Spring 2024 SEAMTN Invited Seminar Series

Southeastern Advanced Machine Tools Network

Speaker
Bhagya Prabhune, Postdoctoral Research Associate, Oak Ridge National Lab (ORNL)

Date and time

Monday, April 1, 2024, 12 pm to 1 pm

Location
2030 Valley Vista Drive, Knoxville, TN

Title
Opportunities at the crossroads of additive manufacturing, topology optimization, and computational mechanics

Abstract
There are numerous opportunities and challenges at the intersection of advanced manufacturing, topology optimization, and computational mechanics. This talk covers three themes at their intersection. Firstly, additive manufacturing simulation, which is crucial in process control and defect detection, is computationally expensive due to the millions of degrees of freedom involved. My research involves the development and use of high-performance simulation tools for simulating AM processes for meso-scale (melt-pool) and part-scale simulation (residual stress prediction). Secondly, AM has made it possible to manufacture intricate multiscale structures, which have numerous advantages due to their high surface-to-volume ratio. My research is focused on graded multiscale TO for designing multiscale structures. Finally, analyzing complex structures designed for AM can pose severe challenges to mesh generators. To alleviate the meshing challenge, “tangled finite element method (TFEM)” has been developed that allows tangled (negative Jacobian) elements in the mesh.

Biosketch
Bhagya Prabhune is a postdoctoral research associate in Multiscale Materials group at ORNL. She earned her Ph.D. and M.S. degrees in Mechanical Engineering from the University of Wisconsin-Madison. She has been selected for the prestigious Rising Stars in Computational and Data Sciences Workshop 2024. Her research at ORNL involves simulating advanced manufacturing processes for metals and polymer composites using high performance computing and machine learning tools.