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Cascade time-scales for energy and helicity in isotropic homogeneous turbulence SUSAN KURIEN, Los Alamos National Laboratory, MARK TAYLOR, Sandia National Laboratories, TAKESHI MATSUMOTO, Kyoto University — Energy and helicity are the two conserved quantities of the inviscid Navier-Stokes equations. Energy has been thought to dominate the dynamics in the inertial range of scales with helicity being carried along more or less passively. We show how an estimate for the time-scale for helicity transfer in wavenumber space implies a richer structure for turbulence dynamics in which helicity can play a significant role. In particular we show that our analysis admits a $k^{-4/3}$ scaling of the energy and helicity spectra, which is slightly shallower than the $k^{-5/3}$ scaling prediction of Kolmogorov (1941). Furthermore, a new helicity-dependent dissipation scale is revealed; this scale becomes much larger than the Kolmogorov dissipation scale as the Reynolds number becomes very large. We will present numerical simulations data which lend some support to our analytical predictions.

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