

## 在不确定观测下离散状态时滞系统的最优滤波

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**摘要** 研究了在不确定观测下离散状态时滞系统的最优滤波问题, 观测值的不确定性则通过一个满足Bernoulli分布且统计特性已知的随机变量来描述. 一般采用状态增广方法将时滞系统转换为无时滞随机系统, 再利用Kalman滤波器的设计方法解决最优状态估计问题, 但是当系统时滞较大时, 转换后的系统状态维数很高, 这样增加了计算负担. 为此, 基于最小方差估计准则, 利用射影性质和递归射影公式得到了一个新的滤波器设计方法, 而且保证了滤波器的维数与原系统相同. 最后, 给出一个仿真例子说明所提方法的有效性.

**关键词** [最优滤波](#), [不确定观测](#), [离散状态时滞系统](#), [射影公式](#).

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## Optimal Filtering for Linear Discrete State Delay Systems Under Uncertain Observations

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**Abstract** The optimal filtering problem is investigated for linear discrete state delay systems under uncertain observations. The uncertainty in the observations is described by a binary distributed random variable and the probability of the occurrence of missing data is assumed to be known. Generally, this problem can be solved by using the state augmentation and the standard Kalman filtering methods. However, it will result in higher state dimensions and expensive computational cost, especially when the delay is large. Therefore, based on the minimum mean square error (MMSE) estimation principle, a new filter design method is proposed by using the projection theory and recursive projection formula in Hilbert space. The dimension of the designed filter is the same as the original systems. A simulation example illustrates the effectiveness of the proposed approach.

**Key words** [Optimal filtering](#) [uncertain observations](#) [discrete state delay systems](#) [projection formula](#).

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