1067-AE-1022 **Laura A Miller*** (lam9@email.unc.edu), CB 3250 Phillips Hall, Chapel Hill, NC 17178, and **Christina Hamlet** and **Arvind Santhanakrishnan**. *How jellyfish can inspire mathematics: A case study of the feeding currents generated by upside-down jellyfish.*

The jellyfish has been the subject of numerous mathematical and physical studies ranging from the discovery of reentry phenomenon in electrophysiology to the development of axisymmetric methods for solving fluid-structure interaction problems. In this presentation, we develop and test mathematical models describing the pulsing dynamics and the resulting fluid flow generated by the upside down jellyfish, Cassiopea. The kinematics of contraction and distributions of pulse frequencies were obtained from videos and used as inputs into numerical simulations. Particle image velocimetry was used to obtain spatially and temporally resolved flow fields experimentally. The immersed boundary method was then used to solve the fluid-structure interaction problem and explore how changes in morphology and pulsing dynamics alter the resulting fluid flow. Unlike pelagic (swimming) jellyfish, there is no evidence of the formation of a train of vortex rings. Instead, significant mixing occurs around and directly above the oral arms and secondary mouths. We found good agreement between the numerical simulations and experiments, suggesting that the presence of porous oral arms induce net horizontal flow towards the bell and mixing. (Received September 17, 2010)