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On the establishment of fully developed turbulence in direct numerical simulations driven by stochastic forcing SUALEH KHURSHID, DIEGO DONZIS, Texas AM University, KATEPALLI SREENIVASAN, New York University — Turbulent statistics are commonly described within the classical Richardson-Kolmogorov paradigm which aims at characterizing flows at very high Reynolds numbers. Recent work, however, has shown that certain aspects observed and predicted by high-Reynolds-number theories are present at very low Reynolds numbers. This motivates our investigation of the emergence of turbulent behavior using highly resolved direct numerical simulations (DNS) on a periodic box starting from zero initial conditions and driven by stochastic forcing at the largest scales. In particular, we focus on the evolution of different wavenumber bands in time to study short-time behavior. Detailed analysis of our DNS data shows limitations of classical approaches in explaining the development of energy cascade. We show how energy is transferred to smaller scales and the rate at which this transfer proceeds. A description of the emergence of small scale intermittency and moments of velocity gradients is also presented.

Sualeh Khurshid
Texas A
M Univ

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