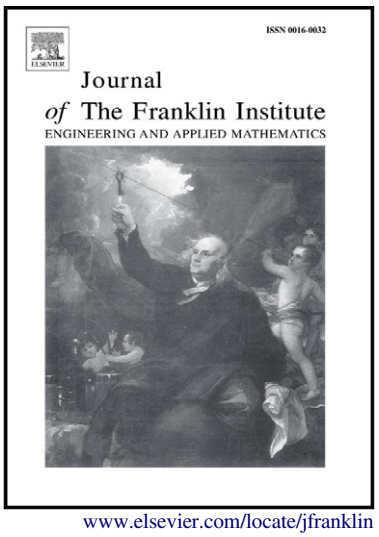

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Xiaojun Ban, Fen Wu

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Gain Scheduling Output Feedback Control of Linear Plants with Actuator Saturation

Xiaojun Ban*
Center for Control Theory and Guidance Technology
Harbin Institute of Technology, Harbin 150001, P. R. China
E-mail: banxiaojun@hit.edu.cn

Fen Wu
Department of Mechanical and Aerospace Engineering
North Carolina State University, Raleigh, NC 27695, USA
E-mail: fwu@ncsu.edu

Abstract

From a gain-scheduling perspective, we will study the output feedback control problem for linear systems with some of control channels subject to actuator saturation. This includes the scenario of all actuator saturation as a special case. A feedback controller, expressed in the form of linear fractional transformation, is proposed to guarantee regional stability of the closed-loop system and provide disturbance/error attenuation measured in $\mathcal{L}_2$ gain. The resulting synthesis condition is formulated as linear matrix inequalities (LMIs) and can be solved efficiently. Moreover, explicit formulas are derived to calculate controller gains, which reduces the computational cost compared to the method of directly solving the LMI-based condition. Numerical examples are provided to demonstrate the proposed saturation control approach.

Keywords Actuator saturation; gain-scheduling; output feedback; regional stability; disturbance attenuation; $\mathcal{L}_2$ gain.

*Corresponding author. Phone: (0451) 86402224-8206, Fax: (0451) 86402689.

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