Computation of Lagrangian Coherent Structures from their Variational Theory MOHAMMAD FARAZMAND, Mathematics and Statistics, McGill University, Canada, MANIKANDAN MATHUR, Laboratoire de Meteorologie Dynamique, Ecole Polytechnique, 91128 Palaiseau, France, GEORGE HALLER, Mechanical Engineering, McGill University, Canada — We describe a computational algorithm for detecting hyperbolic Lagrangian Coherent Structures (LCS) from a recently developed variational theory [1]. In contrast to earlier approaches to LCS, our algorithm is based on exact mathematical theorems that render LCS as smooth parametrized curves, i.e., trajectories of an associated ordinary differential equation. The algorithm also filters out LCS candidates that are pure artifacts of high shear. We demonstrate the algorithm on two-dimensional flow models and on an experimentally measured turbulent velocity field.

[1] G. Haller, A variational theory of hyperbolic Lagrangian Coherent Structures, *Physica D* **240** (2011) 574-598

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