DAVID MICHAEL ALBER

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RESEARCH INTERESTS

Iterative linear solvers, algorithmic efficiency, scalability, combinatorial scientific computing, computational biology. Interested in applications to aerospace, biology, and medicine.

EDUCATION

- **University of Illinois at Urbana-Champaign**, Urbana, IL
  Ph.D. in Computer Science, May 2007
  Doctoral Dissertation: *Efficient Setup Phase Algorithms for Parallel Algebraic Multigrid*
  M.S. in Computer Science, May 2004
  Masters Thesis: *Computational Local Fourier Mode Analysis in the Multigrid Solution of Coupled Systems*
- **University of Iowa**, Iowa City, IA
  B.S. in Biological Science and Computer Science, December 1999

RESEARCH PROJECTS

- Current research in high-performance systems biology. Creating tools to assist in development of a metabolic model for the green alga *Chlamydomonas reinhardtii* and designing and engineering a suite of high-performance software for model integration, function and derivative evaluation, and optimization.
- Parallel coarse grid selection for algebraic multigrid. Developed algorithms and data structures to yield improvements in operator complexity, convergence factors, and computational efficiency.
- Multigrid for Electromagnetics. Contributions to multigrid solvers for problems arising from definite and indefinite forms of Maxwell's equations.
- Local Fourier Analysis for Systems of PDEs. Implemented feature-rich software package to predict convergence factors for multigrid on scalar and system PDE problems.
- Computational Modeling of Protein Tertiary Structure. Produced software to assist in clustering protein backbone angle data and software for real-time visualization of solution during solve phase.

WORK EXPERIENCE

- **Postdoctoral Researcher**, National Renewable Energy Laboratory (May 2007 – current)
  Research on high-performance computational systems biology project studying bio-hydrogen production by green alga *Chlamydomonas reinhardtii*.
- **Research & Teaching Assistant**, University of Illinois at Urbana-Champaign
  Courses as Teaching Assistant: Computer Architecture I (Fall 2000; awarded Outstanding Teaching Assistant Award), Numerical Methods (Spring 2001), Introduction to Numerical Analysis (Summer 2005)
  Research Assistantships for Paul Saylor and Luke Olson
- **Internship**, Lawrence Livermore National Laboratory (Summers 2002 – 2004)
  Research and development on multigrid methods. Topics included Fourier analysis and study of systems of PDEs (developed into Masters thesis) and multigrid for electromagnetics.
- **Programmer**, University of Iowa College of Business (May 1998 – July 2000)
  Developed the Iowa Electronic Markets, a real-time, real-money market, which offers twenty-four hour trading to an audience of several thousand users. Server was built in MS Visual C++ with a SQL database backend. Additional tools built include deadlock detector and trading engine test client.
- **Laboratory Technician**, University of Iowa College of Medicine (June 1994 – January 1998)
  Conducted experiments (Southern blots, PCR, gel runs, darkroom work, analysis) and maintained the lab (prepared chemical solutions, gels, computer work, cleaning, autoclaving).

SKILLS & ACTIVITIES

- Programming proficiencies: C, C++, MATLAB, Perl, PHP, Python
- Comfortable with MPI parallel programming and SQL
- Coursework exposure to many other languages
- Founder of University of Illinois at Urbana-Champaign SIAM Student Chapter

REFERENCE

- Luke Olson, Department of Computer Science, University of Illinois at Urbana-Champaign
- Paul Saylor, Department of Computer Science, University of Illinois at Urbana-Champaign
- Details available upon request