1036-76-64 **Saverio E Spagnolie*** (saverio@courant.nyu.edu), 251 Mercer St., New York, NY 10012, and **Michael J Shelley** (shelley@cims.nyu.edu), 251 Mercer St., New York, NY 10012. *Shape Changing Bodies in Fluid: Hovering, Ratcheting, and Bursting.* Preliminary report.

The locomotion dynamics experienced by a shape changing ellipsoid in a fluid are investigated numerically. The Navier-Stokes equations are solved in 2D on a time-dependent, body conforming grid. We find that a shape changing body may hover in an oscillating flow by exploiting periodic drag reduction, even against the downward pull of gravity. The body may similarly "ratchet" upwards in periodic bursts of positive velocities. Exact solutions are determined for a shape changing ellipsoid in a Stokes fluid under the influence of an oscillating body force. Various aspects of locomotion, such as vortex shedding dynamics and fluid/elastic-body interactions are subjects of active research, and our study relates to the experimental work of Childress, Vandenberghe, and Zhang (Phys. Fluids, 2006) on passive hovering in an oscillating airflow. We also explore a velocity burst experienced by a shape changing ellipsoid during a shape expansion in the direction of motion. This phenomenon is explored for a variety of Reynolds numbers and density ratios, and a momentum conservation argument is considered from which we recover the scalings observed in the simulations. (Received January 08, 2008)