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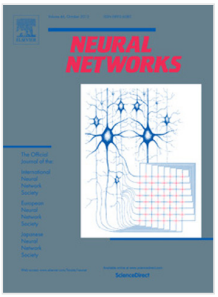

Fixed-time stability of dynamical systems and fixed-time synchronization of coupled discontinuous neural networks

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Fixed-time stability of dynamical systems and fixed-time synchronization of coupled discontinuous neural networks

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Abstract. In this paper, the fixed-time stability of dynamical systems and the fixed-time synchronization of coupled discontinuous neural networks are investigated under the framework of Filippov solution. Firstly, by means of reduction to absurdity, a theorem of fixed-time stability is established and a high-precision estimation of the settling-time is given. It is shown by theoretic proof that the estimation bound of the settling time given in this paper is less conservative and more accurate compared with the classical results. Besides, as an important application, the fixed-time synchronization of coupled neural networks with discontinuous activation functions is proposed. By designing a discontinuous control law and using the theory of differential inclusions, some new criteria are derived to ensure the fixed-time synchronization of the addressed coupled neworks. Finally, two numerical examples are provided to show the effectiveness and validity of the theoretical results.

Key words: Fixed-time stability; Dynamical system; Fixed-time synchronization; Discontinuous neural network;

1 Introduction

Recently, finite-time stability and control of nonlinear dynamical systems have been intensively investigated [1–9]. Different from the classic Lyapunov asymptotical stability,

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