

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

An accurate computation of the flow map gradient SIAVASH AMELI, SHAWN SHADDEN, UC Berkeley — The flow map gradient (tangent map) is often used in dynamical systems for computation of Lagrangian coherent structures. In more sophisticated methods it is important to recover the complete spectrum of this operator, as well as the eigenvectors. Traditional methods to compute the tangent map using finite differencing often fail in accurately computing these quantities. Due to nonlinear effects of the flow, perturbations of trajectories mapped forward by the tangent map may grow excessively and they collapse on the dominant eigenvector of the map. We describe alternative techniques to overcome these issues. Both continuous or discrete QR factorization and singular value decompositions are used to automatically carry out computation of Lyapunov exponents and directions. Results on sum of Lyapunov exponents for divergent free flow, as well as sensitivity to integration time are compared in contrast to previous methods.

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Date submitted: 01 Aug 2014

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