

向量推力控制器探討與噴嘴設計參數對系統頻寬之影響

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摘要

A dynamic model of a thrust-vectoring engine was proposed. The stability of a horizontal pendulum was used to validate the current model through the feedback of the vectoring thrust. The oscillation angle of the limit-cycle between numerical model and test data agree very well. Two different controllers were studied. The response for the controller without a switch is faster than the one with a switch. So the oscillation amplitude of the limit-cycle is smaller for the controller without a switch. However, the performance of recovering from an external disturbance is smooth and fast for the controller with a switch. From the low speed wind tunnel study, an optimal ratio of tangential speed verse axial speed can be found that maximize the bandwidth of the system. For a large vectoring angle, there is an overshoot on the system output. On the other hand, for a fixed vectoring angle of the nozzle, there is an optimal Reynolds number of the deflector that maximizes the bandwidth of the system. For a smaller Mach number through the nozzle, the overshoot of the system is larger.

關鍵字：micro-turbojet engine, thrust-vectoring, horizontal pendulum, controller with a switch, system bandwidth