

Enlightenment in shadows

I Gilmour & LA Smith

Applied nonlinear dynamics and stochastic systems near the millennium, 411, 335-340, 1997

Abstract

Numerical weather forecasting has functioned both as one of the major inspirations for the development of the theory of nonlinear dynamical systems, and as one of its leading applications. While ensemble forecasts used by operational forecast centres both in the US and the EC provide the best operational estimates of the reliability of a given day's forecast, many open questions regarding the construction and evaluation of the ensembles remain. The concepts of shadowing are illustrated and applied to evaluate ensembles for the thermally driven rotating fluid annulus. Low-dimensional dynamical systems are obvious test-beds for proposed improvements, yet the question arises of whether the simplicity that one often observes in very high-dimensional weather models (with millions of apparent degrees of freedom) fails `even in or only in' low-dimensional chaotic systems; this is addressed and initial results on the uniformity of `the linear range' presented for the annulus.