

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

A Unified Approach to Attractor Reconstruction LOUIS PECORA,
LINDA MONIZ, JON NICHOLS, THOMAS CARROLL, Naval Research Laboratory — Reconstruction of attractors for dynamical systems has typically focused on solving seemingly separate problems of finding a proper time delay and then finding a proper embedding dimension. Techniques for solving these problems are somewhat heuristic. We show that the two problems of time delay and embedding dimension are actually the same problem. Using Taken’s theorem we derive a mathematical criterion for adding new components to reconstruction vectors. We also show how several statistics that gauge functional dependence between multivariate data sets can fulfill a practical application of the theory and solve at once the problems of determining time delays, getting embedding dimension, and optimally choosing time series to use from a multivariate data set. This unified approach is compared to “standard” approaches and is shown to be superior in requiring fewer embedding dimensions.

Louis Pecora
Naval Research Laboratory

Date submitted: 14 Dec 2004

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