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On the Verification for Realizing Multi-scroll Chaotic Attractors with High Maximum Lyapunov Exponent and Entropy



| Chapter | First Online: 15 March 2016
 | pp 311–336 | [Cite this chapter](#)



Advances and Applications in Chaotic Systems



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 Part of the book series: [Studies in Computational Intelligence](#) ((SCI, volume 636))

 1537 Accesses  1 Citation

Abstract

Nowadays, many works have been presented regarding the modeling, simulation and circuit realization of different kinds of continuous-time multi-scroll chaotic attractors. However, very few works describe the experimental realization of attractors having high maximum Lyapunov exponent (MLE) and high entropy, which are desirable characteristics to guarantee better chaotic unpredictability. For instance, two chaotic oscillators having the same MLE values can behave in a very different way, e.g. showing different entropy values. That way, we describe the experimental realization of an optimized multi-scroll chaotic oscillator with both high MLE and entropy. First, the MLE is optimized by applying an evolutionary algorithm, which provides a set of feasible solutions. Second, the associated entropy is evaluated for each feasible solution. In this chapter, experimental results are shown for the electronic implementation of a chaotic oscillator generating 2-, 5- and 10-scrolls. Finally, the experimental results show that by increasing the number of scrolls both the MLE and its associated entropy increase in a similar proportion, thus guaranteeing better unpredictability.

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