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Overview

Skilled in **computational science** and **physics-based mathematical modeling**, with extensive experience in computational fluid dynamics, computational electromagnetism and large-scale optimization.

Education

Massachusetts Institute of Technology, Cambridge, MA
Ph.D. Candidate in Applied Mathematics (GPA: 4.9/5.0) Jan 2013
Relevant Coursework: Fluid Mechanics, Electromagnetism, Numerical Methods, Optimization.
City University of Hong Kong, Hong Kong
M.Sc. in Applied Mathematics (GPA: 4.0/4.3) June 2007
B.Sc. with First Class Honors in Computing Mathematics (GPA: 4.23/4.3) May 2005

Research Experience

MIT Department of Mathematics, **Research Assistant** July 2008 – Present

***Control fluid instability*:** Theoretically and computationally studied the breakup phenomenon of multiple-fluid system due to surface tension, with applications in nanoparticle fabrication and fiber-device manufacturing.

- Built and analyzed the mathematical model for the capillary instability of concentric multiple fluids.
- Implemented full 3D Stokes simulations by spectral and level-set methods with C, MATLAB and OpenMP.
- Provided guidance for material selections and design parameters in fiber-drawing experiments.
- Carried out theoretical calculations and performed simulations for collaborative work published in *Nature*.
- Presented results at the 63rd Annual Meeting of the APS Division of Fluid Dynamics.

***Design optical cavity*:** Novel large-scale optimization of 3D optical cavity design for strong confinement of light.

- Developed well-posed and scalable methodology for PDE-constrained optical cavity optimization.
- Implemented full 3D Maxwell's equation frequency domain parallel solver with C, PETSc and MPI.
- Ran large simulations with 3000 CPUs on supercomputer Kraken and optimized the code performance.
- Obtained optimized cavity structure four times better than well-studied hand designs in the literature.
- Presented results at the 2012 Annual Meeting of Society for Industrial and Applied Mathematics.

Leadership/Activities

MIT Ab-initio Physics Research Group, **Linux System Administrator** Aug 2010 – Present

- Installed and maintained 200-CPU Linux cluster. Supported the use of high performance computing.

MIT Department of Mathematics, **Course Section Leader** Jan 2010 – May 2010

- Guided 20 undergraduates to solve problems in class, twice a week. Rated 6.2/7.0 for TA effectiveness.

China Undergraduate Mathematical Contest in Modeling (First Prize) Nov 2003

- Built deterministic SARS model using ODEs and accurately estimated number of SARS cases in Beijing.

Mathematical Contest in Modeling (MCM), USA (Meritorious Winner) Mar 2003

- Determined the size, location, and number of cardboard boxes needed to cushion a stunt-person's fall.

Awards and Honors

SIAM Student Travel Award July 2012
MIT Akamai Presidential Fellowship Sep 2007
College Medal of the College of Science and Engineering, City University of Hong Kong June 2005

Publications

2 first author; 3 co-author; 2 conference presentations; 1 first author manuscript in preparation.

Selected most significant articles:

- Microcavity optimization via the frequency-averaged local density of states. *In preparation.*
- Structured spheres generated by an in-fibre fluid instability. ***Nature***, 2012.
- Linear stability analysis of capillary instabilities for concentric cylindrical shells. ***Journal of Fluid Mechanics***, 2011.