短文

U-D分解的前向固定区间平滑新算法

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摘要
本文提出了两种前向固定区间平滑新算法以解决工程问题. 为了确保算法的数值稳定性并提高计算效率, 两种算法中的协方差矩阵传播均使用了U-D分解形式. 计算量分析结果表明, 两种新算法与Keigo Watanabe前向平滑算法相比较, 计算量减少40%以上;状态维数较高时, 计算效率提高3倍以上.
关键词　 Kalman滤波　 固定区间平滑　 状态估计　 数值稳定性　 飞行试验
分类号

A New U-D Factorization-Based Forward-Pass Fixed-Interval Discrete-Time Smoother

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Abstract
To solve the problem of time-history arrangement of test data, two kinds of forward-pass fixed-interval discrete-time smoothers are presented. These smoothers are based on the Kalman filter, Rauch-Tung-Streible smoother, and Keigo Watanabe forward-pass smoother. To get high numerical stability and computational efficiency, U-D factorizations are used in the propagations of covariance matrices of these new smoothing algorthms. For different systems, one of the new smoothers would be chosen easily by the comparison of operation counts. These new smoothers exhibit excellent numerical accuracy and stability and the number of operations of both the filter and smoother are decreased greatly. Comparison of operation numbers shows that these new smoothers are more than 1.8 times as faster as Keigo. Watanabe's forward-pass smoother.
Key words　 Kalman filter　 fixed-interval smoother　 state estimation　 numerical accuracy　 flight test

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