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Ito Equations out of Domino Cellular Automaton with Efficiency Parameters

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A b s t r a c t

Ito equations are derived for simple stochastic cellular automaton with parameters describing efficiencies for avalanche triggering and cell occupation. Analytical results are compared with the numerical one obtained from the histogram method. Good agreement for various parameters supports the wide applicability of the Ito equation as a macroscopic model of some cellular automata and complex natural phenomena which manifest random energy release. Also, the paper is an example of effectiveness of histogram procedure as an adequate method of nonlinear modeling of time series.

Key words: stochastic processes, cellular automata, avalanches, discrete solvable models, time series.