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Inverse cascades sustained by the transfer rate of angular momentum in a 3D turbulent flow JAVIER BURGUETE, MIGUEL LOPEZ-CABALLERO, University of Navarra — The existence of energy cascades as signatures of conserved magnitudes is one of the universal characteristics of turbulent flows. In this work we present the evidence of an inverse cascade in a fully developed 3D experimental turbulent flow where the conserved magnitude is the angular momentum. We analyze the behavior of a fluid in a closed cavity where two inhomogeneous and strongly turbulent flows collide in a thin region. The experimental volume is a closed cylinder (diameter of 20cm) where two impellers rotate in opposite directions. A key characteristic of this setup the high stability of the propellers (the instantaneous fluctuations are below 0.1%). We have performed PIV and LDA measurements of the velocity fields. Typical characteristics of the turbulent flow in this setup are: turbulence intensity 50%, the $Re_\lambda = 900$, the Taylor microscale $\lambda_T = 1.8$mm and the integral scale $L_I = 15$mm. The analysis of the data series reveal that below the injection scales an inverse cascade can be identified (-1/3 in time, -7/3 in space) that can be explained as the transfer of angular momentum between the diferent fluid layers. A. de la Torre, J. Burguete, Phys Rev Lett 99 (2007) 054101. M. Lopez-Caballero, J. Burguete, Phys Rev Lett 110 (2013) 124501.

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