
This paper deals with adaptive tracking problems for a class of stochastic nonlinear systems with unknown hysteresis nonlinearities. The system considered is in a strict-feedback form driven by unknown Prandtl–Ishlinskii hysteresis and Wiener noises of unknown covariance. By employing backstepping design techniques and stochastic Lyapunov design method, parameter adaptive laws and control laws are obtained, which ensure that the tracking error can converge to a small residual set around the origin in the sense of mean quartic value.


This paper deals with the problems of passivity analysis and passivity-based controller design for Markovian jump systems with both time-varying delays and norm-bounded parametric uncertainties. Firstly, new delay-dependent conditions for the considered system to be passive are obtained by using a mode-dependent Lyapunov functional and by introducing some slack variables. These conditions are expressed by means of LMIs that are easy to check. It is shown through a numerical example that the obtained passivity conditions are less conservative than the existing ones in the literature. Secondly, the passification problem is investigated. On the basis of the obtained passivity conditions, dynamic output-feedback controllers are designed, which ensure that the resulting closed-loop system is passive. The effectiveness of the proposed design method is demonstrated by a numerical example.
Urban search and rescue missions raise special requirements on robotic systems. Small aerial systems provide essential support to human task forces in situation assessment and surveillance. As external infrastructure for navigation and communication is usually not available, robotic systems must be able to operate autonomously. A limited payload of small aerial systems poses a great challenge to the system design. The optimal tradeoff between flight performance, sensors, and computing resources has to be found. Communication to external computers cannot be guaranteed; therefore, all processing and decision making has to be done on board. In this article, we present an unmanned aircraft system design fulfilling these requirements. The components of our system are structured into groups to encapsulate their functionality and interfaces. We use both laser and stereo vision odometry to enable seamless indoor and outdoor navigation. The odometry is fused with an inertial measurement unit in an extended Kalman filter. Navigation is supported by a module that recognizes known objects in the environment. A distributed computation approach is adopted to address the computational requirements of the used algorithms. The capabilities of the system are validated in flight experiments, using a quadrotor.