Sayali Ravindra Kedari

kedarisa@mail.uc.edu | Website | LinkedIn | GitHub | Publications

Skills

- **Programming**: Python (numpy, pandas, scipy, sympy, scikit-learn, tkinter, Pyro), C++, Julia, C, MATLAB
- **FEA**: Abaqus
- **CAD**: CATIA V5, PTC Creo, Autodesk AutoCAD, SOLIDWORKS
- **OS**: Linux, Windows
- **Technologies**: Git

Experience

Graduate Researcher, Vemaganti Research Group, University of Cincinnati *2017 – present*

- Developing hierarchical Bayesian approaches for modeling and predicting the thermal and viscoelastic behavior of polymers.
- Developed optimal design of experiments based on information theory for soft biological materials and polymers.
- Employed Bayesian framework using Python, PyTorch, and message passing interface (MPI) for calibration and validation of viscoelastic material models.
- Simulated the nonlinear material response based on hyperelastic models for solids under different loads using Python, MATLAB.
- Implemented the parallel finite difference and additive Schwartz domain decomposition methods to solve the Poisson problem using C++, MPI.

Graduate Research Assistant, UC Simulation Center/Procter & Gamble *Aug 2018 – present*

- Collaborating with cross-functional design teams to resolve complex flow, thermal and mechanical challenges faced at P&G for optimizing and improving production turnovers for baby care products.
- Employed physics-based predictive-design and developed a digital twin to drive and outline process design and optimization guidelines for feminine care products using Python, Abaqus, Siemens Teamcenter, Solid Edge, MATLAB, and Fortran.

Instructor and Graduate Teaching Assistant, University of Cincinnati *Aug 2016 – Aug 2018*

- Instructed large enrollment (60 students) lab sessions of Applied Computational Methods.
- Assisted in teaching the courses of Applied Computational Methods, Solid Mechanics, Finite Element Method (FEM).
- Supervised students for the class projects based on Ansys, Abaqus and MATLAB.

Graduate Researcher, Computational Mechanics Laboratory, University of Kansas *May 2015 – Aug 2016*

- Implemented the FE simulation of elastic solids and viscous fluids based on the constitutive theories of heat vector and stress tensor using Fortran.
- Validated the constitutive theories using the model problems: 1D transient heat conduction in a rod, square lid-driven cavity.

Graduate Teaching Assistant, University of Kansas *Sept 2014 – May 2016*

- Instructed large enrollment (70 students) lab sessions of Physics and Digital Computational Methods.
- Tutored the students with learning differences for courses of Physics and Intermediate Mathematics.

Engineering Intern, Hindustan Aeronautics Limited, Bangalore, India *Dec 2013*

- Performed simulation of the wing tank refueling system and optimized the pressurization and transfer system of military aircraft

Education

University of Cincinnati (UC), Cincinnati, Ohio, US

Doctor of Philosophy (PhD) candidate in Mechanical Engineering, GPA 3.76/4.0 *Expected Mar 2022*

Advisor : Prof. Kumar Vemaganti, PhD

Research focus : Computational mechanics, numerical analysis, uncertainty quantification, machine learning

University of Kansas (KU), Lawrence, Kansas, US

Master of Science in Mechanical Engineering, GPA 3.84/4.0 *2016*

Thesis : Investigation of constitutive theories for heat conduction in solids and for deviatoric stress tensor in incompressible fluids

University of Pune, Pune, India

Bachelor of Engineering in Mechanical Engineering, first class with distinction *2014*

Senior design project : Computational fluid dynamics (CFD) analysis of filter assembly

Publications

- **Kedari, S. R.**, Atluri, G., Vemaganti, K., *A hierarchical Bayesian approach to regularization with application to the inference of relaxation spectra*, Journal of Rheology, in revision since (2021)
- Vemaganti, K., Madireddy, S., **Kedari, S.**, *On the inference of viscoelastic constants from stress relaxation experiments*, Mechanics of Time-Dependent Materials, (2019): 1-24
- Surana, K. S., Joy, A. D., **Kedari, S. R.**, Nunez, D., Reddy, J. N., Dalkilic, A. S., *A nonlinear constitutive theory for heat conduction in Lagrangian description based on integrity*, Journal of Thermal Engineering, Vol. 3, no. 6, Special Issue 6, (2017): 1615-1631
- Surana, K. S., Joy, A. D., **Kedari, S. R.**, Nunez, D., Reddy, J. N., Wongwises, S., *A nonlinear constitutive theory for deviatoric Cauchy stress tensor for incompressible viscous fluids*, Journal of Thermal Engineering, Vol. 3, no. 3 (2017): 1221-1240
- **Kedari, S. R.**, *Investigation of more complete constitutive theories for heat conduction in solids and for deviatoric stress tensor in incompressible fluids*, MS Thesis, KU (2016)

Projects

- Developed a production-ready software in C++, trained and tested a simple feedforward neural network model using PyTorch C++ application programming interface (API); applied it to the modified National Institute of Standards and Technology (MNIST) dataset.
- Implemented the A-star search optimization algorithm in the route planner problem, produced a replica of a system monitor, built a multithreaded traffic simulator using C++.
- NSF Cyber Carpentry: Data Life-Cycle Training – Containerized the published codes (in Python and R) for modeling the flood severity based on hydrology datasets of environmental conditions using Poisson regression and random forest, as Docker and Singularity images on Jetstream cloud; in collaboration with graduate/post-doctorates from different universities/national labs and fields ranging from statistics, biology to molecular dynamics over one week
- Implemented the global optimization algorithms (genetic algorithm (GA), particle swarm optimization (PSO)) to calibrate the soft tissue hyperelastic constitutive models and proved their advantage over the traditional least-squares approach using MATLAB, over two weeks.
- Performed FE modeling and simulation (M&S) of 1D wave propagation in solid continua using Fortran.

Relevant Graduate Coursework

- **Engineering**: Continuum mechanics, finite element method, high performance computing, advanced fluid mechanics, gas dynamics
- **Mathematics & applied statistics**: Learning probabilistic models, applied probability and stochastic processes, advanced numerical analysis, applied partial differential equations, calculus of variations and integral equations, decision engineering

Workshops

- **International HPC Summer School**, SciNet HPC Consortium, 2021
- **Abaqus/Explicit - Advanced Topics Training**, Dassault Systèmes, 2019
- **NSF Cyber Carpentry: Data Life-Cycle Training**, University of North Carolina at Chapel Hill, 2018

Honors & Achievements

- **CEAS Modeling & Simulation Fellowship**, UC Simulation Center/Procter & Gamble, 2018 – present
- **University Graduate Scholarship**, University of Cincinnati, 2016 – present
- **University Graduate Scholarship**, Government of Maharashtra, India, 2014 – 2015
- Certificate of appreciation for volunteering at "**YOU at KU**" **International Student Orientation**, University of Kansas, 2015
- Certificate of appreciation for **Engineering Mathematics** course, Bachelor of Engineering, India, 2011

References

- Available upon request