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On stochastic partial differential equations in fluid mechanics

We review some results on the stochastic partial differential equations (SPDE) in fluid mechanics, namely the Navier-Stokes and other closely related systems. In particular, we discuss the global existence of a martingale solution for the 3D micropolar fluid (MPF) and magneto-micropolar fluid (MMPF) systems, 3D nonhomogeneous magnetohydrodynamics system, and 2D Boussinesq system with zero dissipation. Moreover, we discuss the existence and uniqueness of an invariant measure as well as the exponential convergence of trajectories to the unique invariant measure for the 2D magnetic Benard problem, 2D MPF and MMPF systems. If time permits, we also discuss large deviation principle results.