JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Weekly CEAFM Seminar: Spring 2013

Date: **Friday, March 1, 2013**

Time: 11:00 AM

Location: Gilman 50 (Marjorie M. Fisher Hall)

Speaker: **Dr. Philippe M. Bardet** (George Washington University)

Title: ***"Micro-Physics of Air Entrainment on Free Surfaces"***

Abstract

Air entrainment from micro-disturbances in the liquid or gas phases has not been systematically studied and still eludes fundamental understanding. However, such processes are present in a multitude of multiphase flows found, for example, in nuclear reactors, surface ships, or environmental flows. High-spatio-temporal resolution subsurface velocity fields have been acquired in an experimental facility designed for validating high-fidelity multiphase CFD models. Micro-particle image velocimetry coupled with planar laser induced fluorescence have been developed to resolve steep mm-scale waves and bubble formation on the surface of a disturbed free surface. These techniques are also being used to characterize surface renewal rate and a variety of air entrainment mechanisms resulting from vortices in the liquid phase. By providing tractable and highly resolved velocity data on bubble entrapment, this work lays the foundation for future experimental and numerical studies of multiphase regimes transitions. Data acquired here will also facilitate the understanding of the complex processes in turbulent flows as well as the identifications and rankings of bubble sources.

Bio

Philippe Bardet is an Assistant Professor at the Mechanical and Aerospace Engineering Department at the George Washington University (GW). He received his Ph.D. from the University of California at Berkeley in 2006. After his doctoral studies, Dr. Bardet was a lecturer and postdoctoral fellow at UC Berkeley, before postdoctoral training at the California Institute of Technology. He joined the Faculty at GW in August 2010. His current research is focused on understanding vorticity interaction with liquid-gas interfaces resulting in air entrainment and atomization, instabilities and vortex breakdown in swirling jets, and Fluid-Structure Interactions in nuclear reactor cores during seismic events. His research group is currently developing non-intrusive laser diagnostics for measuring water vapor temperature and dissolved gas concentration in liquids. Dr. Bardet teaches courses in Fluid Mechanics, Thermodynamics and Experimental Methods.