Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Non-invasive estimation of coral tentacle material properties using underwater PIV data[1] ANNE STAPLES, Virginia Tech, SHAI ASHER, URI SHAVIT, Technion - Israel Institute of Technology — With corals worldwide currently undergoing a third global bleaching event, understanding a detailed picture of local coral colony flow transport processes is more crucial than ever. Many coral species invest energy in extending flexible organs such as tentacles, that extrude from the coral's soft tissue surface and are used in either a passive or active manner for feeding, competitor sensing and even egg release. The significant role of these organs in transport and mixing processes is just beginning to be understood. For example, *Xeniidea*'s rhythmic pulsation of its tentacles has recently been shown to intensify mixing and enhance photosynthesis (Kremien et al., 2013). A critical part of modeling these tentacle-induced flows is obtaining measurements of the tentacles' material properties. Obtaining such measurements, however, is challenging, since the *tentacle is expected to have significantly different material properties than a harvested specimen.* Here, we demonstrate a non-invasive, *in situ* approach for estimating these material properties for *Favia favus* tentacles using underwater particle image velocimetry (PIV) data and tentacle-tracking data, along with structural dynamics models of the tentacles. In this data, 2.7x2 [cm^2] 1392x1024 pixel images were collected at a rate of 5 Hz 7mm above the crest of two separate *Favia Favus* colonies in Eilat, Israel. Using the data and models, we are able to estimate the Young's modulus for the tentacles, which is found to be a function of the wave frequency.

[1]Partial funding by the Fulbright and Israel Science Foundations

Anne Staples
Virginia Tech

Date submitted: 01 Aug 2016 Electronic form version 1.4