

World Scientific Series on
Probability Theory and
Its Applications

Volume 5

Distribution Dependent Stochastic Differential Equations

Corresponding to the link of Itô's stochastic differential equations (SDEs) and linear parabolic equations, distribution dependent SDEs (DDSDEs) characterize nonlinear Fokker-Planck equations. This type of SDEs is named after McKean-Vlasov due to the pioneering work of H P McKean (1966), where an expectation dependent SDE is proposed to characterize nonlinear PDEs for Maxwellian gas. Moreover, by using the propagation of chaos for Kac particle systems, weak solutions of DDSDEs are constructed as weak limits of mean field particle systems when the number of particles goes to infinity, so that DDSDEs are also called mean-field SDEs. To restrict a DDSDE in a domain, we consider the reflection boundary by following the line of A V Skorohod (1961).

This book provides a self-contained account on singular SDEs and DDSDEs with or without reflection. It covers well-posedness and regularities for singular stochastic differential equations; well-posedness for singular reflected SDEs; well-posedness of singular DDSDEs; Harnack inequalities and derivative formulas for singular DDSDEs; long time behaviors for DDSDEs; DDSDEs with reflecting boundary; and killed DDSDEs.

Vol.
5

Distribution Dependent Stochastic Differential Equations

Feng-Yu Wang
Panpan Ren



World Scientific
www.worldscientific.com
13512 Inc ISBN: 2737-4467



World Scientific Series on
Probability Theory and
Its Applications

Volume 5

Distribution Dependent Stochastic Differential Equations

Feng-Yu Wang
Panpan Ren

World Scientific