



## Robust Constrained Model Predictive Control using Linear Matrix

Kothare, Mayuresh V. and Balakrishnan, Venkataramanan and Morari, Manfred (1995) *Robust Predictive Control using Linear Matrix Inequalities*. California Institute of Technology, Pasadena, CA (Unpublished) <http://resolver.caltech.edu/CaltechCDSTR:1995.011>

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### Abstract

The primary disadvantage of current design techniques for model predictive control (MPC) is their lack of robustness to uncertainty in the plant model. This paper presents a new approach for robust MPC which allows explicit incorporation of the description of plant uncertainty in the problem formulation. The uncertainty is expressed both in the time domain and the frequency domain. The goal is to design, in each time step, a state-feedback control law which minimizes a "worst-case" infinite horizon objective function subject to constraints on the control input and plant output. Using standard techniques, the problem of minimizing the upper bound on the "worst-case" objective function, subject to input and output constraints, is formulated as a convex optimization involving linear matrix inequalities (LMIs). It is shown that the feasible receding horizon state-feedback control design robustly stabilizes the set of uncertain plants under consideration. Extensions, such as application to systems with time-delays and problems involving constant setpoint trajectory tracking and disturbance rejection, which follow naturally from our formulation, are discussed. The controller design procedure is illustrated with two examples. Finally, conclusions are presented.

**Item Type:** Report or Paper (Technical Report)

**Additional Information:** Partial financial support from the US National Science Foundation is gratefully acknowledged. We would like to thank Pascal Gahinet for providing the

<b>Group:</b>	software. Submitted to Automatica Control and Dynamical Systems Technical Reports
<b>Record Number:</b>	CaltechCDSTR:1995.011
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