Time-delay Embedding Example
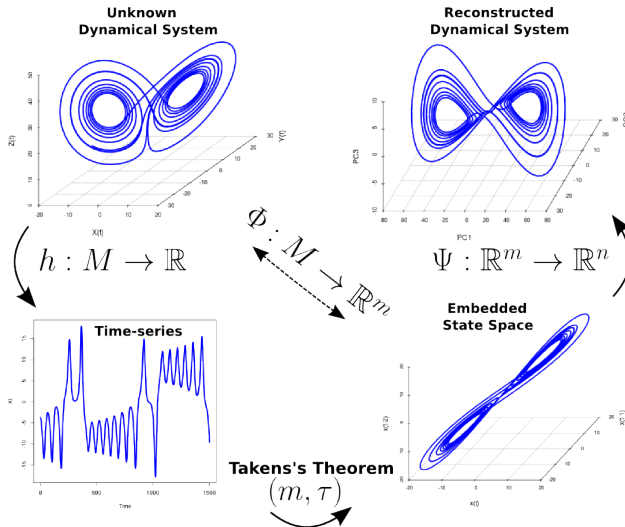
Miguel P. Xochicale

18-21 October 2016

CONACYT
Consejo Nacional de Ciencia y Tecnología

UNIVERSITY OF
BIRMINGHAM

Reconstructed State Space

Time-Delay Embedding Example

Lorenz System

$$\frac{dx}{dt} = \sigma(x - y),$$
$$\frac{dx}{dt} = x(\rho - z) - y,$$
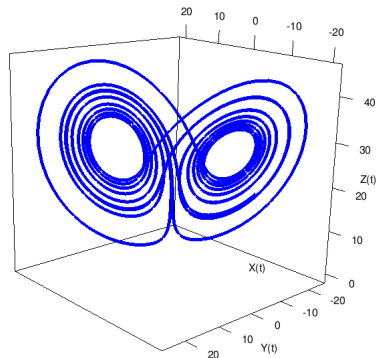$$\frac{dx}{dt} = xy - \beta z.$$

Figure: $\sigma = 10$, $\rho = 28$ and $\beta = 3/8$
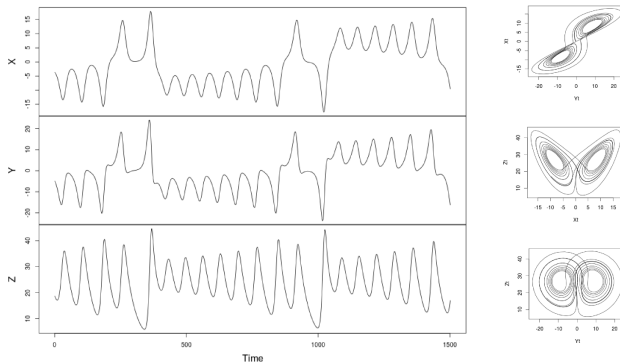
Time-Delay Embedding Example

Figure: Time series of the Lorenz System and 2D manifolds
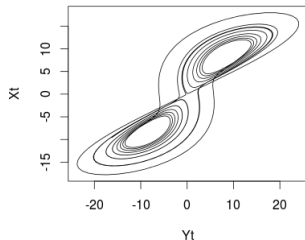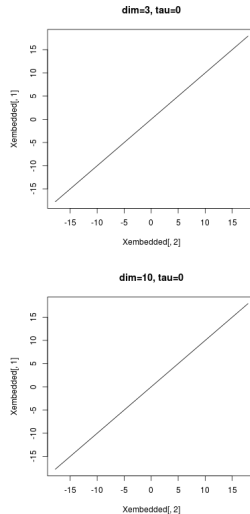
Time-Delay Embedding Example

