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Cascade Chaotic System With Applications

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Abstract

Chaotic maps are widely used in different applications. Motivated by the cascade structure in electronic circuits, this paper introduces a general chaotic framework called the cascade chaotic system (CCS). Using two 1-D chaotic maps as seed maps, CCS is able to generate a huge number of new chaotic maps. Examples and evaluations show the CCS's robustness. Compared with corresponding seed maps, newly generated chaotic maps are more unpredictable and have better chaotic performance, more parameters, and complex chaotic properties. To investigate applications of CCS, we introduce a pseudo-random number generator (PRNG) and a data encryption system using a chaotic map generated by CCS. Simulation and analysis demonstrate that the proposed PRNG has high quality of randomness and that the data encryption system is able to protect different types of data with a high-security level.

Keywords

Author Keywords: Cascade chaotic system (CCS); chaotic map; data encryption; pseudo-random number generator (PRNG)

Keywords Plus: DISCRETE LYAPUNOV EXPONENT; ENCRYPTION SCHEME; MODEL; SYNCHRONIZATION; ENTROPY

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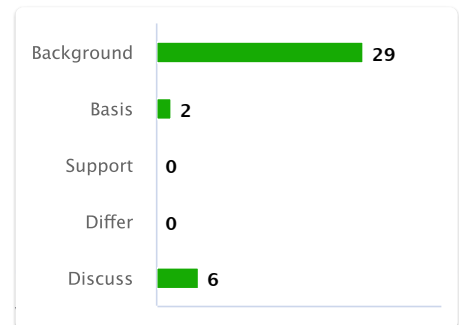
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