

Recent Developments on Prescribed-Time Control by Periodic Delayed Feedback

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Abstract

Prescribed-time control has been a hot topic in recent years. Existing prescribed-time control methods are mainly based on time-varying high-gain feedback (THF). However, since an infinite gain is practically impossible to achieve, such kind of controllers are not well-defined at and after the prescribed settling time. Recently, another control scheme capable of achieving prescribed-time stabilization, namely, a periodic delayed feedback (PDF) scheme, was proposed. An appealing feature of the PDF is that the time-varying controller gain is bounded and can be chosen continuous, continually differentiable and even smooth, thereby avoiding the inherent drawbacks of THF. Over the past three years, there have been many interesting and significant developments in the PDF scheme, achieving prescribed-time stabilization of linear delay systems, strict feedback systems and single input normal nonlinear systems. As applications of the proposed methods, the prescribed-time control problems of spacecraft rendezvous control systems, hypersonic vehicle systems and manipulator systems have been investigated. Numerical simulations show the effectiveness of the proposed methods.



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