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Self similarity and Intermittency in turbulence generated by 3D multi-scale grids

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The measurements of the longitudinal velocity structure functions using hot wire anemometer at different positions in turbulent flow generated by 3D multi-scale grids have shown that the self-similarity is present. The statistical description of this complex turbulent system was performed using Extended Self Similarity (ESS). We propose a complementary methodology suitable for non-homogeneous characteristics of a turbulent field, indicated by non-local dynamics, is separated from those usually assigned as being only due to the intermittency. We propose a physical interpretation of the observed scale independence of the relative scaling exponents in such non-homogeneous flows by means of the compensation effect of the energy transfer on the difference between the strong coherent turbulent events and the background less intense turbulence. This procedure is able to distinguish whether the intermittency arises from the small scales or is linked to coherent structures.