

**Center for Fluid Mechanics, Division of Applied Mathematics  
Fluids, Thermal and Chemical Processes Group, School of Engineering  
Joint Seminar Series**

**TUESDAY – OCTOBER 9, 2012**

**3:00pm**

**Barus & Holley, Room 190**

**Dr. Jesse Belden  
Naval Undersea Warfare Center  
Newport, RI**

**Imaging for New Science and New Science for Imaging**

Across many scientific fields, imaging is an integral tool that leads to the discovery and description of new phenomena. On the other hand, the science of imaging itself has advanced to push the boundaries of experimental techniques. This talk will present research along each of these fronts as we discuss the physics of water skipping elastic spheres and novel three-dimensional (3D) light field imaging for fluid flows (and beyond). In the former, we make use of high speed imaging to discover the physical mechanisms responsible for the magnificent water skipping properties of certain highly deformable spheres. It will be shown that the highly compliant nature of the spheres is responsible both for the enhanced skipping behavior and an unexpected fluid-structure interaction mode involving material waves that propagate in the spheres. The latter research relates to the development of a novel 3D imaging method and its application to fluid flows densely packed with bubbles, droplets and/or particles. The technique enables measurements that are difficult or impossible to achieve with most existing quantitative imaging methods. Finally, preliminary results from the extension of the 3D imaging method to field study of the collective behavior of animal groups are presented.