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Wavelet versus Fourier Analysis of the Conditional Vorticity Budget in Homogeneous Isotropic Turbulence BENJAMIN KADOCH, Aix-Marseille Universite & M2P2-CNRS Ecole Centrale de Marseille, MICHAEL WILCZEK, Institute for Theoretical Physics, University of Muenster, KAI SCHNEIDER, M2P2-CNRS & CMI, Universite de Provence, RUDOLF FRIEDRICH, Institute for Theoretical Physics, University of Muenster, MARIE FARGE, LMD-CNRS, Ecole Normale Superieure — We study the conditional balance of vortex stretching and vorticity diffusion of fully developed three-dimensional homogeneous isotropic turbulence with respect to coherent and incoherent flow contributions. This decomposition is achieved by the Coherent Vorticity Extraction (CVE) based on orthogonal wavelets applied to DNS data, which yields insights into the influence of the different contributions as well as their interaction. It is shown that CVE yields an excellent representation of the total flow using a reduced number of degrees of freedom, which is particularly interesting as the conditional budget of vortex stretching and vorticity diffusion represents a dynamical rather than a purely kinematic relation. The results are compared to a decomposition with a standard Fourier filter.

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