LARGE DEVIATIONS FOR DIFFUSIONS INTERACTING THROUGH THEIR RANKS

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Systems of diffusion processes (particles) with rank-based interactions have been studied heavily due to their importance in stochastic portfolio theory and the intriguing relations with particle systems appearing in statistical physics. We study the behavior of this particle system as the number of particles gets large. By obtaining a large deviations principle (LDP), we will show that the limiting dynamics can be described by a porous medium equation with convection, whereas paths of finite rate are given by solutions of appropriately tilted versions of this equation. This is the first instance of an LDP for diffusions interacting both through the drift and the diffusion coefficients. Based on joint work with Amir Dembo, S. R. Srinivasa Varadhan and Ofer Zeitouni.