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GLOBAL ASYMPTOTIC STABILITY RESULTS FOR UNCERTAIN STOCHASTIC SYSTEMS WITH INTERVAL TIME-VARYING DELAYS AND NONLINEAR PERTURBATIONS

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Abstract. This paper deals with global asymptotic stability analysis problem for uncertain stochastic systems with interval time-varying delays and nonlinear perturbations. The parameter uncertainties are assumed to be norm bounded and the delay is assumed to be time-varying and belong to a given interval, which means that the lower and upper bounds of interval time-varying delays are available. Based on the Lyapunov-Krasovskii functional and stochastic stability theory, new delay-interval dependent stability criteria is obtained in terms of linear matrix inequalities(LMIs). Finally, two numerical examples are provided to illustrate the effectiveness and less conservativeness of the developed techniques.

Keywords. Delay/interval-dependent stability, Linear matrix inequality, Stochastic systems, Interval time-varying delays, Lyapunov-Krasovskii functional.

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1 Introduction

Time delays are frequently encountered in many systems such as electronic, biological, chemical systems, aircraft, economic, rolling mill systems and network control systems [7]. Unlike ordinary differential equations, delay systems are infinite-dimensional in nature and time-delay is, in many cases, a source of instability and poor performance of systems. Also, in practice, the systems almost present some uncertainties because it is very difficult to obtain an exact mathematical model due to environment noise, uncertain or slowly varying parameters, etc., Over the past decade, much effort has