

Stochastic Modelling of Deterministic Systems

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Abstract

Recently methods have been developed that model low-dimensional chaotic systems in terms of stochastic differential equations. We test such methods in an electronic circuit experiment. We achieved to obtain reliable drift and diffusion coefficients even without a pronounced time scale separation of the chaotic dynamics. By comparing analytical solutions of the corresponding Fokker-Planck equation with experimental data we show that crisis induced intermittency can be described in terms of a stochastic model which is dominated by state space dependent diffusion. Further on we demonstrate and discuss some limits of these modelling approaches using numerical models. This enables us to state a criteria that can be used to decide whether or not a stochastic model will capture the essential features of a given time series.