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ON ADAPTIVE TIME SERIES FILTERING BASED ON STOCHASTIC OPTIMIZATION TECHNIQUE

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Classical optimal filters assume knowledge on a priori probability characteristics for whole multitude of signal realizations when observation analysis is produced in accordance with open system principle. At deficient information adaptive filters based on feedback principle are used. They work under any initial conditions at the absence of data on environment and execute single-step movement to an optimal solution.

The basis of adaptive filter is formed by not statistical characteristics but signal realizations (sample functions). The main problems of existing adaptive filters are in probable divergence of obtained estimations with real values of estimated random sequences or in low speed of convergence.

The adaptive algorithm for time series when empirical data are only presented by current observations on the object under study is proposed. The random function from estimating errors that is different from mean square sum of errors is used as procedure criterion. The basis of the algorithm of criterion minimization is stochastic optimization technique.

The features of algorithm are analyzed for discrete simple system which has important practical applications under conditions with deficient a priori information. The algorithm is realized on the base of RATS (ESTIMA) software. The results are compared with optimal Kalman filter. The numerical examples are devoted to analysis of marine drifter location.

FEEDBACK STABILIZATION OF NONLINEAR CONTROL SYSTEMS ON TIME SCALES

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Introduction. In 1983 R. Brockett [2] proved a necessary condition for feedback stabilization of continuous-time nonlinear systems. A similar fact for discrete-time systems was shown by W. Lin and C.I. Byrnes [3] in 1994. We extends those results to nonlinear control systems on arbitrary unbounded time scales. A time scale is a model of time. Time may be continuous, discrete or partly continuous and partly discrete. Differential calculus on time scales unifies standard differential calculus and the calculus of finite differences. Control systems described by delta differential equations on time scales generalize continuous-time and discrete-time systems. A book by M. Bohner and A. Peterson [1] is a good introduction to the theory of dynamical systems on time scales.