

# A Simple but Efficient Method for Nonlinear Parameter Estimation Based on Comparing Phase Space Structures

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We introduce a simple method for nonlinear parameter estimation based on a structural comparison of target and model attractor. The parameters of the model are adapted by means of minimizing the structural difference of the attractors. For this quantitative comparison histograms derived from a coarse graining of the phase spaces are used. We present a time discrete as well as a continuous example to demonstrate the efficiency of this method. The target attractors are computed from the Hénon map and the Rössler system, respectively. The model systems are chosen to be fairly universal endowed with free parameters that are adapted so that the model attractor resembles the target. The estimations work accurate and acceptably fast up to four parameters.

*Key words:* Nonlinear Time Series Analysis; Parameter Estimation; System Identification;  
Attractor Reconstruction.