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## 具有未知输入的线性时不变随机系统的噪声协方差的可辨识性分析 (牟必强)

2023-09-20

Most existing works on optimal filtering of linear time-invariant (LTI) stochastic systems with arbitrary unknown inputs assume perfect knowledge of the covariances of the noises in the filter design. This is impractical and raises the question of whether and under what conditions one can identify the process and measurement noise covariances (denoted as  $Q$  and  $R$ , respectively) of systems with unknown inputs. This article considers the identifiability of  $Q/R$  using the correlation-based measurement difference approach. More specifically, we establish 1) necessary conditions under which  $Q$  and  $R$  can be uniquely jointly identified; 2) necessary and sufficient conditions under which  $Q$  can be uniquely identified, when  $R$  is known; 3) necessary conditions under which  $R$  can be uniquely identified, when  $Q$  is known. It will also be shown that for achieving the results mentioned above, the measurement difference approach requires some decoupling conditions for constructing a stationary time series, which are proved to be sufficient for the well-known strong detectability requirements established by Hautus.

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