

Abstract Submitted
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A Method for Fast Computation of FTLE Fields STEVEN BRUNTON, CLARENCE ROWLEY, Princeton University — An efficient method for computing finite time Lyapunov exponent (FTLE) fields is investigated. FTLE fields, which measure the stretching between nearby particles, are important in determining transport mechanisms in unsteady flows. Ridges of the FTLE field are Lagrangian Coherent Structures (LCS) and provide an unsteady analogue of invariant manifolds from dynamical systems theory. FTLE field computations are expensive because of the large number of particle trajectories which must be integrated. However, when computing a time series of fields, it is possible to use the integrated trajectories at a previous time to compute an approximation of the integrated trajectories initialized at a later time, resulting in significant computational savings. This work provides analytic estimates for accumulated error and computation time as well as simulations comparing exact results with the approximate method for a number of interesting flows.

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