Synchronization and Chaos Propagation between Three-periodic and Chaotic Attractor

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SUMMARY

Synchronization of chaotic systems are good models to describe various higher-dimensional nonlinear phenomena in the field of natural science. Therefore, synchronization of coupled chaotic circuits has been interested by many researchers [1]-[4]. In particular, it is important to investigate synchronization phenomena of coupled circuits under some difficult situations for the circuits. In our research group, synchronization and chaos propagation have been reported in the ring of coupled chaotic circuits [5][6]. However, these research were considered about the only one ring system.

In this study, synchronization and chaos propagation of coupled chaotic circuits in various systems are researched. We propose a ladder system model of 5 chaotic circuits coupled by the resistors. In this model, the central circuit generates chaotic attractor and the other circuits generate the three-periodic attractors. First, we show synchronization and chaos propagation in the ladder system. By measuring the phase difference among all adjacent circuits, we investigate synchronization in the entire system. The symmetric and asymmetric systems obtained from adding the coupling resistor from the ladder system, are studied. Moreover, we proposed a ring system model which is had a characteristic of symmetric system. In the system, we change the number and the place of generated chaotic attractor. We separate the system into several groups and the synchronous state can be defined if the average of the phase difference between the circuits below 10 °. Furthermore, we compare the synchronization among the separated groups.

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