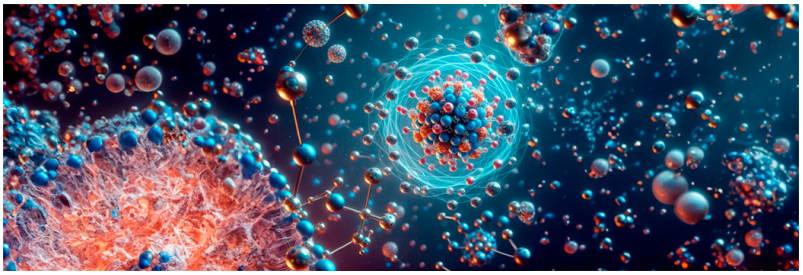

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Self Organized Critical Dynamic on the Sierpinski Carpet

Self-organized criticality is a dynamical system property where, without external tuning, a system naturally evolves towards its critical state, characterized by scale-invariant patterns and power-law distributions. In this paper, we explored a self-organized critical dynamic on the Sierpinski carpet lattice, a scale-invariant structure whose dimension is defined as a power-law with a non-integer exponent, i.e. a fractal. To achieve this, we proposed an Ising-BCP (bond-correlated percolation) model as the foundation for investigating critical dynamics. Within this framework, we outlined a feedback mechanism for critical self-organization and followed an algorithm for its numerical im- plementation. The results obtained from the algorithm demonstrated enhanced efficiency when driving the Sierpinski carpet towards critical self-organization compared to a two-dimensional lat- tice. This efficiency was attributed to the iterative construction of the lattice and the distribution of spins within it. The key outcome of our findings is a novel dependence of self-organized critical- ity on topology for this particular model, which may have several applications in fields regarding information transmission.

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