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Jeffrey Lee Hellrung, Jr.

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OBJECTIVE — Obtain a research position investigating algorithmically challenging problems in scientific computing.

RESEARCH — Elliptic problems on irregular domains; geometric multigrid; fracture simulation; mesh cutting.

SKILLS — Solid computational mathematics and scientific computing background.
Proficient primarily in C++, but also familiar with a wide range of other programming languages, packages, and paradigms; including C, Java, LaTeX, Matlab(R), MIPS assembly, ML/SML, Perl, Python, Qt 4, and Z80 assembly.
Active member of the Boost C++ open source community.
Adept at problem solving, as exemplified by placement in the "Putnam exam", Microsoft Imagine Cup Algorithm Invitational, ACM Programming Contest, and ICFP Programming Contest.
Mathematical modeling experience from clinic, research in reaction-diffusion PDEs, and the MCM.

EDUCATION — **University of California Los Angeles, Los Angeles, CA** — **GPA** : 3.948
Master of Arts in Mathematics, June 2006
pursuing a Ph.D. in Mathematics, June 2012 (expected)

Harvey Mudd College, Claremont, CA — **Overall GPA** : 3.858
Bachelor of Science in Mathematics, May 2005 — **Major GPA** : 4.000
Graduated with High Distinction, Honors in Mathematics

EXPERIENCE — **Park City Mathematics Institute**, Park City, UT; summer 2010. Teaching assistant for Professor Joseph Teran's week-long workshop on nonlinear elasticity.

Walt Disney Animation Studios, Burbank, CA; summer 2008. Created a Maya plugin front-end and developed the back-end algorithms to volumetrically fracture non-volumetric (i.e., quad surface) animation models.

The Aerospace Corporation, El Segundo, CA; summer 2005, 2006, 2007. Supported various programming projects relating to SOAP (Satellite Orbit Analysis Program) and SRE (Software Reliability Engineering). Created and modified existing code in C, C++, and Perl. Used Qt 4 to develop cross-platform graphical user interfaces in C++. Designed and prototyped several algorithms to solve satellite positioning problems.

Teaching Fellow for Department of Mathematics, UCLA, Los Angeles, CA; 2005 – 2011. Led discussion sections to review lecture material, tutored at the Student Math Center, prepared review sessions before exams, and held office hours to provide students with additional help.

Clinic Project Manager serving Hewlett-Packard, HMC, Claremont, CA; 2004 – 2005. Headed a team of four to deliver to HP Labs several tools written in Matlab(R) to analyze and correct printer drift, as well as mid-year and final reports detailing our approaches. Presented our findings at Harvey Mudd College and directly to Hewlett-Packard in Palo Alto, CA.

Auditude™, Inc., Los Angeles, CA; summer 2004. Constructed several test scripts to automate the execution, collection, and compilation of tests and their results, with the aim of optimizing the BroadcastID infrastructure. Wrote several technical summaries analyzing said results and recommending potential efficiency improvements.

Research on Spatiotemporal Pattern Formation under Turing Instabilities, HMC, Claremont, CA; summer 2003. Programmed and used several programs in Matlab(R) (totaling approximately 20,000 lines of code) to solve reaction-diffusion partial differential equations on growing 2-dimensional surfaces. Implemented and studied several different numerical integration schemes to solve these systems of PDEs.

Academic Excellence Mathematics Tutor, HMC, Claremont, CA; 2003 - 2005. Tutored students in linear algebra, differential equations, multivariable calculus, discrete mathematics; conducted workshops and exam review sessions.

Park City Mathematics Institute, Park City, UT; summer 2003. Attended lectures on wavelets, partial differential equations, and Fourier analysis.

PUBLICATIONS

"A Second-Order Virtual Node Algorithm for Nearly Incompressible Linear Elasticity in Irregular Domains." Y. Zhu, Y. Wang, **J. Hellrung**, A. Cantarero, E. Sifakis, J. Teran. 2011. (submitted)

"A Second-Order Virtual Node Method for Elliptic Problems with Interfaces and Irregular Domains in Three Dimensions." **J. Hellrung**, L. Wang, E. Sifakis, J. Teran. Journal of Computational Physics, 2011. (accepted)

"An XFEM method for modeling geometrically elaborate crack propagation in brittle materials." C. Richardson, J. Hegemann, E. Sifakis, **J. Hellrung**, J. Teran. International Journal for Numerical Methods in Engineering, 2011.

"Geometric Fracture Modeling in BOLT." **J. Hellrung**, A. Selle, A. Shek, E. Sifakis, J. Teran. ACM SIGGRAPH 2009 (sketch).

"Local Flaps: A Real-Time Finite Element Based Solution to the Plastic Surgery Defect Puzzle." E. Sifakis, **J. Hellrung**, J. Teran, A. Oliker, and C. Cutting. Medicine Meets Virtual Reality 17, 2009.

"Risk assessment of real time digital control systems." M. Hecht, D. Buettner, **J. Hellrung**. Proceedings of the RAMS '06. Annual Reliability and Maintainability Symposium, 2006. Pages 409 - 415.

AWARDS

ICFP (International Conference on Functional Programming) Programming Contest - 80^{th} (of 215 with positive scores, 872 registered) place (2010) and 95^{th} (of 199) place (2011)

Google Games Santa Monica - 3^{rd} place (2011)

VIGRE Fellowship (2005 – 2009) and Chancellor's Prize (2005 – 2006) (awarded by UCLA)

Robert Borrelli Clinic Prize for Most Outstanding Clinic Team (awarded by HMC) (2005)

William Lowell Putnam Mathematical Competition - Top-200 (2003, 2002) and Top-500 (2004, 2001) Individual Placement and 11^{th} (2004) Team Placement

Microsoft Imagine Cup Algorithm Invitational - 18^{th} place internationally (2004)

MCM (Mathematical Contest in Modeling) - Meritorious Winner (2004)

ACM (Association for Computing Machinery) Programming Contest - 7^{th} / 63 place (2004) and 20^{th} / 59 place (2003)

Stavros Busenberg Prize in Applied Mathematics (awarded by HMC) (2004)

Coleman Prize in Mathematics (awarded by HMC) (2003)

HMC Dean's List, 2002 – 2004