Abstract

The code Calculates the largest Lyapunov exponent. The first version of this code was published in 2009. A function has recently been added in MATLAB named "lyapunovExponent" which is an efficient and accurate code. Advantages of this version our code is noise robustness, and automatic determination of all parameters except than dt, whereas in the Matlab built-in code for getting accurate results at least frequency(fs) and "Expansion range" should be determined by the user. The code is noise-robust because of using the method of Liu et al. (2005).

Keywords: Lyapunov Exponents, Chaos, Time Series, Direct Method, Full Automatic selection code, Autocorrelation, False nearest neighbors, MATLAB lyapunovExponent.

References:

 -Rosenstein, M. T., J. J. Collins, and C. J. De Luca,(1993). A practical method for calculating largest Lyapunov exponents from small data sets. Physica D.

-Hai-Feng Liu, Zheng-Hua Dai, Wei-Feng Li, Xin Gong, Zun-Hong Yu(2005) Noise robust estimates of the largest Lyapunov exponent, Physics Letters A 341, 119-127

-Sprott, J. C. (2003). Chaos and Time Series Analysis. Oxford University Press.

-Lei, M., Wang Z., Feng Z.A method of embedding dimension estimation based on symplectic geometry, Physics Letters A 303 (2002) 179?189.

-Zeng, X., R. Eykholt, and R. A. Pielke (1991)Estimating the Lyapunov-Exponent Spectrum from Short Time Series of Low Precision, Physical Review Letters, Vol. 66, Number 25.

-Kantz, H. (1994), A robust method to estimate the maximal Lyapunov exponent of a time series Physics Letters A, Vol. 185(1), pp. 77-87.