Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Swimming of a Tiny Subtropical Sea Butterfly with Coiled Shell
DAVID MURPHY, FERHAT KARAKAS, University of South Florida, AMY MAAS, Bermuda Institute of Ocean Sciences — Sea butterflies, also known as pteropods, include a variety of small, zooplanktonic marine snails. Thecosomatous pteropods possess a shell and swim at low Reynolds numbers by beating their wing-like parapodia in a manner reminiscent of insect flight. In fact, previous studies of the pteropod *Limacina helicina* have shown that pteropod swimming hydrodynamics and tiny insect flight aerodynamics are dynamically similar. Studies of *L. helicina* swimming have been performed in polar (0 degrees C) and temperate conditions (12 degrees C). Here we present measurements of the swimming of *Heliconoides inflatus*, a smaller yet morphologically similar pteropod that lives in warm Bermuda seawater (21 degrees C) with a viscosity almost half that of the polar seawater. The collected *H. inflatus* have shell sizes less than 1.5 mm in diameter, beat their wings at frequencies up to 11 Hz, and swim upwards in sawtooth trajectories at speeds up to approximately 25 mm/s. Using three-dimensional wing and body kinematics collected with two orthogonal high speed cameras and time-resolved, 2D flow measurements collected with a micro-PIV system, we compare the effects of smaller body size and lower water viscosity on the flow physics underlying flapping-based swimming by pteropods and flight by tiny insects.

David Murphy
University of South Florida

Date submitted: 01 Aug 2017 Electronic form version 1.4