

## Infinite-Dimensional LMI Approach to Analysis and Synthesis for Linear Time-Delay Systems.

Kojiro Ikeda; Takehito Azuma; Kenko Uchida

*Abstract:* This paper considers an analysis and synthesis problem of controllers for linear time-delay systems in the form of delay-dependent memory state feedback, and develops an Linear Matrix Inequality (LMI) approach. First, we present an existence condition and an explicit formula of controllers, which guarantee a prescribed level of  $L^2$  gain of closed loop systems, in terms of infinite-dimensional LMIs. This result is rather general in the sense that it covers, as special cases, some known results for the cases of delay-independent/dependent and memoryless/memory controllers, while the infinity dimensionality of the LMIs makes the result difficult to apply. Second, we introduce a technique to reduce the infinite-dimensional LMIs to a finite number of LMIs, and present a feasible algorithm for synthesis of controllers based on the finite-dimensional LMIs.

*Keywords:*

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