04 大会报告
CONFERENCE REPORT

大会报告5 Adaptive Zero-Sum Differential Games

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报告人简介

郭　雷 院士

Lei Guo is currently a professor of the Academy of Mathematics and Systems Science, Chinese Academy of Sciences (CAS). He is a member of CAS, a foreign member of the Royal Swedish Academy of Engineering Sciences, a fellow of the Academy of Sciences for Developing World, and a fellow of IEEE/IFAC/CAA/CSIAM/ORSC. He was awarded an honorary doctorate by Royal Institute of Technology (KTH, Sweden) in 2014, and the Hendrik W. Bode Lecture Prize by the IEEE Control Systems Society in 2019. His research interests include stochastic systems, adaptive identification, adaptive control, adaptive filtering, adaptive game theory, control of uncertain nonlinear systems, feedback capability, multi-agent systems, and game-based control systems, among others.

报告摘要

In this study, we address the classical two-player zero-sum linear-quadratic stochastic differential games. Contrary to existing literature that typically assumes known system parameters, we explore scenarios where the coefficient matrices of the underlying dynamics are unknown to both players. This necessitates the development of adaptive strategies within a novel game-theoretic framework—termed adaptive games—which remains largely unexplored. To address this gap, we propose a hybrid information structure that integrates competitive and cooperative elements, enabling the design of online learning-based adaptive strategies. These strategies leverage the certainty equivalence principle and a diminishing excitation technique developed in stochastic adaptive control. Under physical structure conditions similar to those in conventional known-parameter settings, we demonstrate that the resulting closed-loop adaptive game systems achieve global stability and asymptotically converge to the Nash equilibrium.