



复旦大学数学科学学院 数学综合报告会

报告题目: Deep numerical schemes for systems of Ergodic BSDEs with applications to regime-switching forward utilities

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地点: 光华东主楼 2001

报告摘要:

In this talk, we introduce two neural-network-based numerical schemes for solving systems of coupled ergodic Backward Stochastic Differential Equations (eBSDEs), motivated by the approximation of optimal strategies within the framework of forward utilities in a regime-switching stochastic factor model. Our approach builds on the representation of such models through systems of eBSDEs introduced in [HLT20]. We first establish a link between the solution of the system of ergodic BSDEs and that of an associated multidimensional BSDE with random terminal time, given by the hitting time of the positive recurrent stochastic factor. Building on this representation, we introduce a locally additive deep learning scheme obtained by minimizing aggregated local error terms. We then present a new Deep Galerkin Method (DGM) inspired algorithm that minimizes the residual of the associated ergodic PDE system, relying on a representation of the ergodic cost. Finally, we apply this framework to regime-switching forward utilities in a stochastic factor model. We first derive a general consistency SPDE that characterizes regime-switching forward utilities and retrieve their representation with systems of ergodic BSDEs in the homothetic case. Numerical experiments demonstrate the performance of the proposed methods, with a particular focus on the impact on forward preferences of taking into account regime switches.

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