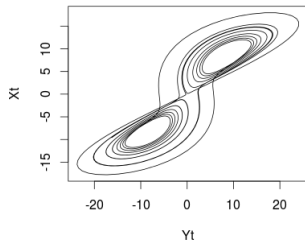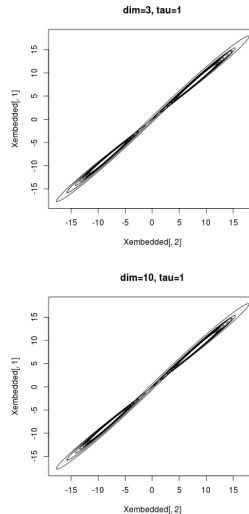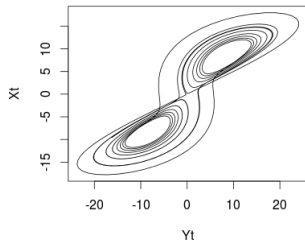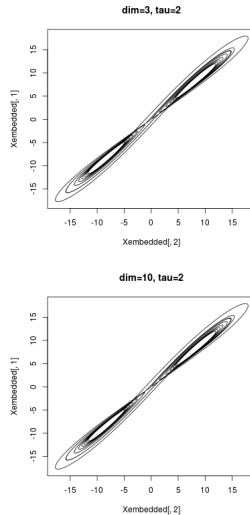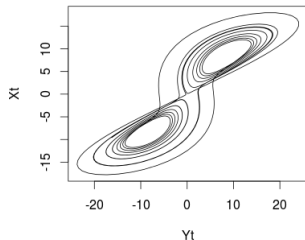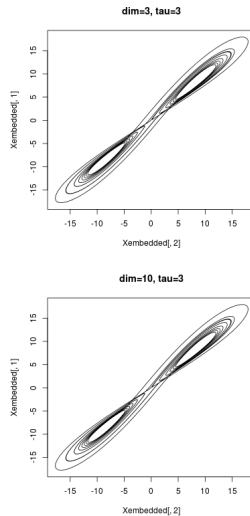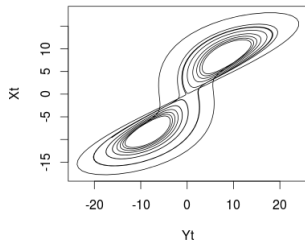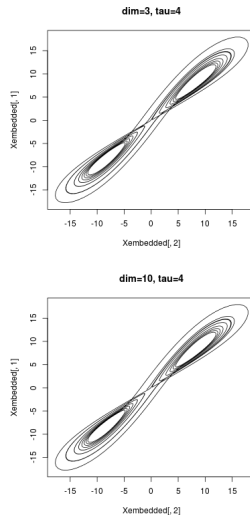**Figure:** Original Manifold

Time-Delay Embedding Example

Figure: Original Manifold

Time-Delay Embedding Example

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Time-Delay Embedding Example

Figure: Original Manifold

Time-Delay Embedding Example
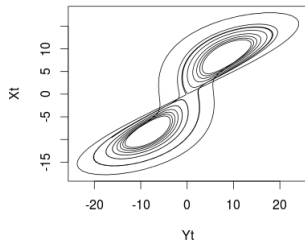
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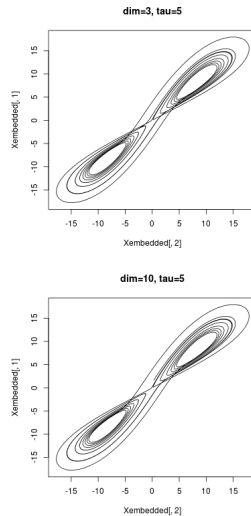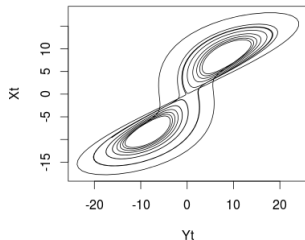

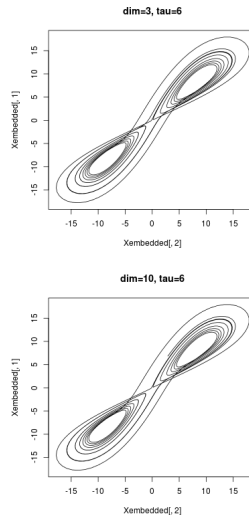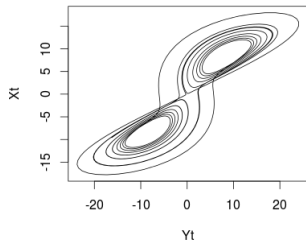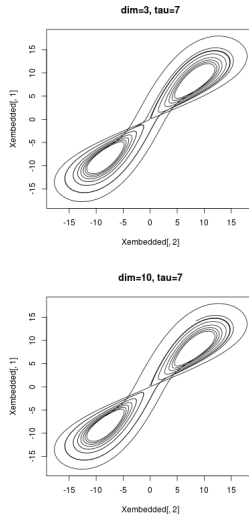
dim=10, tau=4

Figure: Original Manifold
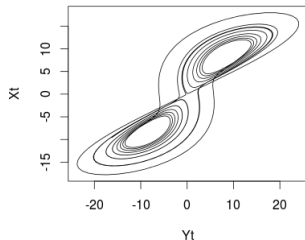
Time-Delay Embedding Example

