

Incremental Approximate Dynamic Programming for Nonlinear Flight Control Design

A self-learning adaptive flight control design for non-linear systems allows reliable and effective operation of flight vehicles in a dynamic environment. Approximate dynamic programming (ADP) provides a model-free and computationally effective process for designing adaptive linear optimal controllers. This paper presents an incremental ADP (iADP) method which combines ADP method and incremental control techniques to design an adaptive near-optimal nonlinear controller. This nonlinear control method does not need any information of the dynamic model, but requires only the considered state (full state) and measured input and output. The iADP method was implemented on an F-16 aircraft simulation model. The results prove the success of the proposed method and show a potential approach of iADP nonlinear flight controllers without knowing full state.