Synchronization State of Coupled Time Delayed Chaotic Circuit

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SUMMARY

There are many nonlinear systems containing time delay, such as neural networks, control systems, meteorological systems, biological systems and so on in the natural world. Namely, it is considered that investigation of stability in such time-delay systems is important [1]. Generation of chaos is reported self excited oscillation system containing time delay. This chaotic circuit can be easily realized by using simple electric circuit element and analyzed exactly [2]. There are examples of nonlinear phenomena, chaotic synchronization, clustering phenomenon and so on [3]. In particular, a number of studies on synchronization of coupled chaotic circuits have been made [4]. Further, interesting synchronization state was confirmed in coupled time delayed chaotic circuits.

In this study, we investigate the new coupled system and synchronization state observed in coupled time delayed chaotic circuits as shown in Fig. 1. The pattern of coupled system by time delayed chaotic circuits depends on attractor types. We focus on relationships between synchronization state and the pattern of coupling. The time delayed chaotic circuit has characteristic time delays methods. We devise a coupled system as shown in Fig. 2. It will be called the coupled system "system including time delay in one direction." By carrying out computer simulations, time delay of subcircuits effects a change synchronization state.

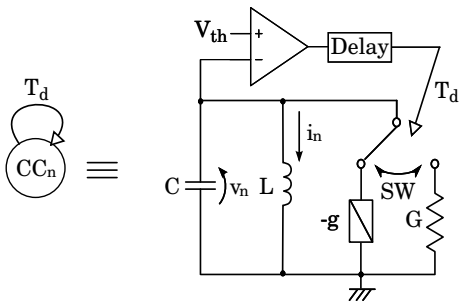

Fig. 1. Time delayed chaotic circuit.

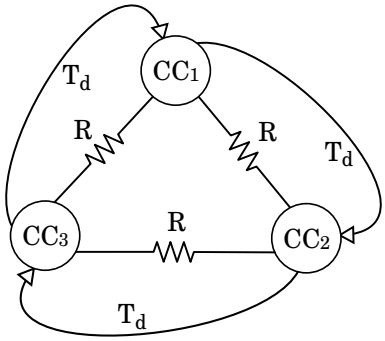

Fig. 2. System including time delay in one direction.

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