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一种时域稳定参数预报与最优估计兼容的参数辨识法

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AN OPTIMAL PARAMETER ESTIMATION METHOD COMPATIBLE WITH STABSE PARAMETER PREDI CTIONN SN TIME DOMAIN

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摘要

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摘要 本文导出一种基于时域稳定的参数预报与最优估计兼容的状态估计和参数辨识算法。这种算法将系统辨识分为三步: 1.以辨识系统预报误差渐近稳定为准则的参数预报; 2.以预报参数为条件的状态估计; 3.对参数和状态的后验修正。即一般分割辨识算法(GPIA)与模型参考辨识算法(MRIA)相结合的兼容辨识算法。本文将这一算法用于飞行器气动系数和控制导数的辨识,并与GPIA算法所得结果相比较。

关键词:

Abstract: A compatible identification algorithm (GPIA-MRIA) is presented, in which the Lainiotis' general partitioning identification algorithm (GPIA) is combined with the model reference identification algorithm (MRIA) based on the stability theory of Lyapunov. By means of this algorithm, the residuals of the system can approach to zero asymptotically and variance of the residuals can be minimized. In the GPIA-MRIA algorithm GPIA gives a linear optimal estimation of state and parameters according to a finite measurement set and MRJA offers an asymptotical approach of the models. This means that GPIA contributes the state estimator of MRJA on the one hand, and on the other hand MRJA predicts the parameters and adjusts the model of GPIA to an optimal estimation of the parameters. This method has been applied to identification of the aerodynamic coefficients (C_{x0} , C_{xi} , C_{y0} , C_{ya} , m_{z0} , m_{za} , $m_{z\omega z}$ and the control derivatives ($C_{y\delta}$, $m_{z\delta}$) of an aircraft by means of digital simulation. It is shown that this method is evidently superior to the single GPIA in accuracy of identification and speed of convergence and requires almost no increase in the capacity of computation.

Keywords:

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