

The Department of Mechanical Engineering Presents

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Title: Capillary Flows of Suspensions

Abstract: Interfacial flows of multiphase systems containing a dispersed solid or liquid phase occur in a broad range of manufacturing, environmental, and bioengineering processes. However, the classical capillary dynamics is strongly modified when the length scale of the liquid becomes comparable to the particle size. This configuration may lead to a failure of classical models based on a rheological approach. For instance, particles can destabilize thin-films, lead to defects in additive manufacturing, reduce transport efficiency, and result in the contamination of substrates. In this talk, I will present some of our recent studies that characterize the role of interfaces in suspension dynamics. I will first describe the formation of a thin-film of suspension on a substrate to illustrate how the particles are entrained and deposited depending on the flow configuration and suspension properties. I will discuss how these results can be used to develop passive capillary filtering and sorting mechanisms. The second part of the talk will characterize how particles can modify the formation of droplets and the atomization of suspension sheets and ligaments. Our approach, bridging different length and time scales, describes how the bulk behavior and local heterogeneities contribute to the dynamics of multiphase capillary objects.



About the Speaker: Alban Sauret is an Assistant Professor in the Department of Mechanical Engineering at UC Santa Barbara. He graduated with a BS and an MS in Physics from ENS Lyon (France) and earned a Ph.D. in Mechanical Engineering from the University of Aix-Marseille (France) in 2013. During his graduate studies, he was awarded a Geophysical Fluid Dynamics Fellowship from the Woods Hole Oceanographic Institution. He then worked as a Postdoctoral Fellow at Princeton University from 2013 to 2014 and then spent four years as a tenured CNRS Research Scientist in a joint academic and industrial laboratory, while also being a visiting research scholar at NYU Tandon School of Engineering. He joined UC Santa Barbara in 2018. His research aims at understanding the dynamics of multiphase systems. He is particularly interested in the couplings between the fluid dynamics, interfacial effects, and particle transport mechanisms involved in environmental and industrial processes. Alban Sauret was named a Soft Matter Emerging Investigators in 2017, was elected a UC Regents Junior Faculty Fellow in 2019, and received the NSF CAREER Award in 2020. His past results were highlighted in various media, including the Los Angeles Times, the Wall Street Journal, and Science Friday.

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