

Abstract Submitted
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Simple computation of null-geodesics, with applications to vortex boundary detection MATTIA SERRA, GEORGE HALLER, Institute for Mechanical Systems, ETH Zurich — Recent results show that boundaries of coherent vortices (elliptic coherent structures) can be computed as closed null-geodesics of appropriate Lorentzian metrics defined on the physical domain of the underlying fluid. Here we derive a new method for computing null-geodesics of general Lorentzian metrics, founded on the geometry of geodesic flows. We also derive the correct set of initial conditions for the computation of closed null-geodesics, based on simple topological properties of planar closed curves. This makes the computation of coherent vortex boundaries fully automated, simpler and more accurate compared to the existing procedure. As an illustration, we compute objective coherent vortex boundaries in Oceanic and Atmospheric Flows.

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