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The fluctuation spectroscopy based on the scaling properties of beta-distribution: Analysis of triple pendulum data

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Abstract

© 2014 Elsevier Ltd. All rights reserved. A new method of consideration and reduced analysis of long-time series is suggested. The method is based on the scaling (fractal) properties of the beta-distribution function that allows finding the stable parameters and reducing the long-time series containing 5 × 105-106 data points to analysis of 10-20 stable parameters. The new procedure of clusterization with the usage of the generalized Pearson correlation function allows to take into account the influence of external factor and combine/separate different parameters into a cluster with respect to the influence of the qualitative external parameter considered. The method is rather flexible and can be applied to wide set of large data. As an example the triple pendulum data are considered. This method opens new possibilities in creation of the reduced database (specific fingerprints) of different long-time series for their comparison and subsequent analysis.

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Keywords

Beta-distribution (FSBD), Chaotic data and their regularization, Clusterization of statistically significant, Detrended fluctuation analysis, Fluctuation spectroscopy based on, Fractional moments, Function, Parameters based on the statistics of the, The generalized Pearson correlation