

Weak diffeomorphisms for conservation laws

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Reformulating hyperbolic conservation laws in a Lagrangian form provides an equivalent description of the problem by means of particle paths. Research in this direction was pioneered by Arnold in 1966, who described the dynamics of an ideal fluid as a geodesic flow on the group of volume-preserving diffeomorphisms of a fixed domain. For systems which describe fluid flow, construction of particle paths follows naturally from the associated velocity field. However, the idea of a particle path can be extended to scalar equations and to systems which do not include velocity fields explicitly. In this talk, we demonstrate how to find a particle path in the form of a weak diffeomorphism, for any scalar conservation law having a smooth flux not necessarily convex, and establish such a particle path as an extremal of a related action functional.

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