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Applying IR Tomo PIV and 3D Organism Tracking to Study Turbulence Effects on Oceanic Predator-Prey Interactions[1] DEEPAK ADHIKARI, MICHAEL HALLBERG, University of Minnesota, BRAD GEMMELL, Marine Biological Laboratory, ELLEN LONGMIRE, University of Minnesota, EDWARD BUSKEY, University of Texas at Austin — The behavorial response of aquatic predators and prey depends strongly on the surrounding fluid motion. We present a facility and non-intrusive instrumentation system designed to quantify the motions associated with interactions between small coral reef fish (blennies) and evasive zooplankton prey (copepod) subject to various flow disturbances. A recirculating water channel facility is driven by a paddlewheel to prevent damaging the zooplankton located throughout the channel. Fluid velocity vectors surrounding both species are determined by time-resolved infrared tomographic PIV, while a circular Hough transform and PTV technique is used to track the fish eye in three-dimensional space. Simultaneously, zooplankton motions are detected and tracked using two additional high-speed cameras with IR filters. For capturing larger scales, a measurement volume of 80 x 40 x 18 mm is used with spatial resolution of 3.5 mm. For capturing smaller scales, particularly for observing flow near the mouth of the fish during feeding, the measurement volume is reduced to 20 x 18 x 18 mm with spatial resolution of 1.5 mm. Results will be presented for both freshwater and seawater species.

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