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Sufficient conditions for exponential and strong stabilization of a class of bilinear systems with distributed delay

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Abstract

Bilinear systems appear in the control of various real problems in engineering, biological, and nuclear fields [1]. In the modeling process, time delay should be taken into account [2], since even small delays in the feedback may destabilize the system [3-4]. Therefore, understanding the effect of delay on the system's stability is important.

This paper investigates the feedback stabilization of a class of bilinear systems with distributed delay in a Hilbert state space. Assuming an observability-like condition, we establish both exponential and strong stability through bounded feedback control. Moreover, an explicit optimal decay rate estimate is obtained. The proofs are based on a decomposition method, and the theoretical findings are validated with a numerical examples.

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