Figure: Original Manifold

Time-Delay Embedding Example

Figure: Original Manifold

Time-Delay Embedding Example
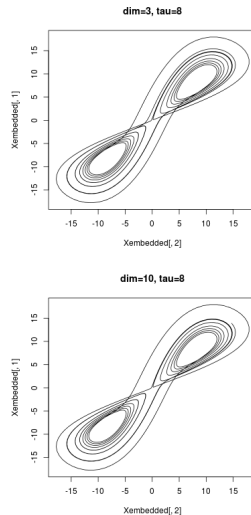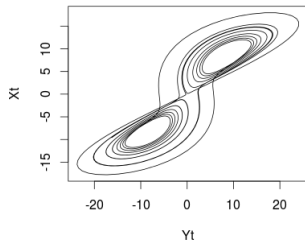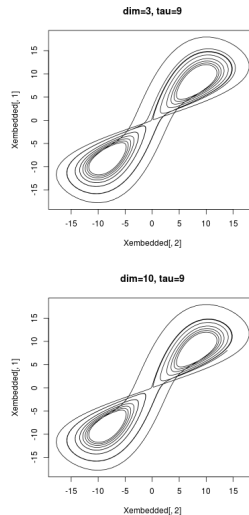

Figure: Original Manifold

Time-Delay Embedding Example
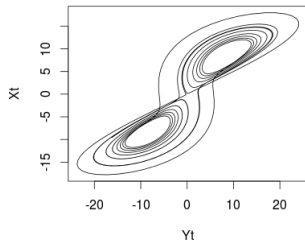

Figure: Original Manifold

Time-Delay Embedding Example

Figure: Original Manifold

Time-Delay Embedding Example

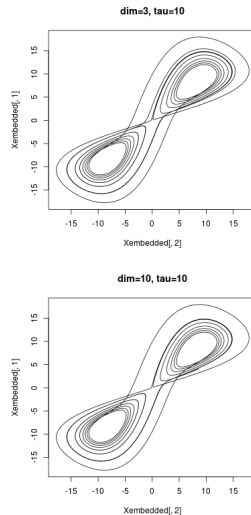**Figure:** Original Manifold
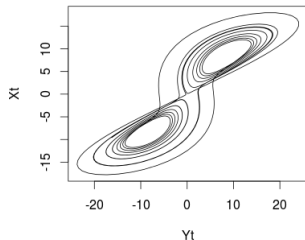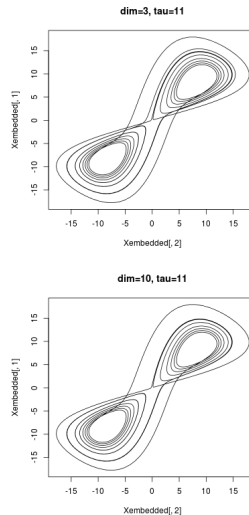
Time-Delay Embedding Example
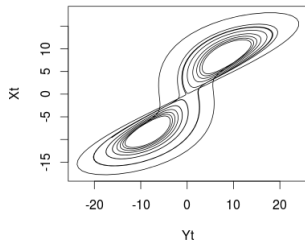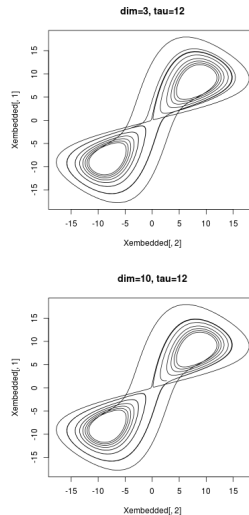

Figure: Original Manifold

Time-Delay Embedding Example
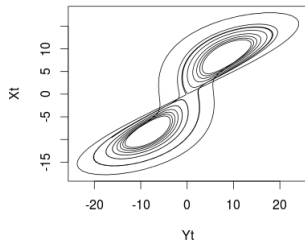

Figure: Original Manifold

Time-Delay Embedding Example
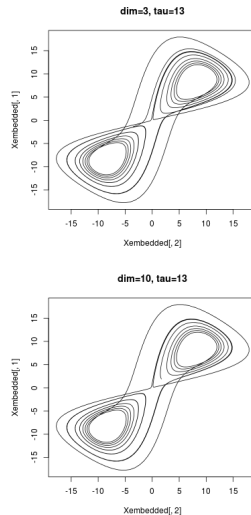

Figure: Original Manifold

Time-Delay Embedding Example
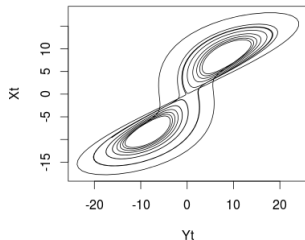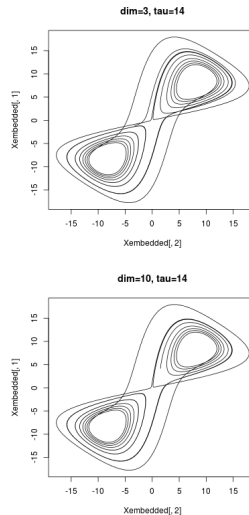

