Nonlinear Model Predictive Control for Landing Guidance of Reusable Rocket Using Thruster Inputs

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Abstract:

This paper proposes a control system design method based on nonlinear model predictive control for automatic landing of reusable rockets with considering the thruster inputs and the manipulation of gimbal angles and aerodynamic coefficients. Model predictive control is a kind of optimal feedback control in which the control performance over a finite future is optimized and its performance index has a moving initial time and a moving terminal time. This paper provides a numerical solution method based on the C/GMRES algorithm to solve the nonlinear model predictive control problem of automatic landing of reusable rockets. The effectiveness of the proposed method is verified by numerical simulations.

Keywords:

Nonlinear Control, Optimal Control, Space Engineering, Control Systems, Automatic Landing.