
# Image Encryption Using 2D Hénon-Sine Map and DNA Approach

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## Highlights

- We propose a novel 2D chaotic map named 2D-HSM, which is generated by connecting Henon map and Sine map. Performance evaluations including phase diagram, bifurcation diagram and Lyapunov exponent spectrum illustrate that the new map has better ergodicity, wider chaotic region, and is more unpredictable than other 2D chaotic maps.
- We analyse the shortcomings of an existing image encryption model (SPDT), and find that the model cannot resist statistical attack, and more importantly, the encryption model is irreversible, which illustrates that the model cannot even guarantee a normal intercommunication.
- To resist statistical attack, equivalent key streams of an encryption model needs to be random and homogeneous. Using the proposed 2D chaotic map, we design a new chaos-based encryption algorithm with equilibrium key streams, and a DNA encryption is designed in the encryption model to enhance the encryption efficiency.
- We verify the security of the proposed scheme in experimental simulation and comparisons from four aspects: the exhaustive attack, the statistical attack, the differential attack and the noise attack. Simulation results show that the proposed algorithm has better security.
- We provide explanations of experimental phenomena in good key sensitivity, resisting differential attack and robustness against noise for someone who believe the three performances seem to contradict each other and cannot exist in an encryption scheme at the same time.