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A delay-derivative-dependent approach to robust H^∞ filter design for uncertain systems with time-varying distributed delays. (English) Zbl 1214.93041

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Summary: This paper focuses on the problem of robust H^∞ filter design for uncertain systems with time-varying state and distributed delays. System uncertainties are considered as norm-bounded time-varying parametric uncertainties. The delays are assumed to be time-varying and differentiable uniformly bounded with delay-derivative bounded by a constant, which may be greater than one. A new delay-derivative-dependent approach of filter design for the systems is proposed. A novel Lyapunov-Krasovskii Functional (LKF) is employed, and a tighter upper bound of its derivative is obtained by employing an inequality and using free-weighting matrices technique. The proposed result has advantages over some existing results, in that it is less conservative and it enlarges the application scope. An improved sufficient condition for the existence of such a filter is established in terms of Linear Matrix Inequality (LMI). Finally, illustrative examples are given to show the effectiveness and reduced conservatism of the proposed method.

MSC:

93B36 H^∞-control
93B51 Design techniques (robust design, computer-aided design, etc.)
93C15 Control/observation systems governed by ordinary differential equations
93C05 Linear systems in control theory

Cited in **9** Documents

Keywords:

robust H^∞ filter design; uncertain systems; Lyapunov-Krasovskii functional (LKF); linear matrix inequality (LMI)

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