

Stochastic energy-cascade model for 1+1 dimensional fully developed turbulence

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Abstract

Geometrical random multiplicative cascade processes are often used to model positive-valued multifractal fields such as the energy dissipation in fully developed turbulence. We propose a dynamical generalization describing the energy dissipation in terms of a continuous and homogeneous stochastic field in one space and one time dimension. In the model, correlations originate in the overlap of the respective spacetime histories of field amplitudes. The theoretical two- and three-point correlation functions are found to be in good agreement with their equal-time counterparts extracted from wind tunnel turbulent shear flow data.