1998-1999	Research Assistant, Caltech (1 year)
1997-1998	Special Institute Fellow, Caltech (1 year)
1997	Instructor, University of Utah (3 months)
1997	Teaching Assistant, University of Utah (3 months)
1994-1995	Data Analyst, Cosmic Ray Research Group, University of Utah (6 months)

### Publications

- [1] E. M. Hyde, O. P. Bruno, "A fast, high-order algorithm for scattering by inhomogeneous media in three dimensions," submitted to the Proceedings of the Sixth International Conference on the Electrical Transport and Optical Properties of Inhomogeneous Media (ETOPIM 6), July 2002.
- [2] E. M. Hyde, O. P. Bruno, "A fast, high-order algorithm for scattering by inhomogeneous media in three dimensions," in preparation.
- [3] M. R. Dorr, F. X. Garaizar, E. M. Hyde, "The validity of paraxial approximations in the simulation of laser-plasma interactions," in preparation.
- [4] O. P. Bruno, E. M. Hyde, "Numerical implementation of a fast, high-order method for scattering by inhomogeneous media in two dimensions," in preparation.
- [5] O. P. Bruno, E. M. Hyde, "High-order Fourier approximation in scattering by two-dimensional, inhomogeneous media," in preparation.
- [6] E. M. Hyde, "The validity of a paraxial approximation in the simulation of laser-plasma interactions," *Student Sym. 2000, Technical Presentations & Career Fair*, August 10, 2000. Sandia NL, Albuquerque, NM. Available as Lawrence Livermore National Laboratory technical report UCRL-JC-139805, August 2000.
- [7] E. M. Hyde, "Random walks and their relationship to Brownian motion," *Honors Thesis*, Department of Mathematics, University of Utah, 1997.

### Research Interests

Numerical solution of partial differential equations with particular emphasis on high-order methods, fast algorithms, integral equation formulations and spectral methods. Related interests include iterative solvers,

preconditioning methods and high-performance computing. Current applications of interest are in the general fields of scattering theory and inverse problems including medical imaging, radar and remote sensing, laser-plasma interactions and material science applications such as neutron scattering and reflection high energy electron diffraction (RHEED).

## Professional Activities

- Summer Internship at LLNL I worked at Lawrence Livermore National Laboratory (LLNL) in the Center for Applied Scientific Computing (CASC) with computational scientists and plasma physicists on the simulation of laser-plasma interactions. I developed codes to validate approximations used in current simulations. I presented my work at a student conference at Sandia National Labs, Albuquerque, NM, at a CASC Division Meeting and at a Plasma Physics Group Meeting at LLNL on a subsequent visit. (Summer 2000)
- Teaching Experience I served as teaching assistant for a course in Advanced PDE (graduate-level course). I held recitation sections twice weekly, answered students' questions outside of class and participated in the organization of the course. (Fall 2001-Winter 2002) In addition, I worked first as a teaching assistant and then as an instructor for a third-quarter calculus course at the University of Utah. I prepared the lectures, developed and graded the homework sets and exams, answered questions outside of class and assigned final grades. (Spring and Summer 1997)
- Service and Leadership I co-advised a summer student, Samba Ba, an undergraduate visiting from École Polytechnique in France. (Summer 2001) I co-organized a biweekly departmental seminar for graduate students and postdocs. (1999-2001)
- Computing Expertise I have developed and implemented algorithms for solving scattering problems in two and three dimensions. The codes were written in Fortran 90, C and C++. I wrote the three-dimensional scattering code in parallel using the parallel linear algebra library PETSc and the parallel FFT implementation fftw. I also participated in the purchase of a Beowulf cluster consisting of 128 dual-processor nodes. This effort included researching hardware and software issues, benchmarking possible configurations and meeting with vendors.

## Honors and Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship (2002-2005)  
Department of Energy Computational Science Graduate Fellowship (1999-2002)  
Achievement Rewards for College Scientists (ARCS) Foundation Fellowship (1998-2002)  
NSF Travel Funds for conference on "Nonlinear PDE and Applications to Materials" at IMA (1999)  
Honorable Mention, NSF Graduate Fellowship (1998)  
Special Institute Fellowship, Caltech (1997)  
Honors Baccalaureate Scholarship, Honors Program, University of Utah (1997)  
Gibson Award in Mathematics, Department of Mathematics, University of Utah (1997)  
Keith Reid Memorial Scholarship, Department of Mathematics, University of Utah (1996)

## Presentations

ETOPIM 6, Snowbird, Utah (July 2002)  
Department of Applied Physics and Applied Mathematics, Columbia University (February 2002)  
Department of Mathematics, Brigham Young University (January 2002)  
Department of Mathematics, University of Utah (January 2002)  
Department of Mathematics, Claremont Graduate University (January 2002)

## Languages

Fluent in German

## Professional Memberships

Phi Beta Kappa, Phi Kappa Phi, American Mathematical Society,  
Society for Industrial and Applied Mathematics

## Citizenship

USA

## References

Available upon request