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Output-Feedback Control Design for a General Class of Systems Subject to Sampling and Uncertainties

Authors : Tomas Menard

Abstract : The synthesis of output-feedback control law has been investigated by many researchers since the last century. While many results exist for the case of Linear Time Invariant systems whose measurements are continuously available, nowadays, control laws are usually implemented on micro-controller, then the measurements are discrete-time by nature. This fact has to be taken into account explicitly in order to obtain a satisfactory behavior of the closed-loop system. One considers here a general class of systems corresponding to an observability normal form and which is subject to uncertainties in the dynamics and sampling of the output. Indeed, in practice, the modeling of the system is never perfect, this results in unknown uncertainties in the dynamics of the model. We propose here an output feedback algorithm which is based on a linear state feedback and a continuous-discrete time observer. The main feature of the proposed control law is that only discrete-time measurements of the output are needed. Furthermore, it is formally proven that the state of the closed loop system exponentially converges toward the origin despite the unknown uncertainties. Finally, the performances of this control scheme are illustrated with simulations.

Keywords : dynamical systems, output feedback control law, sampling, uncertain systems
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