State and output feedback control of switched linear systems with time-varying delay

Abstract:
This paper investigates the problem of designing suitable switching strategies for stabilizing a switched linear system subject to a time-varying delay, assumed to lie in a bounded interval. Based on an extended version of the small gain theorem, two distinct globally stabilizing switching laws expressed in a state-feedback form are worked out. The first one requires the knowledge of an upper bound on the time-variation rate of the delay, while the second one does not rely on this information and it applies also when the time variation rate is greater than 1, which is known to be a very demanding situation. Both switching strategies are then extended to cope with the case when only a measured output vector is available for feedback. All conditions are formulated in terms of Lyapunov-Metzler inequalities, which allow maximization of the upper bound on the delay for which stability is guaranteed. A simple numerical example is provided to show the effectiveness of the proposed approach.

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