STOCHASTIC POPULATION CROSS-DIFFUSION SYSTEM: EXISTENCE OF GLOBAL MARTINGALE SOLUTIONS

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The existence of global nonnegative martingale solutions to a stochastic cross-diffusion system for an arbitrary but finite number of interacting population species is shown. The random influence of the environment is modeled by a multiplicative noise term. The diffusion matrix is generally neither symmetric nor positive definite, but it possesses a quadratic entropy structure. This structure allows us to work in a Hilbert space framework and to apply a stochastic Galerkin method. The existence proof is based on energy-type estimates, the tightness criterion of Brzeźniak and co-workers, and Jakubowski's generalization of the Skorokhod theorem. The nonnegativity is proved by an extension of Stampacchia's truncation method due to Chekroun, Park, and Temam.