VERSITA

On the Reconstruction of Ito Models on the Basis of Time Series with Long-Tail Distributions

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A b s t r a c t

Two methods of reconstruction of Ito equations on the basis of time series were analysed. The Sequin method appeared to be completely inadequate in cases of considerable noise. The histogram method required some improvements; therefore, the procedure of smoothing of joint distribution function was proposed and verified.

Ito equations may constitute some macroscopic models of phenomena in which microscopic interactions are averaged in an adequate way. Analysis of two geophysical phenomena is presented. For these two examples, Ito equations are constructed and some physical causes of resulting forms of the deterministic and stochastic force are deduced.

Key words: Ito equation, stochastic process, nonlinear time series analysis, histogram method, Sequin method.