Clark, Ronald R, Performance Sensitivity Analysis of a Kalman Filter Using Adjoint Functions, NAVAL AVIONICS FACILITY INDIANAPOLIS IN, 14 FEB 1972 AD0891992

Abstract : A method is proposed for determining the performance sensitivity of a Kalman filter with respect to small variations in the parameters of both a 'real world' reference model and an assumed filter model. It is shown that a sizable reduction in computational effort may be achieved using the adjoint method presented here to calculate the local performance sensitivities for a large number of parameters rather than using more direct methods. In the report, equations for the covariance functions of the combined filter and reference system are found and adjoint equations corresponding to the linear perturbation equations of the system covariance functions determined. An expression is found for the change in a performance index in terms of the adjoint functions and small, possibly time-varying, changes in the parameters of the combined system. (Author)

Descriptors : , (*INERTIAL NAVIGATION, INSTRUMENTATION), (*ADAPTIVE CONTROL SYSTEMS, MATHEMATICAL MODELS), PARTIAL DIFFERENTIAL EQUATIONS, MATRICES(MATHEMATICS), SENSITIVITY, NUMERICAL ANALYSIS, PERTURBATION THEORY.

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