Robust Dynamic Parameter-Dependent Output Feedback Control of Uncertain Parameter-Dependent State-Delayed Systems

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Abstract: In this paper, we investigate the problem of robust dynamic parameter-dependent output feedback (RDP-DOF) stabilization under $H_{\infty}$ performance index for a class of linear time invariant parameter-dependent (LTIPD) systems with multi-time delays in the state vector and in the presence of norm-bounded non-linear uncertainties. Using Hamiltonian–Jacobi–Isaac (HJI) method and the idea of polynomial parameter-dependent quadratic (PPDQ) Lyapunov–Krasovskii functions, a new sufficient condition is derived to ensure robust asymptotic stability and robust disturbance attenuation of the closed-loop system. Finally, an example is included that demonstrates the application of the results.

Keywords: Parameter-dependent systems; multi-time delays; linear matrix inequality; robust dynamic parameter-dependent.

Mathematics Subject Classification (2000): 34D20, 93A30, 93B36.

1 Introduction

The stability analysis and control design of linear time invariant parameter-dependent (LTIPD) systems where the state-space matrices depend affinely on parameter vector, whose values are not known a priori, but can be measured online for control process, have received considerable attention recently (see for instance [1, 2, 3, 5, 6, 18, 23, 25, 26, 28, 31] and the references therein). In many industrial applications, like flight control and process control, the operating point can indeed be determined from measurement, making the LTIPD approach viable, see for example [21, 24]. Establishing stability via the use of

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