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LQR AIRCRAFT PITCH CONTROLLER DESIGN FOR HANDLING DISTURBANCE USING DIFFERENTIAL EVOLUTION

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Abstract

This work presents the use of differential evolution (DE) for tuning a proportional-integral-derivative (PID) controller, linear quadratic regulator (LQR) with an integral action for aircraft pitch control. An optimisation problem for the three controllers is presented to optimise percentage of overshoot, settling time and steady state error while weighted sum technique is applied. A DE optimisation technique is used to find control gains for the PID controller and the matrix Q and R for the LQR controller in order to minimise the proposed objective function and satisfy the system constraints requirement. Multiple steps input and some disturbance are specified to test stability of the system performed by MATLAB. The results showed that LQR with an integral action is the most efficient in this study.

Keywords: PID, LQR integral action, DE, Aircraft pitch control