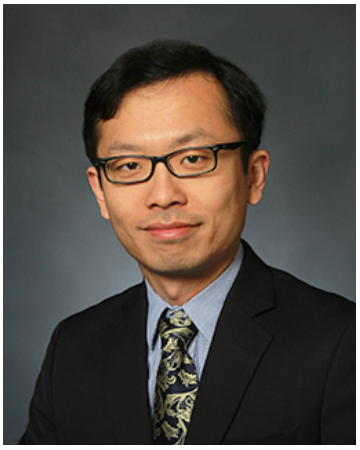
UNIVERSITY OF MARYLAND

THE BURGERS PROGRAM FOR FLUID DYNAMICS PRESENTS THE JOINT FLUID DYNAMICS REVIEWS AND AEROSPACE ENGINEERING SEMINAR

STRONG COUPLINGS BETWEEN DEFORMING BUBBLES AND TURBULENCE



Thursday, October 4, 2018 | 3:00 pm
2164 Martin Hall, DeWALT Seminar Room

Guest Speaker

DR. Rui Ni

Assistant Professor
Department of Mechanical Engineering
Johns Hopkins University

ABSTRACT

A persistent theme throughout the study of multiphase flows is the need to model and predict the detailed behaviors of all involved phases and the phenomena that they manifest at multiple length and time scales. When combined with background turbulent flows with similar multiscale nature, they pose a formidable challenge, even in the dilute dispersed regime. For many applications, from nuclear thermal hydraulics to bubble-mediated air-sea gas exchange, the dispersed phase often consists of many bubbles, bounded by surface tension and separated from the surrounding fluid by a deformable interface. Although many analytic and empirical models of multiphase flows have been formulated strictly for spherical or spheroidal particles with fixed shapes, in turbulent flows, finite-sized bubbles are constantly deforming with altogether different dynamics and momentum couplings over a wide range of scales. In this talk, I will share some ongoing efforts on developing new experimental facilities and techniques to simultaneously measure both the bubble deformation and surrounding turbulent flows in a Lagrangian framework. These preliminary results unveil different mechanisms of bubble deformation and breakup and will help to validate future closure models for Eulerian-Eulerian and Eulerian-Lagrangian two-fluids simulations in a turbulent environment.

BIO

Dr. Ni recently joined the Johns Hopkins University as Assistant Professor of Mechanical Engineering in 2018. Before this position, he was the endowed Kenneth K. Kuo Early Career Professor at Penn State since 2015. He received his Ph.D. in Physics Department in 2011 from the Chinese University of Hong Kong and worked as a postdoctoral scholar at Yale and Wesleyan University. He won the NSF CAREER award in fluid dynamics and ACS-PRF New Investigator Award in 2017. His primary research focus is the development of advanced experimental methods for understanding gas-liquid and gas-solid multiphase flow as well as two-phase heat transfer problem. His other research interests include collective animal behaviors and physiological flows.

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