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Deformation dynamics of thin flexible sheets in homogenous isotropic turbulence VAMSI SPANDAN, MAZIYAR JALAAL, ROBERTO VERZICCO, DETLEF LOHSE, Physics of Fluids, Univ. Twente — The dynamics of rigid anisotropic bodies such as ellipsoids and rods immersed in turbulent flows has been studied extensively in the past both for fundamental scientific research and for its relevance in industrial applications. In this work, we move a step further by studying the deformation dynamics of thin flexible sheets immersed in a homogeneous isotropic turbulent environment. We use direct numerical simulations to simulate a coupled system of a fluid which is driven by stochastic forcing at the large scales and a thin flexible sheet, the deformation of which depends on local flow conditions. We analyse the effect of bending stiffness and density ratio on the response of the sheet and find new deformation modes which are absent in one-dimensional fibers. We analyse these modes through characterising the distribution of the local curvatures. Furthermore, we provide results on turbulence modulation due to the presence of the sheet.

Vamsi Spandan
Physics of Fluids, Univ. Twente

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