Figure: Original Manifold

Time-Delay Embedding Example
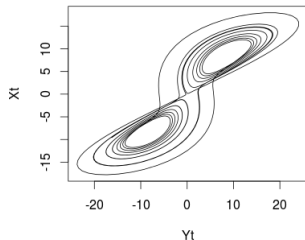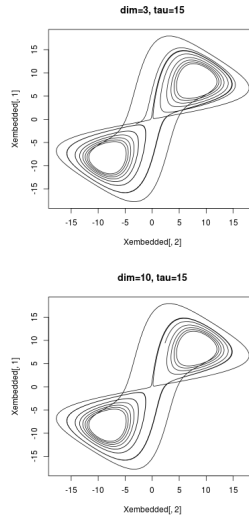

Figure: Original Manifold

Time-Delay Embedding Example
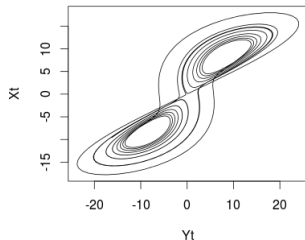

Figure: Original Manifold

Time-Delay Embedding Example
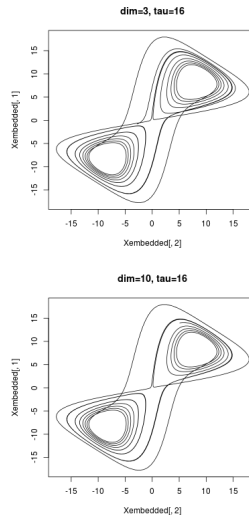

Figure: Original Manifold

Time-Delay Embedding Example
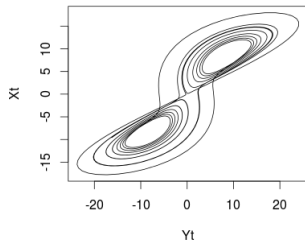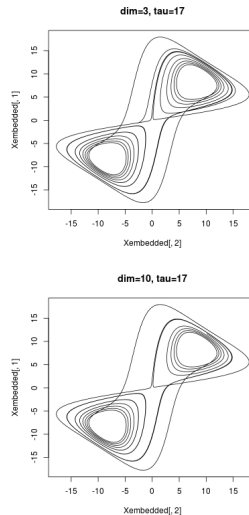

Figure: Original Manifold

Time-Delay Embedding Example
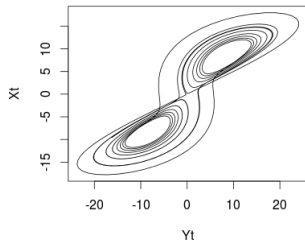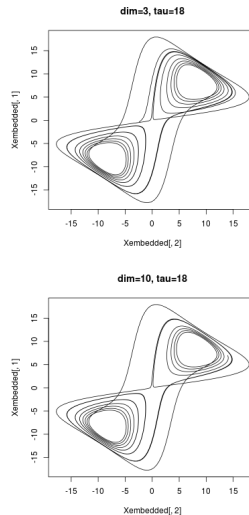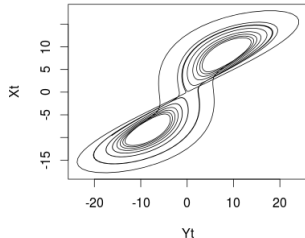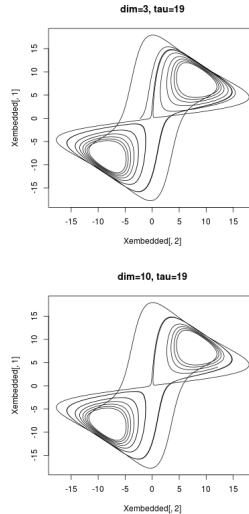

Figure: Original Manifold

Time-Delay Embedding Example

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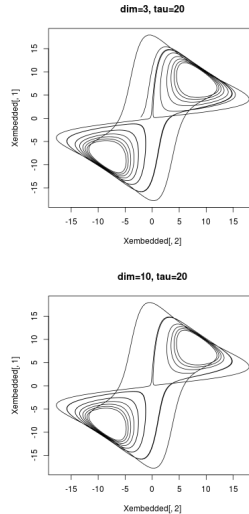

dim=3, tau=20

dim=10, tau=20

Figure: Reconstructed Manifold Miguel P. Xochicale

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University of Birmingham, U.K.

http://mxochicale.github.io/