1060-00-193   **Sanjay M Dharmavaram*** (`sd282@cornell.edu`), 112, Kimball Hall, Cornell University, Ithaca, NY 14850, and **Timothy J Healey** (`tjh10@cornell.edu`). *Phase Separation in Two Phase Lipid Membrane Vesicle.*

The aim of our work is to propose a model for two-phase lipid bilayers and use the Giant Unilamellar Vesicles (GUVs) as an example to test our theory (motivated by the experiments of Baumgart, et. al. - Nature, 425, (2003) p. 821). Although mean-field theories have been proposed to explain phase separation in multi-phase lipid bilayers, these theories usually introduce an ad-hoc curvature-phase coupling energy. Here, we instead, propose a model using a non-convex potential for in-plane effects and a bending potential energy which takes into consideration the change in thickness associated with each phase. The latter introduces a natural coupling between curvature and phase. We interpret the question of phase transition in the context of bifurcation theory and use group-theoretic strategies to show the existence of non-spherical bifurcated equilibria. These equilibria represent phase-separated states from the homogeneous vesicle and bear striking similarity to many of the non-spherical states observed in experiments. We further, perform numerical continuation and present results for some axisymmetric two-phase configurations. (Received March 30, 2010)