

Lyapunov-Metzler inequalities with solutions sharing a common Schur complement

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Abstract

Given a set of Lyapunov inequalities $A_i^T P_i + P_i A_i < 0$, with $i = 1, \dots, N$, such that A_1, A_2, \dots, A_N are Metzler square matrices, we investigate when the Lyapunov solutions P_i , with $i = 1, \dots, N$ share the same Schur complement of certain order. In view of the results obtained in [1], this provides a sufficient condition for stabilizability by partial reset of positive switched linear systems under arbitrary switching law.

Keywords

Metzler matrix, Schur complement, Stability, Switched system, Quadratic Lyapunov function.

References

- [1] Brás, I., A. C. Carapito and P. Rocha (2013). Stability of Switched Systems With Partial State Reset. *IEEE Transactions on Automatic Control*, 58, 4, 5634–5639.
- [2] Hespanha, J. P., P. Santesso and G. Stewart (2007). Optimal controller initialization for switching between stabilizing controllers. *46th IEEE Conference on Decision and Control*, 5634–5639.

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