School of Engineering Seminar

SAN FRANCISCO STATE UNIVERSITY

Speaker:

Dr. Kedar Shete

PhD, Mechanical Engineering,
UMass Amherst

Date:

Tuesday
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1:00-1:50 PM

Location:

Hensill Hall (HH) 803

Advancing Clean Energy and Understanding Climate Change through the Study of Phase Changing Solid-Liquid Flows

Abstract: As our society decarbonizes its energy sources, it faces the challenge of managing intermittency in the supply of electric energy from variable energy sources and the changes in demand of electricity based on commercial and residential timetables. At the same time, thermal energy is a significant portion of our energy usage, and the storage and retrieval of thermal energy must be a part of any comprehensive energy system. Thus, long-duration energy storage (LDES) is one of the essential components of the future electric grid. Latent heat thermal energy storage (LHTES) has been proposed as an attractive LDES technology. The power capacity of LHTES depends on a variety of design-based and use-based factors. I shall discuss the relative importance of these factors, and how they may be harnessed to produce the next generation of LDES devices. The study of phase changing solid-liquid flows necessitates the use of coordinated experimental and numerical techniques. A number of buoyancy-driven melting flows, such as LHTES or even the melting of glaciers, require extreme-scale simulations to explore the large parameter space and complement experimental measurements. The turbulent boundary layer that forms on the transient solid-liquid interface needs investigation, especially when the flow involves the mixing of multiple scalars such as salt and heat. I shall discuss my approach to the problem of predicting melting behavior using experiments and large simulations, and the relevance of this study for addressing the issues of clean energy and climate change.

***Speaker Bio*:** Dr. Kedar Shete is a recent graduate from the University of Massachusetts Amherst in Mechanical Engineering. He was awarded the Industrial Assessment Center (IAC) Award for Excellence in Applied Energy Engineering Research 2020. He is currently a Co-PI on a supercomputing grant with National Renewable Energy Laboratory (22.8 million core hours) and Principal Investigator on a supercomputing grant at Argonne Leadership Computing Facility (ALCF, 1.2 million core hours), both awarded for the study of phase changing flows. He served as lead student of the UMass IAC from Sep 2017 to Dec 2022. Prior to that, he has conducted research related to the design of air-cooled heat exchangers, and fluidized bed risers. His current interests are phase changing solid-liquid flows, experimental studies of LDES and direct numerical simulations. Kedar is a member of American Physical Society, Division of Fluid Dynamics and a member-at-large of the Topical Group on Energy Research and Applications (GERA). He is a reviewer for Journal of Energy Storage.

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