

# Elijah Newren

## Education

- Doctor of Philosophy in Mathematics, University of Utah, expected Dec. 2006, 4.00 GPA
- Master of Science in Mathematics, University of Utah, Dec. 1998, 3.98 GPA  
Thesis: Multilevel distributed memory solution of Poisson's equation.
- Bachelor of Science in Mathematics, University of Utah, Mar. 1998, 3.90 GPA, Cum Laude

## Awards and Honors

- Department of Energy Computational Science Graduate Fellowship, Sep. 2001–Aug. 2005
- NSF Research Training Grant, Aug. 2005–Jul. 2006
- Graduate Certificate in CES (Computational Engineering and Science)

## Summary

- Strong knowledge of programming languages, methods, and algorithms.
- Ability to communicate well both orally and in written form.
- Advanced knowledge of numerical PDEs and distributed parallel processing.
- Highly interdisciplinary as reflected in coursework, awards, supervisory committee, and open source involvement.

## Areas of Concentration in Graduate Study

Numerical solution of PDEs	Mathematical Modeling	(Bio-)Fluid dynamics
Scientific Visualization	Numerical Optimization	Multigrid
Numerical Linear Algebra	Mathematical Physiology	

Including many courses from Computer Science, Bioengineering, and Mechanical Engineering.

## Experience

Graduate Research Fellow, University of Utah, Sep. 2001–Present

- Solved a long-standing numerical stability issue with the Immersed Boundary (IB) and Immersed Interface (II) methods that was forcing the use of tiny timesteps even in implicit methods.
- Wrote fluid dynamics solver program for low to moderate Reynolds number flow including handling of elastic structures which both exert a force on the flow and are deformed by the flow.
- Utilized the IB and II methods in writing this software, which included subsolver components such as multigrid, projection methods, and a Quasi-Newton solver.
- Mapped out a parallel communication algorithm needed for the IB method with actual surfaces.

Intern, Lawrence Livermore National Laboratories, Fall 2002

- Worked on incorporating boundary variables into the adaptive mesh refinement framework of SAMRAI.

Intern, Los Alamos National Laboratories, Summer 2001

- Extended the SAMRAI framework (a package written at Lawrence Livermore National Laboratories for adaptive mesh refinement programs) to interface to the SLES functions of the PETSc package (developed at Argonne National Laboratories).

Teaching Fellowship, Mathematics Department at University of Utah, Aug. 2000–May 2001

- Taught mathematics courses. Responsible for all aspects of the classes, including preparing syllabi, creating assignments and exams, lecturing, and grading.

Teaching Assistantship, Mathematics Department at University of Utah, Sep. 1997–Aug. 1998

- Tutored engineering math students, ran problem solving sessions, and taught two courses.

Intern, Supercomputing Institute at University of Minnesota, Summer 1997

- Optimized and Parallelized a physics code simulating TPA experiments.

Consultant, Center for High Performance Computing at University of Utah, Dec. 1996–Sep. 1997

- Answered user questions about high performance machines, in particular about usage of MPI.

## Publications

- [1] Elijah Newren, Aaron Fogelson, Robert Guy, and Mike Kirby. Unconditionally stable discretizations of the Immersed Boundary equations. *to appear in the Journal of Computational Physics*, 2006.
- [2] Elijah Newren. Multilevel distributed memory solutions of poisson's equation. Master's thesis, University of Utah, 1998.

## Computer Skills

- Languages  
C++ (including Object Oriented Programming, Design Patterns, Templates, etc.), C, Matlab, shell scripting (bash, tcsh), Python, Perl, Fortran, AWK, SQL, x86 assembly, Pascal.  
Plus minor familiarity with M4, Tcl/Tk, Scheme, Basic, Emacs Lisp, Java, Sparc Assembly.
- Libraries/Packages:
  - Parallel Programming  
MPI, PETSc, SAMRAI
  - Scientific Libraries  
VTK (Visualization ToolKit), LAPACK, ARPACK (eigensolvers), SLEPC (eigensolvers), FFTW (FFTs), PETSc, SAMRAI (structured AMR)

- Version Control Systems  
cvs, arch (tla/baz), bazaar, subversion, git
- Debuggers/Debugging/Profiling  
Totalview, gdb, strace, valgrind, gprof, oprofile, electric fence, sysprof
- Graphical User Interfaces  
GTK+, libglade, GConf, and other Gnome libraries (including C, C++, Python, and Perl language bindings for these libraries)
- Others  
Bugzilla, Matlab, Maple, LaTeX, Docbook, emacs, Bonsai/LXR/Viewcvs, bison, flex, half a zillion standard unix utilities (patch, diff, grep, find, locate, xargs, rsync, etc., etc.)
- Architectures  
IBM SP2, Cray T3E, Linux Clusters with Myrinet, SGI Power Challenge, Workstations and PC's; various flavors of Unix and Linux

## Volunteer Work: Involvement in GNOME

- Release Team Manager, Aug. 2005–Present; Release Team Member, Aug. 2004–Present
  - Managed software releases comprising about 3.5 million lines of code, 120 subprojects, and hundreds of developers (including employees of several companies as well as many volunteers)
  - Streamlined and further documented the release process
  - Pushed towards consensus on divisive issues
- Co-Maintainer of Metacity, Libwnck, and Gnome Bugzilla
  - Fixed hundreds of bugs, implemented new features, made releases, added documentation
  - Redesigned inherently problematic portions of the code base
  - Worked to get more people involved in these projects
- Contributed fixes to over a dozen other subprojects
- Wrote a tutorial on Gnome development that was adopted by the “Gnome Love” project (whose goal is to try to get new contributors involved in Gnome)
- Member of Quality Assurance (“bugsquad”) team

## Affiliations

- Society for Industrial and Applied Mathematics, 2001–Present
- American Mathematical Society, 2001–Present

## Other

- Volunteer Church Representative, Aug. 1998–Aug. 2000; selected to supervise 8 fellow representatives
- Great memory—memorized Pi to 960 places in 9th grade