

Fixed-Time Bounded H Infinity Tracking Control of a Single-Joint Manipulator System with Input Saturation

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Research Article

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Abstract

Based on Lyapunov finite-time stability theory and backstepping strategy, we put forward a novel fixed-time bounded H infinity tracking control scheme for a single-joint manipulator system with input saturation. The main control objective is to maintain that the system output variable tracks the desired signal at fixed time. The advantages of this paper are the settling time of the tracking error converging to the origin is independent of the initial conditions, and its convergence speed is more faster. Meanwhile, bounded H infinity control is adopted to suppress the influence of the external disturbances on the controlled system. At the same time, the problem of input saturation control is considered, which effectively reduce the input energy consumption. Theoretical analysis shows that the tracking error of the closed-loop system converges to a small neighborhood of the origin within fixed time. In the end, a simulation example is presented to demonstrate the effectiveness of the proposed scheme.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

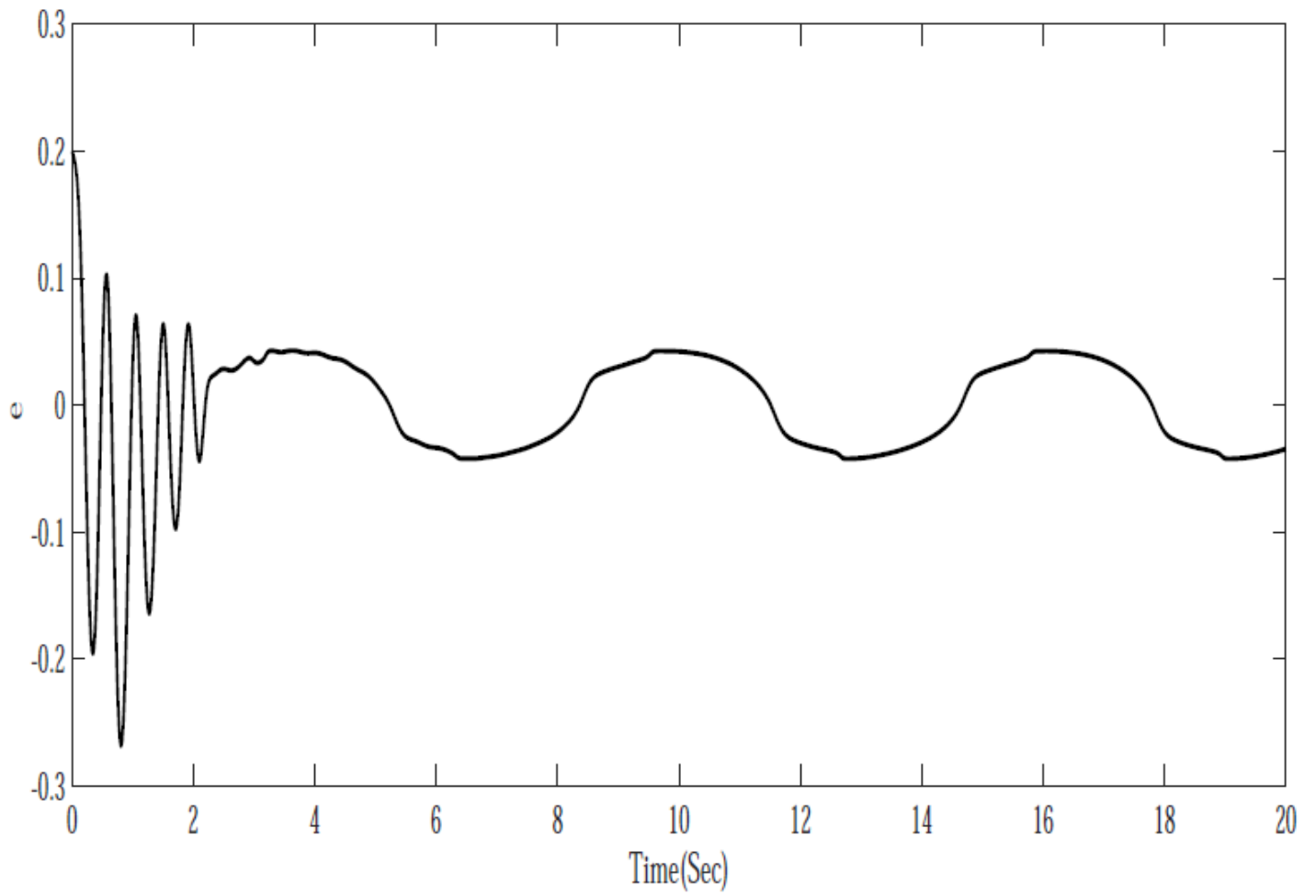


Figure 1

Response curves of the tracking error

