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Agyrotropic pressure tensor induced by the plasma velocity shear

FRANCESCO PEGORARO, University of Pisa, Italy, DANELE DEL SARTO, Institut Jean Lamour, UMR 7198 CNRS - Universite de Lorraine, France, FRANCESCO CALIFANO, University of Pisa Italy — We show that the spatial inhomogeneity of a shear flow in a fluid plasma is transferred to a pressure anisotropy that has both a gyrotropic and a non gyrotropic component. We investigate this process both analytically and numerically by including the full pressure tensor dynamics. We determine the time evolution of the pressure agyrotropy and in general of the the pressure tensor anisotropization which arise from the action of both the magnetic eld and the flow strain tensor. This mechanism can affect the onset and development of shear-induced fluid instabilities in plasmas and is relevant to the understanding of the origin of some of the non-Maxwellian distribution functions evidenced both in Vlasov simulations and in space plasma measurements that exhibit pressure agyrotropy.

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