Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Development of Turbulence Downstream of a Submerged Aquatic Canopy[1] FRANCISCO ZARAMA, ROBERT ZELLER, JEFFREY KOSEFF, Stanford University — Submerged aquatic canopies are present throughout nature in the form of seagrasses, corals, and other sessile organisms. The turbulence generation mechanisms of these systems have been explored, but the effect of the turbulent signature on the flow downstream is poorly understood. Moreover, the drag created by these canopies will create a lingering velocity deficit. These lasting effects of the canopy may have profound effects on downstream mixing, sediment dynamics, and propagule transport. The present study focuses on the adjustment of turbulence and flow characteristics downstream of a model canopy. Specifically, this work examines the evolution of mean velocity, TKE and Reynolds stresses using both acoustic velocimetry and 2D particle image velocimetry. To determine the dependencies of the downstream evolution, these experiments vary canopy height and current velocity. As expected, preliminary results show the flow evolves in distinct phases with changes in the mean statistics happening early, while the turbulence statistics adjust further downstream. Moreover, the mean flow takes a monotonic path towards the steady-state boundary layer, but the Reynolds stresses and TKE grow and spread towards the surface and bottom boundary before relaxing to the steady-state.

[1]FJZ is supported by an NSF Graduate Research Fellowship grant number DGE-114747. Work is supported by the Woods Institute for the Environment.

Francisco Zarama
Stanford University

Date submitted: 31 Jul 2014 Electronic form version 1.4