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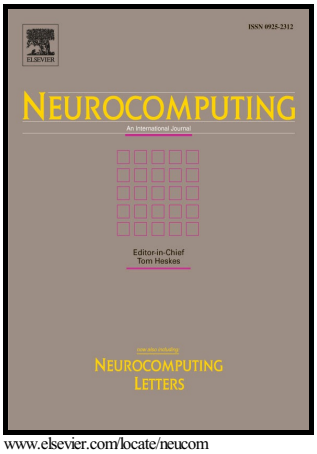

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Robust Estimator Design for Networked Uncertain Systems with Imperfect Measurements and Uncertain-Covariance Noises ☆

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Abstract

The robust Kalman filter design problem is investigated for networked uncertain systems subject to uncertain-covariance noises and incomplete measurements. The norm-bounded parameter uncertainties exist simultaneously in the state, output and white noise covariance matrices. A unified measurement model is adopted to describe multi-step random delays and packet dropouts. Utilizing the measurement reorganization technique, the addressed system is transformed into uncertain stochastic system without delay, for which a robust Kalman filter is proposed. With resort to state augmentation and Riccati difference equations, an upper bound on the filtering error covariance is obtained for all admissible uncertainties. Subsequently, filter parameters are determined by minimizing the trace of the derived upper bound. As the main difference from other existing results, the robust filter developed in this paper considers the effect from uncertain-covariance white noises, multi-step random delays and packet dropouts by using measurement reorganization technique. Finally, an example is provided to demonstrate the effectiveness of the proposed filter.

Keywords: Robust Kalman filter, Uncertain-covariance noises, Measurements reorganization, Multi-step delays, Riccati difference equations

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