

Contributed
Talk

Self-feedback Delay Induces Extreme Events in the Theoretical Brusselator System

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We present a study of the theoretical Brusselator model with time-delayed self-feedback, demonstrating its ability to induce extreme events when delays in reaction processes significantly influence subsequent dynamics. Stability analyses reveal the mechanisms driving this behaviour with respect to the delay time. The occurrence of extreme events is validated using various numerical and statistical tools, including phase portraits, Poincaré plots, probability distribution functions, and return maps. A comprehensive two-parameter scan delineates the parameter regimes where the extreme events emerge, alongside the identification of transient chaos within specific regions of the parameter space. To confirm these numerical findings, we constructed an analog electronic circuit that emulates the model, providing experimental validation of the predicted dynamics.
