Approximation Approach for Nonlinear Filtering Problem with Time Dependent Noises. Part I: Conditionally Optimal Filter in the Minimum Mean Square Sense.

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Abstract: An approximation approach is proposed to design a nonlinear recursive filter which is conditionally optimal in the minimum mean square (MMS) sense for a nonlinear filtering problem with dependent noises. Definition of an MMS estimator in a given class of estimators is introduced and its uniqueness (with probability 1) is established in Theorem 1. Efficiency of a new optimal filter is illustrated in Theorems 2, 3. Some numerical examples are presented.