自动化学报 2010 36 (12): 1788-1796 ISSN: 0254-4156 CN: 11-2109/TP

短文

存在多步测量数据包丢失的线性离散时变系统鲁棒H_∞故障检测滤波器设计

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收稿日期 2010-2-2 修回日期 2010-7-30 网络版发布日期 接受日期

摘要
研究了一类存在多步测量数据包丢失的线性离散时变系统故障检测滤波器(Fault detection filter, FDF)设计问题. 采用基于观测器的鲁棒H_∞故障检测滤波器作为残差产生器, 将故障检测滤波器的设计问题转化为一类随机时变系统的H_∞滤波问题, 基于Riccati方程推导并证明了其存在的充分必要条件. 将滤波器参数矩阵求取转化为二次型优化问题, 通过求解Riccati方程, 得到滤波器参数矩阵的显式解. 算例验证了所提算法的有效性.

关键词 故障检测滤波器 线性离散时变系统 多步数据包丢失 Riccati方程

分类号

On Designing Robust H_∞ Fault Detection Filter for Linear Discrete Time-varying Systems with Multiple Packet Dropouts

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Abstract
This paper deals with the problem of designing robust H_∞ fault detection filter (FDF) for linear discrete time-varying systems with multiple measurement packet dropouts. By using an observer-based robust H_∞-FDF as a residual generator, the design of FDF is formulated in the framework of H_∞ filtering for a class of stochastic time-varying systems. A sufficient and necessary condition for the existence of the FDF is derived in terms of a Riccati equation. The determination of the parameter matrices of the filter is converted into a quadratic optimization problem, and the explicit solutions of the parameter matrices are obtained by solving the Riccati equation. Numerical examples are given to illustrate the effectiveness of the proposed method.

Key words Fault detection filter (FDF) linear discrete time-varying systems multiple packet dropouts Riccati equation

DOI: 10.3724/SP.J.1004.2010.01788

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