SarahBeetham

PhD candidate, University of Michigan

contact

snverner@umich.edu

programming

C++, MATLAB, Fortran & LaTeX

software packages

OpenFOAM, NX Ideas, Inca (ETAS), COMSOL Multiphysics, Git, emacs, deal.ii

patents

US9254786 B2 "Vehicle Horn Control Assembly," 2016
US9150187 B1 "Curtain Airbag Assembly", 2015
US8973941 B2 "Vehicle Interior Trim Panel," 2015
US2011201888 A1 "Medical Devices and Methods", 2011

awards

ME nominee, Beyster Fellowship (2020)
4th place, scientific visualization, Engineering Graduate Research Symposium (2020)
3rd place, poster competition, MICDE Symposium (2018)
GSRF, NSF (2016)
MICDE Fellowship (2016)
Design for Six Sigma Black Belt, GM (2015)
Innovation Award, Nissan (2013)
Roger M. Jones Fellowship, UM (2011)
Marion Sarah Parker Scholar , UM (2009)
Undergraduate Research Fellowship, NSF (2009)
DiamlerChrysler Chancellor Scholarship, UM (2008)

education

2016–present **PhD** candidate — The University of Michigan, Ann Arbor
Mechanical Engineering and Scientific Computing
2016 National Science Foundation Graduate Research Fellow.
Anticipated graduation: July 2021

2010–2011 **Master** of Fine Arts in Creative Writing — The University of Southampton, United Kingdom
Funding provided by the Roger M. Jones Fellowship Abroad.

2006–2010 **Bachelor** of Science in Mechanical Engineering — The University of Michigan, Ann Arbor

publications

Beetham, S., Capecelatro, J. (2020). Sparse identification of multiphase turbulence closures for coupled fluid–particle flows. Journal of Fluid Mechanics (under review), arXiv:submit/3138409

Beetham, S., Capecelatro, J. (2020). Formulating turbulence closures using sparse regression with embedded form invariance. Physical Review Fluids. 5, 084611.

Beetham, S., Capecelatro, J. (2019). Biomass pyrolysis in fully-developed turbulent riser flow. Renewable Energy. 140, 751-760.

Verner, S., Garikipati, K. (2018). A computational study of the mechanisms of growth-driven folding patterns on shells, with application to the developing brain. Extreme Mechanics Letters, 18:58-69.

Narayanan, H., **Verner, S.**, Mills, K, Kemkemer, R., Garikipati, K. (2010). In silico estimates of the free energy rates in growing tumor spheroids. Journal of Physics: Condensed Matter, 22:1-16.

communication skills

Oral Presentations

"Heat transfer in strongly-coupled gas-solid flows"

American Physical Society, Division of Fluid Dynamics, Chicago, IL (virtual), November 2020

American Institute of Chemical Engineering, San Fransisco, CA (virtual), November 2020

"Modeling of multiphase turbulence using sparse regression with embedded invariance."

American Physical Society, Division of Fluid Dynamics, Seattle, WA, November 2019

American Institute of Chemical Engineering, Orlando, FL, November 2019

National Energy Technology Laboratory Workshop, Morgantown, WV, August 2019

Pan-American Congress of Applied Mechanics, Ann Arbor, MI, May, 2019

American Physical Society, Division of Fluid Dynamics, Atlanta GA, November 2018

National Energy Technology Laboratory Workshop, Houston TX, August 2018

"Pattern and morphogenesis of cortical folding."

US Congress for Computational Mechanics, Montreal QC, July 2017

Poster Presentations

NSF Workshop: New Frontiers of Thermal Transport, December 2020
Multiphase Flow Workshop, Burgers Program, University of Maryland, June 2019

Women in Data Science Annual Workshop, May 2019

Michigan Institute for Computational Discovery and Eng. (MICDE) Symposium, April 2019

Michigan Institute for Computational Discovery and Eng. (MICDE) Symposium, April 2018

involvement

2019-2020, **Science Communications fellow**
2019-2020, **Mechanical Engineering Graduate Council**, Diversity Co-chair
2019-present, **GradSWE**, Member, Friendtorship mentor
2018-present, **Women in High Performance Computing**, Member & Mentee
2013-2016,**Livingston Symphony Orchestra, Violinist, Board Member**, graphic designer.
2012-2014, **Nissan Women's Business Synergy Team** (WBST), Member
2013-2014, **WBST**, Community Co-Chair and Career Chair.
2013, **Michigan Automotive Summit**, Panelist
2011-2013, **St. Clair Shores Symphony Orchestra**, Violinist
2009,2011, **High School Tutor**, Calculus,
2010-2011, **Southampton University Symphony Orchestra & Sinfonietta**, Violinist
2010-2011, **University of Southampton Creative Writing Anthology**, Editor
2009-2010, **Michigan Pops Orchestra**, Violinist and graphic designer
2009-present, **Pi Tau Sigma, Pi Rho Chapter**, member

academic experience

2017–present **Capecelatro Research Group** — University of Michigan, Ann Arbor
Graduate Research Assistant
- Development of data-driven techniques for developing tractable, accurate multiphase turbulence model closures across scales.
- Analysis of the role multiphase effects (e.g. clustering) have on complex, reactive flows, such as biomass pyrolysis.

2016–2017 **Computational Physics Group** — University of Michigan, Ann Arbor
Graduate Research Assistant
- (2016-2017) Conducted a parametric study to determine the underlying physics leading to asymmetric cortical folding, with specific application to the human fetal brain and central sulcus formation.
- (2008-2010) Applied principals of continuum mechanics and a tumor growth model to quantify the energy consumption required for solid tumor spheroid growth.

2015–2016 **Office of Academic Innovation** — University of Michigan, Ann Arbor
Course Advocate for Finite Element Methods (Coursera) and Continuum Mechanics (EdX)
- Developed course content (quizzes) and monitored forums for these Massively Open Online Classes (MOOCs)

2015–2016 **Ferris State University,** — Warren, MI
Adjunct lecturer
- Courses taught: "Quality Science Statistics" (MFGE 341: 3 credits, Winter 2015) & "Engineering Economics" (MFGE 423: 2 credits, Fall 2015)
- Developed course plans and lecture materials and delivered course lectures.

2007–2008 **Michigan Research Community** — University of Michigan, Ann Arbor
Undergraduate Peer Advisor
- Advised a group of 8 undergraduate students.
- Organized and facilitated a 1-credit course on research topics, with invited faculty speakers.

industry experience

2014–2016 **General Motors Corporation** — Milford, MI
Powertrain Calibration Engineer
- Responsible for the calibration of all engine air parameters for turbocharged engines: Gasoline, E100 and CNG.

2011–2014 **Nissan Technical Center North America** — Farmington Hills, MI
Safety & Restraints Design Engineer
- Led the Titan Truck team: managed budget for all safety commodities, coordinated design changes with cross-functional teams
- Championed value optimization activities for 2012 FY, achieved the 4.5% cost optimization target.
- Coordinated Tech Center Diversity activities as the NTCNA Diversity Champion

2010 **Carlson, Gaskey & Olds, P.C.** — Birmingham, MI
Intellectual Property Law Clerk
- Conducted patent searches for both patent prosecution as well as patent litigation cases and presented findings to senior members of the firm.
- Drafted background and claims for new patent applications.