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, Computers and Mathematics with Applications 79(4), 2020

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—Aug. 2019
Advisor: Adrianna Gillman

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

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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 2017
Institute for Computational and Experimental Research in Mathematics (ICERM) and Hong Kong University of Science and Technology (HKUST)

Named to "List of Teachers Ranked as Excellent by Their Students" Fall 2014
TA for TAM 335, Introductory Fluid Mechanics

University of Illinois Computational Science & Engineering Fellow 2011-2013

University of Illinois Carver Fellow 2010-2011
One of four incoming graduate students chosen across the College of Engineering

Outstanding Sophomore in Mechanical Engineering 2007-2008

Member, Tau Beta Pi & Pi Tau Sigma

Service

Reviewer for:
Journal of Scientific Computing
Parallel Computing

Officer for MechSE Graduate Women student organization 2012-2014