



JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Weekly CEA FM Seminar: Spring 2014

Date: **Friday, March 14, 2014**
Time: 11:00 AM
Location: Gilman # 50 (Marjorie M. Fisher Hall)
Speaker: **Dr. Melissa Green** (Syracuse University)
Title: ***“Eulerian and Lagrangian methods for coherent structure analysis of vortex-dominated flows”***

Abstract

There are a variety of tools and methods available to identify and investigate coherent structures in a range of vortex-dominated fluid flows, from both computational and experimental data. Eulerian criteria, such as the Q or swirl, use the instantaneous velocity field and its gradient and are less computationally intensive and give a good indication of the vortex cores. The definition of vortices, however, can be subjective, and they do not capture structure boundaries. Lagrangian techniques, such as the Finite-time Lyapunov exponent, calculate criteria values along particle trajectories, making them more computationally expensive, but they yield objective structure boundaries. For a thorough investigation of both numerically simulated and experimentally measured vortex-dominated flows, inclusion of both techniques can provide the most information. This is demonstrated with results from both simulation and experiments of a circular cylinder in cross-flow, and an experimentally investigated bio-inspired propulsor (fish-fin swimming).