Chaos, Chaotization and Uncoupled Chaos Synchronization of Integral and Fractional Order Double Ikeda Systems

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ABSTRACT

In this thesis, the chaotic behaviors in the integral and fractional order double Ikeda systems are studied numerically by phase portraits, Poincaré maps and bifurcation diagrams. The chaos in integral and fractional order double Ikeda systems with total order of derivatives from 2 to 0.2 are studied by phase portraits, Poincaré maps and bifurcation diagrams. It is found that chaos exists in all cases. Lag or anticipated synchronization and the lag or anticipated anti-synchronization of two double Ikeda systems with different initial conditions are discovered. By replacing their delay times by a function of chaotic state variables of a second chaotic system, the chaotic behaviors of Ikeda systems are obtained. The chaotization of a double Ikeda system is studied by using a function of state variables of a second identical system to replace the delay time of the first system. It is found that chaotization exists. Robust lag chaos synchronization, lag quasi-synchronization and chaos control of two uncoupled double Ikeda system, are achieved by replacing the corresponding parameters of two systems by different chaotic state variables of a third chaotic system. Robustness of synchronization is studied by addition of various noises. The results are satisfactory.