

Jason M Larkin

jasonlarkin84@gmail.com

412-398-8813
4763 Sherwood Dr
Pittsburgh, PA 15236

EDUCATION

Carnegie Mellon University, Pittsburgh, PA

Ph.D. Mechanical Engineering GPA: 3.9

2009-2013

Thesis: Thermal Modeling of Disordered Materials

- Explored molecular dynamics (**MD**) and lattice dynamics (**LD**) based methods for predicting thermal properties of disordered alloys, glasses, and organic/inorganic hybrids, confirming the phenomenological high-scatter limit.
- Predicted propagating modes in amorphous materials using large-scale models, comparing with recent experimental/theoretical predictions.
- Predicted the thermal properties of solar-energy material Fullerene-derived PCBM with the lowest thermal conductivity of a fully-dense solid, the origin of which is due to increased-scattering from the organic molecules.
- Performed **ab initio** calculations on phase-change materials (PCM) and fit classical interatomic potentials to study their thermal properties.

Advisor: Alan J.H. McGaughey

Coursework: molecular and electron structure simulation, nanoscale transport phenomena.

University of Pittsburgh, Pittsburgh, PA

M.S. Mechanical Engineering GPA: 3.7

2007-2009

Thesis: Statistics of Particle Concentrations in Free-Surface Turbulence

- Performed experiments using novel 2D and 3D flow configurations, optical lasers and lenses, high-speed photography, and automation.
- Showed the difference between inertial and viscous flow regimes of a 2D turbulent flow, which controls the concentration dynamics of passively-advected particulates in oceanic and atmospheric flow.

Advisor: Walter I. Goldburg

Coursework: quantum and statistical physics, chaos and nonlinear phenomena.

B.S. Mechanical Engineering GPA: 3.2

2007-2009

Research: modeling of novel flow chamber to study development of aneurysms.

- Used Finite Element Analysis (FEA) to design a model arterial bifurcation for *in vitro* study.

EXPERIENCE

Carnegie Mellon University

Teaching Assistant - 24-322: Heat Transfer

2010-2012

- Topics in conduction, convection, and radiation. Supervised recitations and substituted for lectures.

University of Pittsburgh

Assistant - Advanced Fluid Mechanics

Teaching

2008 - Topics in fluid

mechanics including viscous flow, boundary layer theory, and scale similarity.

Lecturer - Physics

2007-2009

Lectured to undergraduate students, graduate students, and faculty on mathematics, turbulence, bio-physics, statistical physics, and nonlinear phenomena.

Precision Therapeutics

Intern - Technology Development

2006-2007

- Worked with team of software developers, information technology specialists, and laboratory equipment specialists.
- Computer-aided drafted and designed (**CADD**) components of optical microscopes and automation controls.
- Assisted in fabrication of microscope components and laboratory equipment.

SKILLS

Computing Languages: Matlab, Python, Latex, Shell, Fortran, C/C++, Java, Perl, Markdown, HTML

High-Performance Computing: linux/unix cluster administration/computing, parallel computation (MPI, OpenMP), mixed-language development, open-source development

General Computing: linux/unix, Windows, Microsoft Office, Mac OS

Modeling: atomistic/molecular simulation, quantum chemistry, nanoscale transport, statistical and non-linear systems, turbulent flow

Hardware: general computing hardware, linear optics, visible lasers, DI/DO AI/AO interfaces, simple automation, high-speed video capture, simple machining, simple circuitry

PROJECTS

Quantum Mechanics-Driven Prediction of Nanostructure Thermal Conductivity	2011-2013
- Served as an investigator for this project under the Air Force Office of Scientific Research (AFOSR) with collaborators at Carnegie Mellon and the University of Pittsburgh, performing calculations on the Department of Defense's (DOD's) High Performance Computing (HPC) system as part of the High Performance Computing Modernization Program (HPCMP).	
ntpy	2012-Present
- Created this open-source, collaborative effort between members of the Nanoscale Transport Phenomena Laboratory (NTPL) and the University of Toronto, hosted on Github.	
disorder	2012-2013
- A comprehensive repository of open-source code and data from my PhD thesis, hosted on Github.	
GULP: General Utility Lattice Program	2012-2013
- Worked with Julian D. Gale at the Nanochemistry Research Institute at Curtin University, Perth Australia to contribute several subroutines for predicting thermal properties.	

