Breaking Symmetry with Gravity: Two-Link Swimming Using Buoyant Orientation[1] LISA BURTON, Massachusetts Institute of Technology, ROSS HATTON, HOWIE CHOSET, Carnegie Mellon University, ANETTE HOSOI, Massachusetts Institute of Technology — Swimming at low Reynolds number requires the swimmer's motion to be non-reciprocal in order to break the time-reversal symmetry of the equations of motion. We demonstrate that a neutrally buoyant swimmer can achieve net motion simply by introducing a static separation between the centers of mass and buoyancy. In the presence of gravity, the swimmer passively reorients toward its natural equilibrium without changing shape. We derive the governing equations for the system and explain how to control swimming direction with parameter and stroke selection and discuss swimming efficiency for various strokes.

Lisa Burton
Massachusetts Institute of Technology