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Dynamical Scaling in Wave Turbulence COLM CONNAUGHTON, Centre for Complexity Science, University of Warwick, UK, PAUL KRAPIVSKY, Physics Department, Boston University, ALAN NEWELL, Department of Mathematics, University of Arizona — Wave turbulence concerns itself with the non-equilibrium statistical mechanics of ensembles of nonlinearly interacting dispersive waves in the presence of external forcing and damping. In the limit of weakly interacting waves, one may consistently derive a kinetic equation describing the evolution of the wave spectrum. The stationary solution of this equation, the Kolmogorov–Zakharov (KZ) spectrum, describes a cascade of wave energy from the forcing scale to the dissipation scale. We present a mixture of numerical and asymptotic results which show that dynamical scaling solutions the 3-wave kinetic equation can be non-trivial. Firstly, the transient spectrum which precedes the establishment of the KZ spectrum in the case of forced turbulence is shown to be steeper than that predicted by KZ theory in the finite capacity case. Secondly, the transient relaxation spectrum in the case of decaying turbulence can exhibit non-trivial logarithmic corrections to the expected dynamical scaling laws.

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