Cover letter

Switched systems have strong engineering background in various areas and are often used as a unified modeling tool for a great number of real-world systems.
Stability analysis and stabilization under arbitrary switching are fundamental and challenging research issue in the design and analysis of these systems. Indeed, this matter can be guaranteed if it exists a common Lyapunov function for all the subsystems. Therefore, this method is usually very difficult to apply even for switched linear systems. Thus, it becomes more complicated in the nonlinear case.

On the other hand, from the practical viewpoint, it is of great importance to investigate uncertain switched systems unfortunately, the available results on stability analysis and stabilisation of switched nonlinear systems with polytopic uncertainties are limited.

Motivated by these mentioned shortcomings for the existed results as well in the sense of various methods that can be employed, the purpose of this paper aims to solve the problem of state feedback stabilization for a class of both continuous and discrete-time switched nonlinear systems under arbitrary switching and subject to time-varying polytopic uncertainties. Indeed, by transforming the representation of these considered systems into the arrow form matrix employing a suitable constructed common Lyapunov function and applying the Kotelyanski lemma combined with the $M-$matrix proprieties, a new robust pole placement stabilization under arbitrary switching is deduced.

In contrast with some existing results on switched nonlinear systems with polytopic uncertainties, the contributions of this paper are as follows: First, the new pole placement design is given to guarantee the closed loop system asymptotic stability under arbitrary switching and may overcome the conservatism of searching a common Lyapunov function. Second, the new stabilization conditions are formulated in terms of the time-varying polytopic uncertain parameters. Third, the obtained results are validated by introducing an example which modeled a real system.

With all the respect to your journal, we are looking forward to accepting our work