



复旦大学数学科学学院 数学综合报告会

报告题目: Indefinite linear quadratic mean-field game

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报告摘要:

In this talk, we focus on recent results on indefinite linear-quadratic (LQ) mean-field games (MFGs). First, for forward systems, we study an indefinite MFG with Markov jump parameters and design decentralized optimal strategies via new types of Hamiltonian systems and consistency condition systems. The well-posedness of these systems is established using a relaxed compensator method under an easily verifiable condition. Moreover, by deriving novel estimates for the perturbed state and the cost functional, we show that the resulting decentralized strategies form an epsilon-Nash equilibrium in the indefinite setting, without imposing any assumptions on the admissible control sets. Second, for backward systems, we consider an LQG MFG with heterogeneous agents under model uncertainty. The introduction of an uncertain parameter enlarges the limiting state process to an augmented state space. By solving two new types of indefinite LQ optimal control problems, one for backward systems and the other for backward-forward systems, and by incorporating consistent mean-field approximations, we construct decentralized strategies for the robust game. Notably, the corresponding consistency condition admits a unique solution without requiring additional assumptions. Finally, we discuss recent progress on indefinite LQ MFGs with random coefficients and present numerical simulations for related problems.

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