

## Complexity and dynamic characteristics of a new discrete-time hyperchaotic model

### ABSTRACT

Based on two of the existing one-dimensional chaotic maps and the two-dimensional Hénon map, a new two-dimensional Hénon-Gaussian-Sine model (2D-HGSM) is proposed. Basic dynamic characteristics of the 2D-HGSM are studied from the following three aspects: trajectory, bifurcation diagram and Lyapunov exponents. The complexity of 2D-HGSM is investigated by means of Approximate entropy. Performance evaluations show that the 2D-HGSM has higher complexity level, better ergodicity, wider chaotic and hyperchaotic region than different chaotic maps. Furthermore, the 2D-HGSM exhibits a qualitatively different chaotic behavior with respect to the variation of its corresponding parameters. Therefore, the 2D-HGSM has good application prospects in secure communication.

**Keyword:** Hyperchaotic; Lyapunov exponents; Approximate entropy; Complexity analysis