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Controller failure time analysis for symmetric $\mathcal{H}_\infty$ control systems. (English) Zbl 1059.93040

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Summary: We consider a controller failure time analysis problem for a class of symmetric linear time-invariant (LTI) systems controlled by a pre-designed symmetric static output feedback controller. We assume that the controller fails from time to time due to a physical or purposeful reason, and we analyse stability and $\mathcal{H}_\infty$ disturbance attenuation properties of the entire system. Our aim is to find conditions concerning controller failure time, under which the system's stability and $\mathcal{H}_\infty$ disturbance attenuation properties are preserved to a desired level. For both stability and $\mathcal{H}_\infty$ disturbance attenuation analysis, we show that if the unavailability rate of the controller is smaller than a specified constant, then global exponential stability of the entire system and a reasonable $\mathcal{H}_\infty$ disturbance attenuation level is achieved. The key point is to establish a common quadratic Lyapunov-like function for the entire system in two different situations.

MSC:

93B36 H^∞-control
90B25 Reliability, availability, maintenance, inspection in operations research

Cited in **18** Documents

Full Text: DOI

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