Journal of Electrical and Computer Engineering

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Special Issue on

Advances in Optimal and Robust FIR Estimation with Applications

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Fast state-space estimators are of top interest in many applied areas and the most widely used solutions are the Kalman filter (KF) and its numerous modifications. However, the optimal KF is a Bayesian estimator, which requires all information about the process and the noise. Therefore, the KF performance may be poor if such information is not fully available; that is, the KF-based estimators may suffer from the insufficient robustness against mismodeling and temporary uncertainties, effect of the initial values, and high vulnerability to errors in the noise statistics. All these problems arise when attempting to use the KF in the real world due to its infinite impulse response (IIR) structure. Jazwinski stated in his book Stochastic Processes and Filtering Theory (Academic Press, 1970) that a limited memory filter appears to be the only device for preventing divergence in the presence of unbounded perturbations in the system. Thus, higher robustness is peculiar to estimators having the finite impulse response (FIR) and operating with most recent data.

During decades, diverse optimal and suboptimal state-space structures relying on most recent data and discarding older ones were designed for linear and nonlinear systems. Almost all of the early approaches relying on limited data were developed to increase the robustness of the KF-based estimators. Latter, different optimal, unbiased, bias-constrained, maximum likelihood, and norm-bounded solutions were found in the convolution-based batch and iterative forms in continuous and discrete time for FIR filtering and receding horizon (one-step predictive) FIR filtering. But, even though numerous applications have proved the high robustness of FIR estimators, the room for investigations remains open.

The aim of this special issue is to bring the researches in this area together with the engineers to break down barriers and develop innovative solutions and practical algorithms. The scope covers all aspects of theoretical studies and engineering applications related to FIR estimation.

Potential topics include but are not limited to the following:

- Optimal, unbiased, maximum likelihood, and Bayesian FIR estimators
- Minimax norm-bounded, game theory-based, and other robust FIR solutions
- Fast iterative FIR algorithms using recursions
- Applications of FIR filters, smoothers, and predictors in science and engineering
- Electrical and electronic systems utilizing FIR estimators

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Papers are published upon acceptance, regardless of the Special Issue publication date.

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