

Finite-time Stability of Singular Nonlinear Switched Time-Delay Systems: A Singular Value Decomposition Approach

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Abstract: In this paper, a constructive geometric design of switching laws is proposed for the finite-time stability of singular nonlinear switched systems subjected to delay and disturbance. The state-dependent switching law is constructed based on the construction of a partition of the stability state regions in convex cones such that each system mode is activated in one particular conic zone. Using the state-space singular value decomposition approach, new delay-dependent sufficient conditions for the finite-time stability of the system are presented in terms of linear matrix inequalities (LMIs). The obtained results are applied to uncertain linear singular switched systems with delay. Numerical examples are given to illustrate the effectiveness of the proposed method.

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