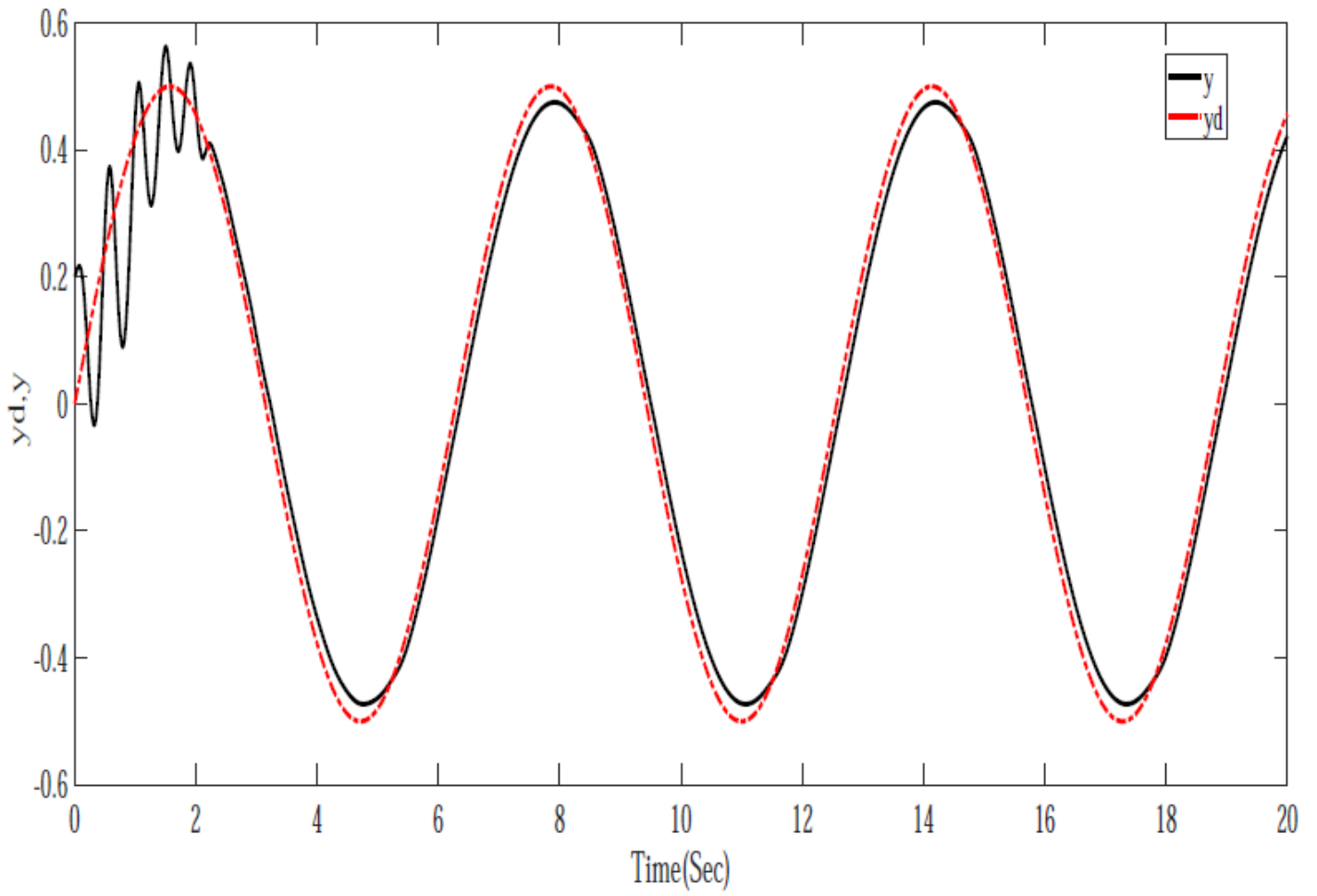


Figure 2

Response curves of the output signal

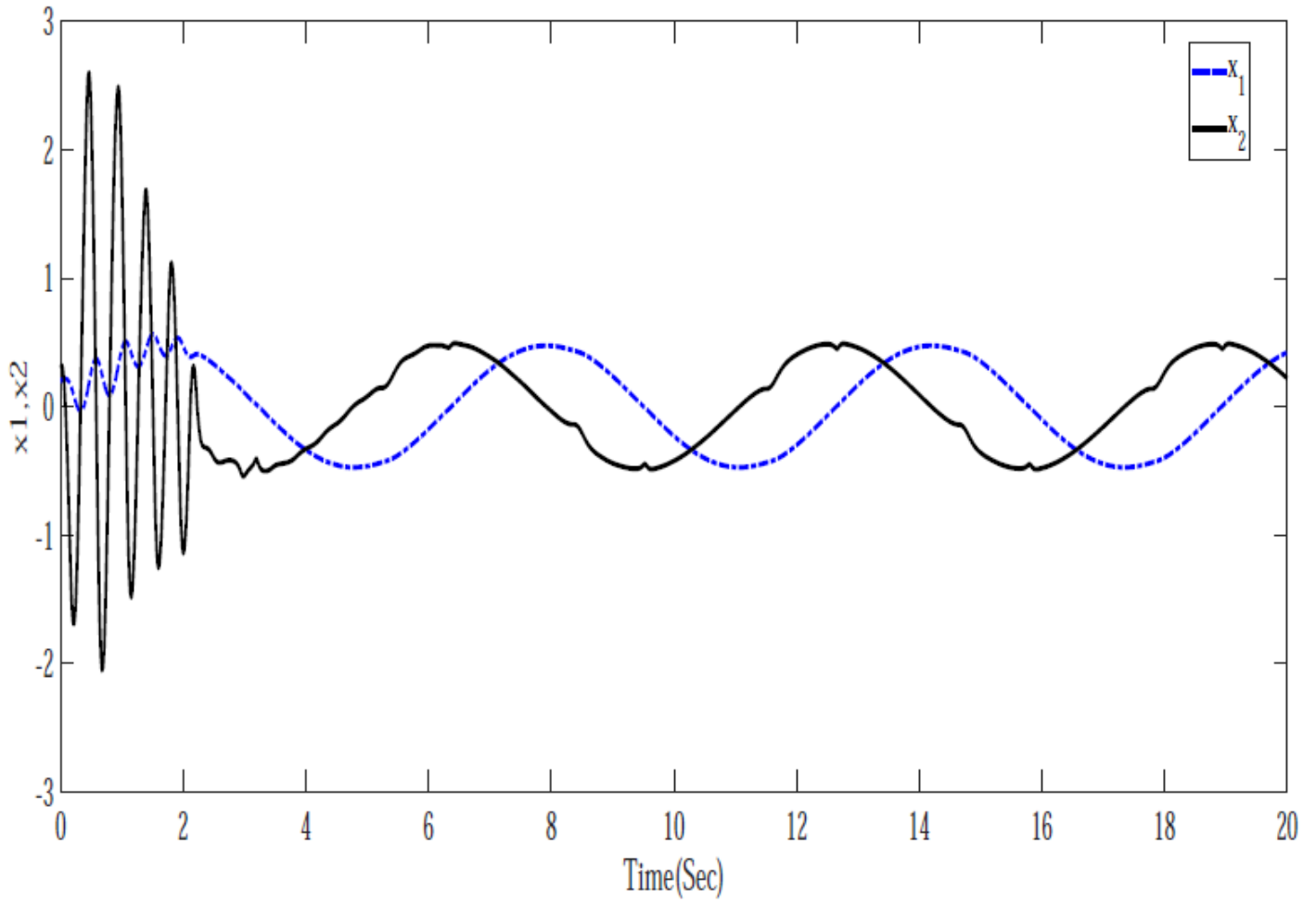


Figure 3

Response curves of x_1, x_2

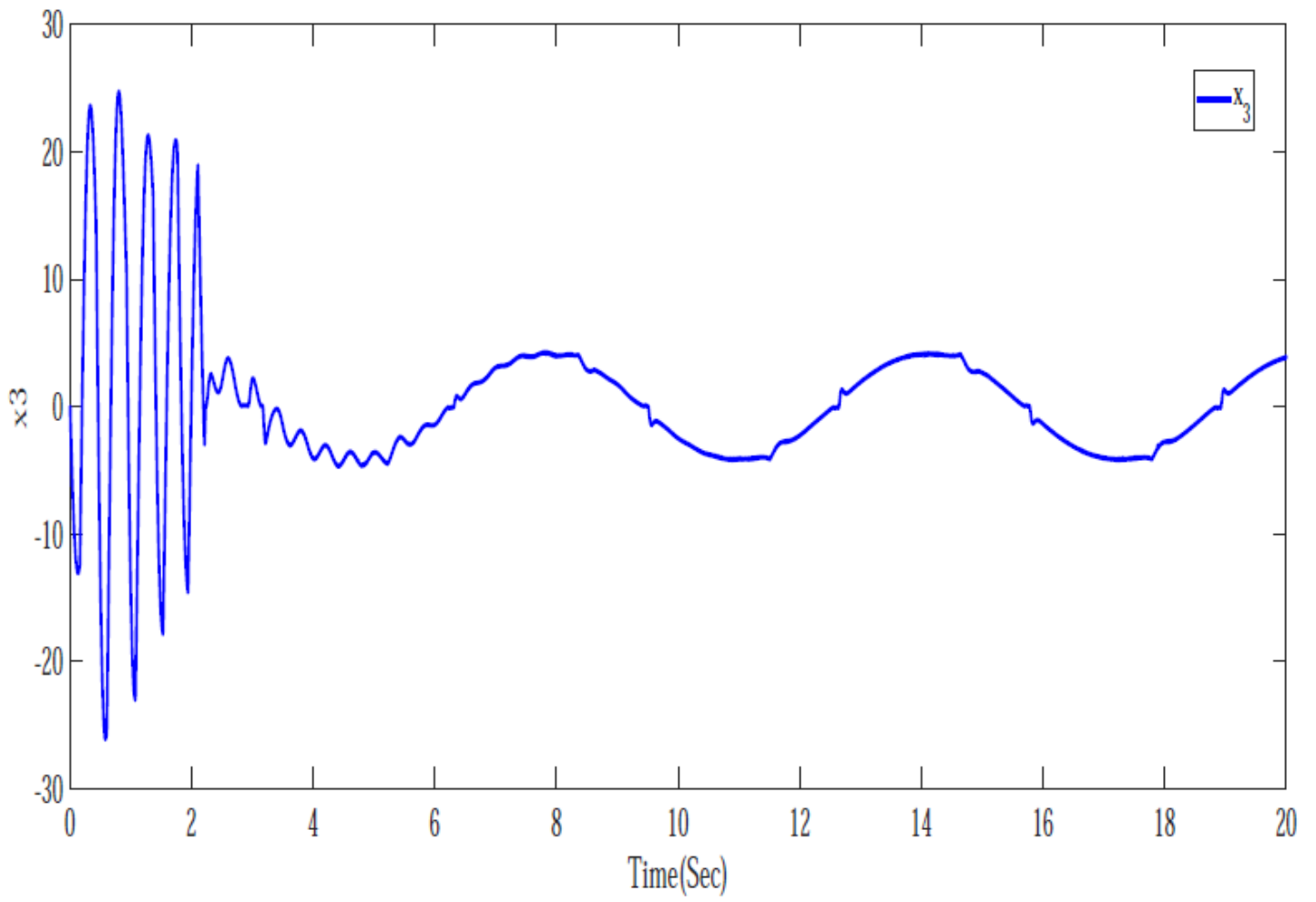


Figure 4

Response curve of x_3

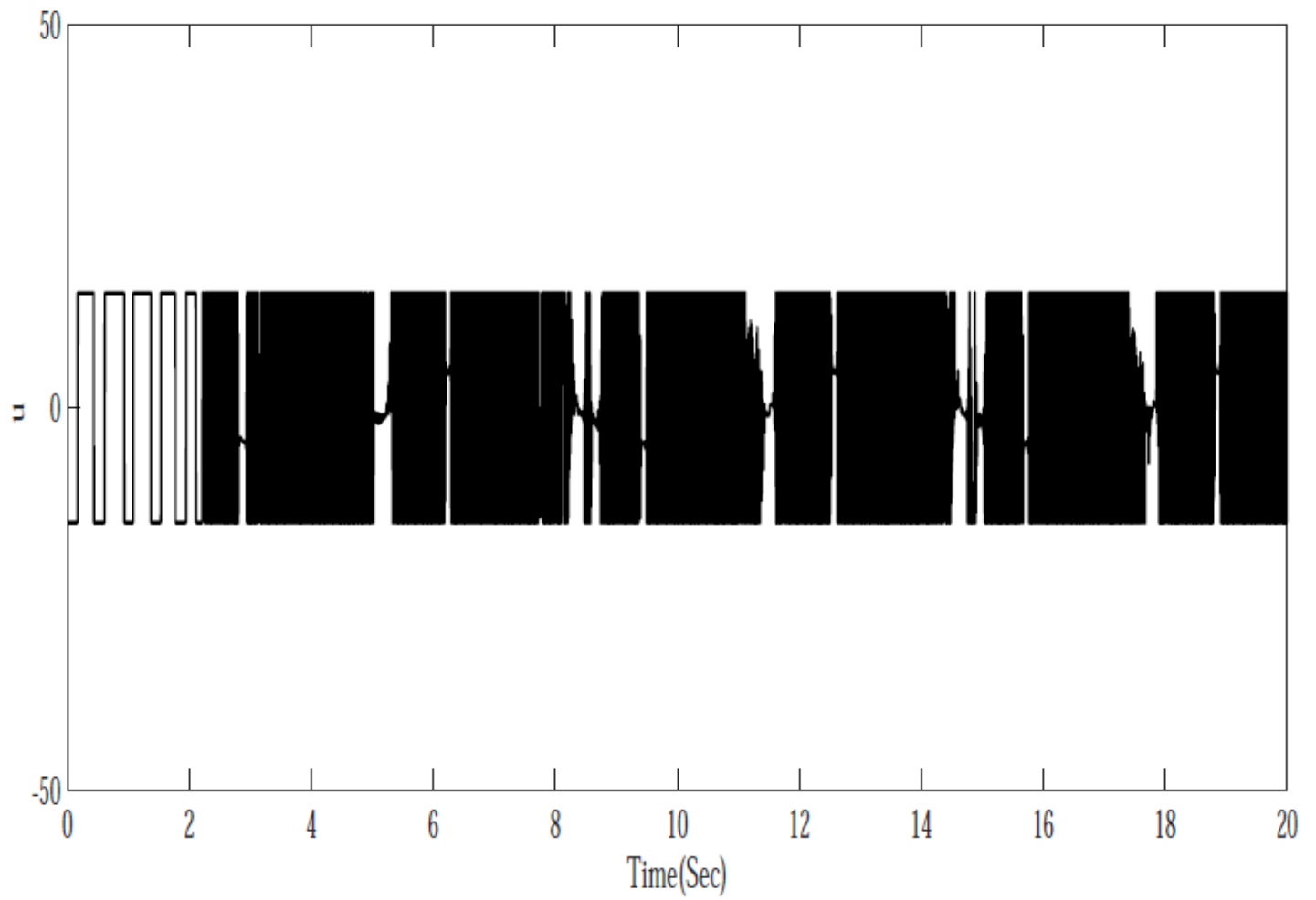


Figure 5

Response curve of the control input signal