Fluid dynamics with Hall viscosity: variational approach
ALEXANDER ABANOV, Stony Brook University, GUSTAVO MONTEIRO, University of Campinas — Hall (odd) viscosity is a non-dissipative part of fluid stress tensor allowed in isotropic two-dimensional fluids with broken parity. In this work we formulate the variational principle for hydrodynamics of compressible fluids with Hall viscosity in arbitrary geometric and electromagnetic background fields as well as study the responses of such fluids to external perturbations. Using the developed variational approach we consider various constraints on fluid dynamics. Motivated by dynamics of quantum Hall droplets, we impose for example a constraint relating fluid vorticity to its density as suggested in [1]. We also consider various boundary conditions and applications of variational principle in studies of fluids with Hall viscosity. [1] M. Stone. Superfluid dynamics of the fractional quantum Hall state. Phys. Rev. B, 42, 212217 (1990).

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