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Adaptive Output Control of a Class of Time-Varying Uncertain Nonlinear Systems

Jing Zhou, Changyun Wen* and Ying Zhang

School of Electrical and Electronic Engineering, Nanyang Technological University, Nanyang Avenue, Singapore 639798

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Abstract: In this paper, we present a new scheme to design adaptive controllers for single-input single-output uncertain time-varying systems in the presence of unknown bounded disturbances. No knowledge is assumed on the sign of the term multiplying the control. The control design is achieved by introducing certain well defined functions, estimating variation rates of parameters and incorporating a Nussbaum gain. To overcome the problem of overparametrization, tuning functions, which are different from the standard ones due to the use of projection operations, are employed. It is shown that the proposed controller can guarantee global uniform ultimate boundedness.

Keywords: *Adaptive control; backstepping; time-varying systems; tuning functions; Nussbaum gain.*

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