In recent times, control design with disturbance estimation and rejection techniques for nonlinear systems have gained popularity. In this study, a control technique called Uncertainty and Disturbance Estimator (UDE) has been presented for a missile pitch autopilot. To control the nonlinear nominal missile model, an Input Output Linearization (IOL) controller has been designed. Since pitch plane dynamics contain considerable uncertainties, IOL has been augmented with UDE to robustify the system. A Luenberger like UDE observer has also been designed and system stability analysis has been performed on the IOL augmented UDE based Controller-Observer. Simulations under various operating conditions have been carried out to illustrate the performance of UDE. A comparative study has also been performed with other prominent nonlinear robust controls laws and it was seen that UDE performed significantly better.

A control technique called Uncertainty and Disturbance Estimator (UDE) has been applied on a missile pitch autopilot. To control the nonlinear nominal missile model, an Input Output Linearization (IOL) controller has been designed. IOL has been augmented with UDE to robustify the system against pitch plane uncertainties. A Luenberger-like UDE observer has also been designed and stability analysis has been performed on the IOL augmented UDE based Controller-Observer. Simulations in various operating conditions and comparative study with other prominent nonlinear robust control laws is included.