HAMILTONIAN AND RIEMANNIAN GEOMETRY BEHIND COMPRESSIBLE FLUIDS

Boris Khesin

ABSTRACT. We describe a geometric framework to study Newton's equations on infinite-dimensional configuration spaces of diffeomorphisms and smooth probability densities. It turns out that several important PDEs of hydrodynamical origin can be described in this framework in a natural way. In particular, the so-called Madelung transform between the Schrödinger-type equations on wave functions and Newton's equations on densities turns out to be a Kähler map between the corresponding phase spaces, equipped with the Fubini–Study and Fisher–Rao information metrics.

This is a joint work with G. Misiolek and K. Modin.

University of Toronto, Toronto, Canada.