

Piecewise-Affine State Feedback for Piecewise-Affine Slab Systems Using Convex Optimization

L. Rodrigues and S. Boyd

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This paper shows that Lyapunov-based state feedback controller synthesis for piecewise-affine (PWA) slab systems can be cast as an optimization problem subject to a set of linear matrix inequalities (LMIs) analytically parametrized by a vector. Furthermore, it is shown that continuity of the control inputs at the switchings can be guaranteed by adding equality constraints to the problem without affecting its parametrization structure. Finally, it is shown that piecewise-affine state feedback controller synthesis for piecewise-affine slab systems to maximize the decay rate of a quadratic Lyapunov function can be cast as a set of quasi-concave optimization problems analytically parametrized by a vector.

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