A BRANCHING PARTICLE SYSTEM APPROXIMATION FOR A CLASS OF FBSDES

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Abstract: In this talk, a new numerical scheme for a class of coupled forward-backward stochastic differential equations (FBSDEs) is proposed by using branching particle systems in a random environment. First, by the four step scheme, we introduce a partial differential equation (PDE) used to represent the solution of the FBSDE system. Then, infinite and finite particle systems are constructed to obtain the approximate solution of the PDE. The location and weight of each particle are governed by stochastic differential equations derived from the FBSDE system. Finally, a branching particle system is established to define the approximate solution of the FBSDE system. The branching mechanism of each particle depends on the path of the particle itself during its short lifetime $\epsilon = n^{-2\alpha}$, where n is the number of initial particles and $\alpha < \frac{1}{2}$ is a fixed parameter. The convergence of the scheme and its rate of convergence are obtained. This is based on a joint paper with Chang and Liu.