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GAIN-SCHEDULED GUARANTEED COST CONTROL OF LPV SYSTEMS WITH TIME-VARYING STATE AND INPUT DELAYS

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Abstract. *This paper investigates the problem of delay-dependent guaranteed cost control for linear parameter-varying systems with time-varying state and input delays. Attention is focused on the design of gain-scheduled guaranteed cost controller such that the resulting closed-loop system is asymptotically stable and a parameter-dependent cost performance is also satisfied. By parameter-dependent Lyapunov approach, a sufficient condition is proposed for designing gain-scheduled state feedback controller, in which the controller gain is dependent on the scheduling parameters. A numerical example is provided to illustrate the proposed method.*

Keywords: Linear parameter-varying system, Parameter-dependent cost function, Parameter-dependent Lyapunov function, Gain-scheduled control

1. **Introduction.** In recent years, the area of analysis and control of linear parameter-varying (LPV) systems has received increasing attention because of its importance in developing systematic techniques for gain-scheduling. Most dynamical systems have nonlinear and/or time-variant properties in nature, and a certain class of these systems can be represented as LPV systems that nonlinearly depend on time-varying parameters [1], and thus numerous achievements have been reported, see for example, [2]-[8] and the references therein.

On the other hand, time delay frequently appears in a variety of dynamic systems, such as nuclear reactors, biological systems, population dynamics models, and systems with lossless transmission lines. The time delay is a source of instability and poor performance.