Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Turbulent intensity Enhancement by gaps in submerged Canopy Flows HAYOON CHUNG, TRACY MANDEL, MARGARITA DRONOV, JEFFREY KOSEFF, Stanford University — Canopies such as seagrass alter their dynamical environment by impacting the flow and turbulent structures. However, unlike well-studied systems in which fully developed boundary layers encounter homogenous and uniform canopies, many aquatic canopy systems display patchiness, e.g. gaps and clearings, that impact the flow, and also interact with velocity fields that are still developing. Therefore, what are the impacts of gaps, both locally and at the canopy scale? We conducted experiments in a recirculating flume with a model vegetation canopy. The canopy is broken up by gaps of varying lengths, and velocity and turbulence measurements were made in the gaps and wakes. Observations suggest that gaps effect the decay of the mixing layer in the gap before it re-enters the downstream canopy segment. The ML decays into a more linear profile, and spreads more shear and turbulent intensities throughout the water column, particularly higher up away from the canopy roughness. Therefore, when compared to an uninterrupted homogenous canopy, the fragmented canopy experiences enhanced turbulent energy at various locations along the canopy. We studied the impact of gap lengths on the extent of turbulence enhancement, and the extent to which the disturbance propagates along the canopy.

Hayoon Chung
Stanford University

Date submitted: 01 Aug 2019 Electronic form version 1.4