COOL RESEARCH

系列报告第九讲

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报告题目：Mean-Square Stability Radii for Stochastic Robustness Analysis

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Mean-Square Stability Radii for Stochastic Robustness Analysis

Abstract： This talk will introduce a comprehensive framework for mean-square robust control when dealing with stochastic multiplicative uncertainties. We consider stochastic uncertainties structured in a block diagonal form, encompassing various structures with predefined variance bounds. These uncertainties can arise from multiple sources and can effectively model communication losses. Notably, we go beyond previous works by allowing the stochastic uncertainties to exhibit statistical correlation. A general mean-square robustness measure, termed mean-square stability radius (MSSR), is introduced as the metric to quantify stability robustness under the mean-square criterion. Explicit expressions of the MSSR are derived, and a small-gain type necessary and sufficient condition is obtained for mean-square robust stability. In addition, we delve into the mean-square stability analysis of random delay systems, investigate the robust convergence of Kalman filtering in the presence of multi-channel packet drops, and explore the output feedback robust stabilization problems. All these investigations are conducted within the framework of the MSSR, aiming to enhance our understanding and enrich the scope of our results.

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报告人简介: Jianqi Chen received a B.S. degree in automation from Zhejiang University, Hangzhou, China, and a Ph.D. degree in electrical engineering from City University of Hong Kong, China. He is currently with the Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology, as a Postdoctoral Researcher. His research interests include PID control, time-delay systems, networked control, electrical networks, and cyber-physical systems. Dr. Chen was the recipient of the Guan Zhao-Zhi Best Paper Award at the 38th Chinese Control Conference in 2019, the Best Paper Award at the 5th Chinese Conference on Swarm Intelligence and Cooperative Control in 2021, and the Best Paper Nomination Award at the 14th IFAC Workshop on Adaptive and Learning Control Systems in 2022.

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