

The Super Ornstein-Uhlenbeck Process Interacting with its Center of Mass

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We construct a supercritical interacting measure-valued diffusion with representative particles that interact with the center of mass by using the historical stochastic calculus of Perkins to modify a super Ornstein-Uhlenbeck process. In doing so we prove continuum analogues of results of Engländer (2010) for binary branching Brownian motion.

On the survival set it is shown, in the attractive case, that the mass normalized process converges almost surely in the Vasserstein metric to the stationary distribution of the Ornstein-Uhlenbeck process, centered at the limiting value of its center of mass. In the repulsive case it is shown that it converges in probability, provided the repulsion is not too strong, by appealing to a result of Engländer and Winter (2006).

A version of a result of Tribe (1992) is proven on the extinction set; that is, as it approaches the extinction time, the normalized process in both the attractive and repulsive cases converges to a random point a.s.