The Finite Time Lyapunov Exponent Field of N Interacting Vortices in the Zero Viscosity Limit[1] RICHARD GALVEZ, Syracuse University, Vanderbilt University, MELISSA GREEN, Syracuse University — We present an analysis of the Finite Time Lyapunov Exponent (FTLE) field of interacting vortices in the potential flow limit. This work is based on an inviscid approximation, but develops a useful tool that will aid in the effort of understanding the interactions of vortices and turbulence in viscous fluids. The FTLE field of N interacting vortices is computed numerically in two dimensions in different physical scenarios: i) orbiting one another with no initial velocities, ii) approaching each other given an initial velocity and iii) as periodically produced behind a circular cylinder. For situation ii) we expand on the cases where the approach velocities of the vortices are less than or greater than a critical capture velocity, that is, the velocity necessary to escape a captured orbit between co-rotating vortices. We focus on the evolution and interaction of the Lagrangian coherent structures (LCS) in these scenarios to determine if there is a way to anticipate the character of vortex interaction by the initial structure of the LCS. Additional remarks will be made on the extrapolation of observations to a large number of interacting vortices (large N).

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