

Controlling Chaos and Chaotification in the Chen-Lee System by Multiple Time Delays

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Abstract

Controlling chaos and chaotification using delayed continuous feedback is studied in this paper. The effects of time delay parameters on the dynamics of the Chen-Lee system were numerically studied. The system displays comprehensive dynamic behaviors, such as fixed points, periodic motion, and chaotic motion. The maximum Lyapunov exponent, time histories, and phase trajectories all indicated that chaotic motion could successfully be controlled. Period doubling routes to chaos and inverse period doubling phenomena were also found in the Chen-Lee system. This paper points out that the time delay parameters are good switch keys. The dynamics of this system can be controlled under appropriate feedback gains and delay times. This study showed that the delayed control feedback (DCF) method is very straightforward, and that it is easy to switch from a chaotic trajectory to a regular periodic orbit while simultaneously improving the system's properties.

Keyword : chaos, Chen - Lee system, multiple time delays,