A new approach to linear filtering and prediction problems.

Journal of Basic Engineering | Volume 82 | Issue 1 | Research Paper

< PREVIOUS ARTICLE | NEXT ARTICLE >

RESEARCH PAPERS

A New Approach to Linear Filtering and Prediction Problems

R. E. Kalman

[+] Author and Article Information

J. Basic Eng 82(1), 35-45 (Mar 01, 1960) (11 pages)

doi:10.1115/1.3662552

History: Received February 24, 1959; Online November 04, 2011

ARTICLE

Abstract

The classical filtering and prediction problem is re-examined using the Bode-Shannon representati of random processes and the â œstate-transitionâ method of analysis of dynamic systems. New resu are: (1) The formulation and methods of solution of the problem apply without modification stationary and nonstationary statistics and to growing-memory and infinite-memory filters. (2) nonlinear difference (or differential) equation is derived for the covariance matrix of the optin estimation error. From the solution of this equation the co-efficients of the difference (or differenti equation of the optimal linear filter are obtained without further calculations. (3) The filtering proble is shown to be the dual of the noise-free regulator problem. The new method developed here applied to two well-known problems, confirming and extending earlier results. The discussion largely self-contained and proceeds from first principles; basic concepts of the theory of rando processes are reviewed in the Appendix.

Topics: Filtration , Equations , Filters , Stochastic processes , Errors , Noise (Sound) , Dynamic system