

Localized Lyapunov Exponents and the Prediction of Predictability

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Phys. Lett. A, 271 (4): 237-251, 2000

Abstract

Every forecast should include an estimate of its likely accuracy, a current measure of predictability. Two distinct types of localized Lyapunov exponents based on infinitesimal uncertainty dynamics are investigated to reflect this predictability. Regions of high predictability within which any initial uncertainty will decrease are proven to exist in two common chaotic systems; potential implications of these regions are considered. The relevance of these results for finite size uncertainties is discussed and illustrated numerically.

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