

Article Abstract

Title:	Model predictive control of a 3-DOF helicopter system using successive linearization
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Abstract:	Helicopter dynamics are in general nonlinear, time-varying, and may be highly uncertain. Traditional control schemes such as proportional–integral–derivative (PID) control, linear quadratic regulator (LQR), and eigen-structure assignment are usually not effective when a linearized model is used and the helicopter moves away from the design trim point. This paper presents a nonlinear model predictive control (NMPC) method to control the elevation and travel of a three degree of freedom (DOF) laboratory helicopter using successive linearization to approximate the internal model of the system. The developed algorithm is evaluated by simulation, and its performance is compared with that achieved by linear model predictive control (LMPC).
Keywords:	nonlinear systems, helicopter dynamics, MIMO systems, model predictive control, successive linearization