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Does the Kolmogorov scaling bridge hydrodynamic linear stability and turbulence? STEFANIA SCARSOGLIO, FRANCESCA DE SANTI, DANIELA TORDELLA, Politecnico di Torino — The way in which the kinetic energy is distributed over the multiplicity of scales is a fundamental feature of turbulence. According to Kolmogorov's 1941 theory, by dimensional analysis, the only possible form for the energy spectrum function is the -5/3 spectrum. Experimental evidence has accumulated that supports it. Until now, such a power-law decay was considered a specific treat of the nonlinear interaction overlooking turbulence dynamics. We show here that this picture is also present in the linear interaction relevant to three-dimensional stable perturbation waves. Through extensive computation of the transient life of these waves in typical shear flows, we observe that the energy they own when, out of the transient phase, enter the final exponential decay shows a spectrum very close to the -5/3 spectrum. Moreover, also the observation times show a similar scaling.

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