

Natalie N. Beams

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Education

University of Illinois at Urbana-Champaign — Urbana, IL, USA

Ph.D. in Theoretical & Applied Mechanics 2017
Thesis title: “High-order hybrid numerical methods using Green's functions and finite elements”
Thesis advisors: Luke Olson, Andreas Klöckner

M.S. in Theoretical & Applied Mechanics 2014

University of Oklahoma — Norman, OK, USA

B.S. in Mechanical Engineering 2010
Summa cum Laude

Papers

A parallel implementation of a high order accurate solution technique for variable coefficient Helmholtz problems, **N. N. Beams**, A. Gillman, and R. Hewett, to appear in *Computers and Mathematics with Applications* (2019).

High-order Finite Element—Integral Equation Coupling on Embedded Meshes, **N. N. Beams**, A. Klöckner, and L. N. Olson, *J. Comp. Phys.* 375, 2018

A Scalable Fast Method for N-body Problems Based on Exact Finite Element Basis Screen Functions, **N. N. Beams**, L. N. Olson, and J. B. Freund, *SIAM J. Sci. Comput.* 38(3), 2016

Presentations

An Efficient and High Order Accurate Solution Technique for Three Dimensional Elliptic Partial Differential Equations, **N. N. Beams** and A. Gillman, SIAM Conference on Computational Science and Engineering (CSE), 2019

A Parallel Implementation of a Hierarchical Spectral Solver for Variable Coefficient Elliptic Partial Differential Equations, **N. N. Beams**, A. Gillman, and R. Hewett, International Conference on Spectral and High Order Methods, 2018

A parallel implementation of a high order accurate variable coefficient Helmholtz solver, **N. N. Beams**, A. Gillman, and R. Hewett, SIAM Conference on Applied Linear Algebra, 2018

Targeting Interface Problems at Scale with Coupled Elliptic Solvers, **N. N. Beams**, A. Klöckner, and L. Olson, 6th Joint Laboratory for Extreme-Scale Computing Workshop, 2016

A Scalable Method for Cellular Blood Flow and Other N-body Systems, **N. N. Beams**, L. N. Olson, and J. B. Freund, University of Illinois at Urbana-Champaign Computational Science & Engineering Annual Meeting, 2013

Ordered and chaotic flow of red blood cells flowing in a narrow tube, **N. N. Beams** and J. B. Freund, 66th Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2013

Stability of red cells flowing in narrow tubes, **N. N. Beams** and J. B. Freund, 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2011

Program Visualization Tool for Educational Code Analysis, **N. N. Beams**, 2010 Global Conference on Educational Robotics

Posters

A parallel implementation of a high order accurate variable coefficient Helmholtz solver, **N. N. Beams**, A. Gillman, and R. Hewett, Rice Oil & Gas HPC Conference, 2018

A method for N-Body problems based on exact finite element basis screen functions, **N. N. Beams**, L. N. Olson, and J. B. Freund, SIAM Conference on Computational Science and Engineering, 2015

Research Positions

Innovative Computing Laboratory, University of Tennessee — Knoxville, TN, USA
Research Scientist I, Linear Algebra group Aug. 2019 —

Rice University — Houston, TX, USA
Postdoctoral Research Associate, Computational and Applied Mathematics Aug. 2017—
Advisor: Adrianna Gillman Aug. 2019

University of Illinois at Urbana-Champaign — Urbana, IL, USA
Research Assistant Fall 2013—Spring 2014,
Spring 2015—Fall 2016, Spring 2017

Teaching Experience

University of Illinois at Urbana-Champaign — Urbana, IL, USA
Teaching Assistant for CS 556, Iterative & Multigrid Methods Fall 2016
Teaching Assistant for CS 555, Numerical Methods for PDEs Spring 2015
Teaching Assistant for TAM 335, Introductory Fluid Mechanics Fall 2014
Instructor of 3 lab sections

University of Oklahoma — Norman, OK, USA

Engineering Dean's Leadership Council Peer Tutor	2007-2009
Assisted students with homework assignments and understanding of course material; worked with the Multicultural Engineering Program to promote success for minority students	

Programming & Software

Languages with significant programming experience: **C/C++**, **Python**, **Fortran** (90/95), Matlab
Parallel implementation: **OpenMP**, some experience with MPI

Awards & Honors

Recipient of Early Career Travel Award for SIAM Conference on Applied Linear Algebra	2018
Invited participant of "Integral Equation Methods, Fast Algorithms and Their Applications to Fluid Dynamics and Materials Science" International Program <i>Institute for Computational and Experimental Research in Mathematics (ICERM) and Hong Kong University of Science and Technology (HKUST)</i>	2017
Named to "List of Teachers Ranked as Excellent by Their Students" <i>TA for TAM 335, Introductory Fluid Mechanics</i>	Fall 2014
University of Illinois Computational Science & Engineering Fellow	2011-2013
University of Illinois Carver Fellow <i>One of four incoming graduate students chosen across the College of Engineering</i>	2010-2011
Outstanding Sophomore in Mechanical Engineering	2007-2008
Member, Tau Beta Pi & Pi Tau Sigma	

Service

Officer for MechSE Graduate Women student organization	2012-2014
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