1063-76-245 **Fangxu Jing*** (fjing@usc.edu), 854 Downey Way, RRB101, Los Angeles, CA 90089, and **Eva Kanso** and **Paul K. Newton**. *Viscous evolution of point vortex equilibria: The collinear state.*

When point vortex equilibria of the 2D Euler equations are used as initial conditions for the corresponding Navier-Stokes equations (viscous), typically an interesting dynamical process unfolds at short and intermediate time scales, before the long time single peaked, self-similar Oseen vortex state dominates. In this paper, we describe the viscous evolution of a collinear three vortex structure that corresponds to an inviscid point vortex fixed equilibrium. Using a multi-Gaussian 'core-growth' type of model, we show that the system immediately begins to rotate unsteadily, a mechanism we attribute to a 'viscously induced' instability. We then examine in detail the qualitative and quantitative evolution of the system as it evolves toward the long-time asymptotic Lamb-Oseen state, showing the sequence of topological bifurcations that occur both in a fixed reference frame, and in an appropriately chosen rotating reference frame. The evolution of passive particles in this viscously evolving flow is shown and interpreted in relation to these evolving streamline patterns. (Received August 17, 2010)