

Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Odd viscosity in three dimensional flows TALI KHAIN, COLIN SCHEIBNER, VINCENZO VITELLI, University of Chicago — A fluid that breaks microscopic time-reversal symmetry, for example, by being composed of spinning units, can acquire a so-called odd-viscosity, an antisymmetric contribution to the viscosity tensor. In isotropic two-dimensional fluids, it has been shown that the odd viscosity does not modify the flow in the incompressible limit. In this work, we consider the extension of odd viscosity to three dimensional flows. We find a host of additional odd viscosity coefficients that give rise to dramatic changes in the flow even in incompressible fluids. By revisiting classic hydrodynamic problems in the Stokes limit, we elucidate the effects of these additional coefficients, and discuss the modifications in the presence of odd stress. Our work provides guiding principles for experimental and numerical investigations of complex fluids in suitable biological and active matter systems.

Tali Khain
University of Chicago

Date submitted: 31 Jul 2020

Electronic form version 1.4