

**Better nonlinear models from noisy data: Attractors with maximum likelihood**

P McSharry & LA Smith

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**Abstract**

A new approach to nonlinear modeling is presented which, by incorporating the global behavior of the model, lifts shortcomings of both least squares and total least squares parameter estimates. Although ubiquitous in practice, a least squares approach is fundamentally flawed in that it assumes independent, normally distributed (IND) forecast errors: nonlinear models will not yield IND errors even if the noise is IND. A new cost function is obtained via the maximum likelihood principle; superior results are illustrated both for small data sets and infinitely long data streams.

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