



Synchronization Phenomena in Two Chaotic Circuits Coupled with Memristors and a Resister

Kana Kobayashi

Dept. Electrical and Electronic Eng.,
 Tokushima University

Email: kobayashi@ee.tokushima-u.ac.jp

Yasuteru Hosokawa

Dept. Media and Information Syst.,
 Shikoku University

Email: hosokawa@keiei.shikoku-u.ac.jp

Yoko Uwate and Yoshifumi Nishio

Dept. Electrical and Electronic Eng.,
 Tokushima University

Email: uwate,nishio@ee.tokushima-u.ac.jp

SUMMARY

Shinriki-Mori circuit [1], which is one of the chaos circuits, have been studied by many researchers. Some of them reported about coupled chaotic circuits. In these system, various kinds of interesting phenomena related to chaotic synchronization phenomena [2]-[4] are observed.

On the other hand, a memristor is investigated by researchers who are focusing on chaotic circuits. Gambuzza and et al. [5] investigated memristors as coupling elements in chaotic circuits. They proposed a model which two memristor are coupled in anti-parallel and investigated the model as a coupling element of two chaos circuits. However, the coupling strength has not changed.

In this study, a coupling element which consists of two memristors and a resister is proposed. By applying to two Shinriki-Mori circuit, relationship between synchronization phenomena and a coupling strength of the model is investigated.

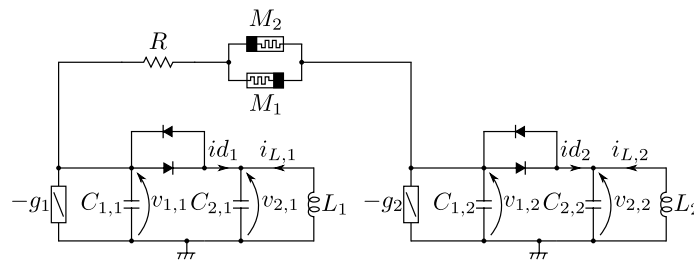


Fig. 1. System Model.

REFERENCES

- [1] M. Shinriki, M. Yamamoto and S. Mori, "Multimode Oscillations in a Modified van der Pol Oscillator containing a positive nonlinear conductance," *Proc. IEEE*, vol.69, no.3, pp.394-395, 1981.
- [2] H. Fujisaka and T. Yamada, "Stability theory of synchronized motion in coupled oscillator systems," *Prog. Theor. Phys.*, vol.69, no.1, pp.32-47, 1983.
- [3] L. M. Pecora and T. L. Carroll, "Synchronization in chaotic systems," *Phys. Rev. Lett.*, vol.64, no.8, pp.821-824, 1990.
- [4] M. G. Rosenblum, A. S. Pikovsky, and J. Kurths, "Phase synchronization of chaotic oscillators," *Phys. Rev. Lett.*, vol.76, no.11, pp.1804-1807, 1996.
- [5] L. V. Gambuzza, A. Buscarino, L. Fortuna, M. Frasca, "Memristor-Based Adaptive Coupling for Consensus and Synchronization," *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol.62, no.4, pp.1175-1184, 2015.