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Dean-Kawasaki Dynamics: Ill-Posedness vs. Triviality

Abstract:

We show that the Dean-Kawasaki SPDE with smooth drift potential admits only solutions for a discrete range of parameters in which case the solution is given in terms of a finite system of particles with mean field interaction. The statement and proof are based on the concepts of weak martingale solutions and log-Laplace duality which are standard in the general theory of measure valued diffusion processes.