Predictor-Based Prescribed-Time Output Feedback for a Parabolic PDE

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Résumé

In this paper, we consider a 1D reaction-diffusion system with boundary input delay and propose a general method for studying the problem of prescribed-time output boundary stabilization. We first reformulate the system as a PDE-PDE cascade system (i.e., a cascade of a linear transport partial differential equation (PDE) with a linear reaction-diffusion PDE), where the transport equation represents the effect of the input delay. We then apply a time-varying infinite-dimensional backstepping transformation to convert the cascade system and the proposed observer system into two prescribed-time stable (PTS) target systems. The stability analysis is conducted on the target systems, and the desired stability property is transferred back to the closed-loop system and the error system using the inverse transformation.

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