Abstract Submitted
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The transfer of kinetic energy in turbulent flows[1] JOSE I. CARDESA, JAVIER JIMENEZ, Universidad Politecnica de Madrid — We study the statistics of the point-wise inter-scale energy transfer across a given filter width in direct numerical simulations of homogeneous isotropic turbulence, homogeneous shear flow and turbulent channels. This is first done for the classical subgrid-scale (SGS) dissipation found in the kinetic energy equation for the filtered velocity field. It is then compared with an analogous term T arising in the equation for the residual (small-scale) velocity field. T can take several expressions, and we report on the one which minimises its variance. For all flows, the SGS dissipation exhibits a negative skewness which increases with the filter width, while T has a positive skewness which decreases with filter width. This is consistent with the SGS dissipation being an average energy sink for the large scales, while T is an average energy source for the small ones. The different dependence on filter width of the mean and standard deviations of these two quantities is explored, and joint probability density functions based on the two quantities are investigated to understand the observed discrepancies between forward scatter and backscatter events.

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Jose Cardesa-Duenas
Univ Politecnica de Madrid

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