1105-92-163 **Austin J Baird*** (`baird@math.duke.edu`) and **Laura Miller** (`lam9@unc.edu`).
ELECTRO-DYNAMIC SUCTION PUMPING AT SMALL SCALES.

Dynamic suction pumping is characterized by a bidirectional elastic wave and a non-linear frequency flow relationship. This pumping mechanism has been proposed as the driving mechanism for the vertebrate embryonic heart at the tubular stage. In this study, we consider the tubular, valveless heart of a chordate, the Ascidian *Clavelina picta*. These hearts operate at a Womersley number of about 0.3. We investigate traditional dynamic suction pumping on these small scales and show computationally and experimentally that significant flow isn't achieved. We propose a different pumping mechanism that couples traveling waves of depolarization to the contraction of the boundary. Active contractile waves replace passive elastic waves, but the resulting kinematics are similar to dynamic suction pumping. This pumping mechanism can be computationally shown to drive fluid flow at the low Womersley numbers found in Ascidian hearts. We can then improve upon this mechanism by computationally modeling a rigid boundary which surrounds the elastic pumping region. This boundary is a means to computationally model the Pericardium, a rigid, pressurized, fluid filled structure which encloses the valveless Ascidian heart. (Received September 17, 2014)