PUBLICATIONS

- **J.M. Larkin**, A.J.H. McGaughey, "Origin of the Exceptionally Low Thermal Conductivity of Fullerene Derivative PCBM Films", *Phys. Rev. B* (in progress).
- **J.M. Larkin**, A.J.H. McGaughey, "Vibrational Mean Free Paths in Amorphous Systems", *Phys. Rev. B* (in progress).
- A.J.H. McGaughey and **J.M. Larkin**, "Predicting Phonon Properties from Equilibrium Molecular Dynamics Simulations", *Advances in Heat Transfer* Volume 17 (Academic Press, 2013).
- **J.M. Larkin**, A.J.H. McGaughey, "Predicting Alloy Vibrational Mode Properties using Lattice Dynamics Calculations, Molecular Dynamics Simulations, and the Virtual Crystal Approximation", *J. of App. Phys.* (in press).
- **J. M. Larkin**, A.D. Massicotte, J.E. Turney, C.H. Amon, A.J.H. McGaughey, "Comparison and Evaluation of Spectral Energy Methods for Predicting Phonon Properties", to appear in *J. Comp. and Theo. Nano.*
- S. Stefanus, **J. Larkin**, W. Goldburg, "A Search for Conformal Invariance in Compressible Two Dimensional Turbulence", *Phys. Fluids* **23** (2011) 105101 (appeared on cover).
- **J. Larkin**, W. Goldburg, M.M. Bandi, "Time-Evolution of a fractal distribution: Particle concentrations in free-surface turbulence", *Physica D* **239** 14 (2010) 1264-1268.
- **J. Larkin**, W. Goldburg, "Decorrelating a Compressible Turbulent Flow: an Experiment", *Phys. Rev. E* **82**, 016301 (2010).
- **J. Larkin**, M.M. Bandi, A. Pumir, W. Goldburg, "Power-law distributions of particle concentration in free-surface flows", *Phys. Rev. E* **80**, 066301 (2009).

PRESENTATIONS (15 TOTAL)

- "Evaluation of the Virtual Crystal Approximation for Predicting Thermal Conductivity", **J.M. Larkin (speaker)**, A.J.H. McGaughey, presented at 2013 MRS Spring Meeting San Francisco, CA.
- "Ordered and Disordered Contributions to Lattice Thermal Conductivity", **J.M. Larkin (speaker)**, A.J.H. McGaughey, presented at 2012 PHONONS Conference Ann Arbor, MI.
- "Comparison of Spectral Energy Methods for Predicting Phonon Properties", **J.M. Larkin**, A.D. Massicotte, J.E. Turney, C.H. Amon, A.J.H. McGaughey (speaker), presented at 2012 ASME Micro/Nanoscale Heat & Mass Transfer International Conference Atlanta, GA (top 5 technical paper).
- "Predicting Thermal Conductivity of Defected Systems using the Spectral Energy Density", **J. Larkin (speaker)**, A.J.H. McGaughey, 2011 MRS Fall Meeting Boston, MA.
- "Predicting Thermal Conductivity of Defected Systems using the Spectral Energy Density", **J. Larkin (speaker)** 2011 Bennett Presentation (Award for Best Presentation).
- "Statistics of Preferential Particle Concentration in Free-Surface Turbulence", **J. Larkin (speaker)**, M.M. Bandi, W. Goldburg, 2009 American Physical Society March Meeting Pittsburgh, PA.
- "Turbulent Dynamics of a Hydraulic Jump in two dimensions: Soap Film Flow" **J. Larkin (speaker)**, W. Goldburg, T. Tran, P. Chakraborty, G. Goia, 2008 Meeting of the APS Division of Fluid Dynamics San Antonio, TX.
- "The Generalized Fractal Dimensions of a 2-D Compressible Turbulence", **J. Larkin (speaker)**, M.M. Bandi, W. Goldburg, 2008 American Physical Society March Meeting New Orleans, LA.

AWARDS

Northrop-Grumman Fellow, Carnegie Institute for Complex Engineered Systems (ICES)	2011
NSF Graduate Student Research Grant, University of Pittsburgh Dept. of Physics	2007-2009

MEMBERSHIPS

American Physical Society, American Society of Mechanical Engineers, Materials Research Society, Society of Industrial and Applied Mathematics, DOD High Performance Computing Modernization Program.
