In this project, a framework for control of F-16 aircraft with Takagi-Sugeno (TS) fuzzy systems is developed.

Firstly, based on the best-available nonlinear dynamical model of F-16 aircraft in the open domain, the TS fuzzy model of F-16 aircraft is presented and validated with reasonable accuracy.

Secondly, three control strategies, namely, LQR based control, Lyapunov based control and gain scheduling control, are proposed using the TS model. Each of them is applied to synthesize a F-16 flight control system for both stabilizing control and attitude tracking control. Extensive simulation is carried out and comprehensive comparative studies are made with the normal linear control and among three approaches.

It is concluded that the proposed three control designs are feasible and all of them outperform the linear control design significantly. In particular, the gain scheduling control has achieved superior performance, which is almost equivalent to the best nonlinear control of high complexity.

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Acknowledgement
This work was sponsored by the following DIRP project "Development of an Intelligent Control System for Unmanned Aerial Vehicles"

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