

Computational Modelling of Nonlinear Calcium Waves

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The calcium transport in biological systems is modelled as a reaction-diffusion process. Nonlinear calcium waves are then simulated using a stochastic cellular automaton whose rules are derived from the corresponding coupled partial differential equations. Numerical simulations show self-organized criticality in the complex calcium waves and patterns. Both the stochastic cellular automaton approach and the equation-based simulations can predict the characteristics of calcium waves and complex pattern formation. The implication of locality of calcium distribution with positional information in biological systems is also discussed.

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