

STABILITY, ROBUSTNESS ANALYSIS AND MODEL ORDER REDUCTION OF PERIODIC CONTROL SYSTEMS WITH DELAY

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Linear periodic time-delay (LPTD) models describe dynamical systems in many fields of science and engineering. They arise from the linearization of nonlinear autonomous time-delay systems around a periodic orbit or from a periodic excitation. At the same time, in some situations periodic control strategies outperform time-invariant controllers and even solve tasks beyond their scope, such as stabilization in fixed time by smooth feedback. The control design for LPTD systems is challenging, due to the interplay between the infinite-dimensional dynamics and the explicit time-dependence of the models, which renders powerful techniques for spectrum based control of time-invariant systems not directly applicable, as the latter techniques are rooted in the availability of a characteristic equation in an explicit form. After a brief general introduction of time-delay systems, I will give an overview of basic properties, limitations and opportunities of control of LPTD systems and some first results towards the development of systematic analysis, model reduction and control design tools.

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