

SPICE Simulation of Three Dimensional Chaotic Circuit Based on Generalized Memristor

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Abstract

Some chaotic circuits using memristor have been proposed. One of them is generalized memristor consisting of a diode bridge with a first order parallel RC filter proposed by Chen et al [1]. The system consists of one negative resistor, two capacitors, one inductor and one generalized memristor which consists of a diode bridge and a RC filter. It means that this system is a forth order system. However, chaos can be generated by a third order system.

In this study, chaotic circuits based on generalized memristor consisting of a diode bridge with a first order parallel RC filter as shown in Fig. 1. This system is a third order system. Bifurcation route from periodic orbits via period doubling bifurcation phenomena to chaos can be observed. Figure 2 shows one of circuit experiment results. Chaotic attractor can be observed.

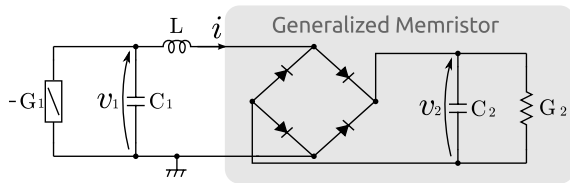


Figure 1: Proposed Circuit.

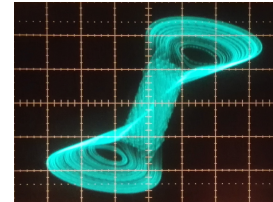


Figure 2: Circuit Experiment Result. Horizontal axis: v_1 . Vertical axis: Node of Generalized Memristor. $C_1=0.033[\mu\text{F}]$, $C_2=0.102[\mu\text{F}]$, $L=30[\text{mH}]$, $G_1=0.844[\text{mS}]$ and $G_2=1.38[\text{mS}]$.

References

- [1] M. Chen, J. J. Yu, Q. Yu, C. Li and B. C. Bao, "A Memristive Diode Bridge-Based Canonical Chua's Circuit," *Entropy*, no. 16, pp. 6464-6476, 2014.