ON THE WAVE TURBULENCE FOR A RANDOM KDV EQUATION

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Despite the fact that wave fields describing the processes of random wave interactions in nature are enormously diverse, there is a common mathematical framework that models and describes the dynamics of spectral energy transfer through probability densities associated with weakly non-linear interactions in quantum or classical wave systems. The probability densities are solutions of wave kinetic equations, whose nonlocal interaction operators are of kinetic types.

In this talk, starting from a random KdV equation with and without noise, by using Duhamel expansions and Feynman diagrams, we derive a wave kinetic equation, at the kinetic time $t = \mathcal{O}(\lambda^{-2})$, in which λ is the constant describing the weak nonlinearity, under some constraints.

This is joint work with Gigliola Staffilani.