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Adaptive neural networks finite-time tracking control for non-strict feedback systems via prescribed performance*

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Abstract: This paper focuses on the semi-globally practical finite-time tracking control problem for a class of nonlinear systems with non-strict feedback structure. Inspired by prescribed performance control (PPC), a new performance function called finite-time performance function (FTPF) is defined for the first time. With the aid of neural networks and backstepping, an adaptive finite-time tracking controller is properly designed. Different from the existing finite-time results, the proposed method can guarantee that the tracking error converges to an arbitrarily small region at any settling time and all the signals in the closed-loop system are semi-globally practical finite-time stable (SGPF-stable). Two simulation examples are given to exhibit the effectiveness and superiority of the presented technique.

Keywords: Semi-globally practical finite-time stability (SGPFS), prescribed performance control (PPC), tracking control, neural networks (NNs)

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