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学术报告会

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The delay margin problem: Analysis and control design via analytic interpolation

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Abstract:

In this talk we will focus on analysis and control design for robust stabilization, in particular for systems with an output delay. To this end, we will first review the classical robustness measures gain margin and phase margin, where how to compute the corresponding maximum stability margin has been solved. Moreover, internal stability of a closed-loop systems can be expressed in terms of the Nyquist criteria, and the gain and phase margins can be illustrated as forbidden regions in the Nyquist plot. Internal stability can also be expressed as an analytic interpolation problem, where the gain and phase margins similarly can be expressed as forbidden regions in the range of the interpolant. These ideas are then used to analyze the maximum delay margin problem, which is still an unsolved problem. From this we derive a method for how to compute a lower bound on the maximum delay margin, a method which involves a tunable parameter that can be used to improve the results. We also outline a controller synthesis procedure for obtaining a controller that is arbitrarily close to achieving this lower bound on the maximum delay margin.

Biography:

Axel Ringh received a M.Sc. in Engineering Physics in 2014, and a Ph.D. in Applied and Computational Mathematics in 2019, both from KTH Royal Institute of Technology, Stockholm, Sweden. From autumn 2019 he will be a postdoctoral researcher with Hong Kong University of Science and Technology, Hong Kong, China. His research is focused on optimization, control, and inverse problems, and current research interests include delay margin problems, moment problems, inverse problems in imaging, optimal mass transport, and machine learning.