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Editorial

Advanced Stochastic Control Systems with Engineering Applications

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Stochastic phenomenon has played an important role in various branches of science such as biology, economics, and aircraft. Stochastic modeling approach has achieved a great number of distinguished contributions for a wide spectrum of systems including Markovian jumping systems, Itô stochastic systems, networked control systems with random communication delays, and/or packet losses. Over the past few decades, considerable attention has been paid to modeling, stability analysis, stabilization, robust filtering, model reduction, and practical applications of stochastic dynamical systems. In spite of the extensive and systemic development of stochastic approaches and techniques, there still remain various types of open problems desired to be further strengthened, which includes modeling, filtering, nonparametric methods, system realization and identification, and so forth. Meanwhile, novel and updated developed theories and results are required to be investigated for application of stochastic systems in practical engineering.

This special issue contains thirty-four papers, which are summarized as follows.

"*Event-based H_∞ filter design for sensor networks with missing measurements*" by J. Liu et al. proposes an event triggered mechanism based on sampled-data information, which has some advantages over existing ones. Considering the missing sensor measurements and the network-induced delay in the transmission, a new event-based H_∞ filtering is constructed by taking the effect of sensor faults with different failure rates. By using the Lyapunov stability theory and the stochastic analysis theory, sufficient criteria are derived for the existence of a solution to the algorithm of the event-based filter design.

"*Finite-horizon robust Kalman filter for uncertain attitude estimation system with star sensor measurement delays*" by H.-M. Qian et al. addresses the robust Kalman filtering problem for uncertain attitude estimation system with star sensor measurement delays. Combined with the misalignment errors and scale factor errors of gyros in the process model and the misalignment errors of star sensors in the measurement model, the uncertain attitude estimation model can be established to indicate that uncertainties not only appear in the state and output matrices but also affect the statistic of the process noise. Meanwhile, the phenomenon of star sensor measurement delays is described by introducing Bernoulli random variables with different delay characteristics. A finite-horizon robust Kalman filter is proposed to solve this estimation problem which takes into account the effects of star sensor measurement delays and model uncertainties.

"*Robust adaptive fault-tolerant control of stochastic systems with modeling uncertainties and actuator failures*" by W. Cai et al. deals with the problem of actuator fault-tolerant control of a class of uncertain stochastic systems with model uncertainties. A robust adaptive control scheme is developed to solve this problem. The proposed approach does not require