عنوان مقاله:

Rolling Airframe Aerodynamic Parameters Estimation using Extended Kalman Filter Tuned by Particle Swarm Optimization

محل انتشار:

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خلاصه مقاله:

In this article, the heuristic optimization algorithm particle swarm optimization (PSO) is used to tune the extended Kalman filter (EKF) parameters. The performed method namely EKF-PSO is applied for aerodynamic parameter estimation of a typical one pair ON-OFF actuator rolling airframe. Rolling airframe is a high nonlinear system, with high parameters variations during flight. In other hand, EKF is a first order linearization algorithm, and tuning of process noise covariance matrix (Q) and measurement noise covariance matrix (R) are required. So, the optimization technique PSO is utilized to tune the Q and R matrices of EKF. The 6-degrees of freedom state model equations are derived in the rolling airframe, and the two accelerometers fixed on the rolling airframe body provide the flight test data for the measurement model. This hybrid EKF-PSO method is implemented on the rolling airframe model. First PSO algorithm is applied to tune Q and R matrices by minimizing the error between the flight test data of the accelerometers and the estimated accelerations, then the EKF algorithm is applied on the model with tuned matrices. The performance of the proposed algorithm EKF-PSO is compared with that of state of the art algorithm EKF. The simulation result shows that EKF-PSO algorithm is better than EKF algorithm in term of accuracy.

کلمات کلیدی:

Extended Kalman Filter Tuning – Particle Swarm Optimization- Estimation- Rolling Airframe - Aerodynamic Parameters.

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