Symbolic Stability Analysis of Turbulent Fluctuation Data*

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Abstract

In the paper [1] we have developed a method for computing stability parameters γ, of symbolic cycles using time record of fluctuating variables X(t). In the present work we are using the same method to compute stability parameter γ averaged over the whole chaotic or turbulent orbit. It appears to be good numerical convergence of this quantity. The main goal of this work is to demonstrate that derivative of γ with respect to the parameter approaches infinity at the turbulent transition point. This could be used as a practical way of diagnosis of turbulent transitions from the analysis of fluctuation data.

As a specific example of turbulent transition we are studying the reverse bifurcation transition in the model of zonal flow [2].

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[1]M. Lehrman and A.B. Rechester, Phys. Rev. Lett **87** 16, 4501 (2001).
[2]L. Chen, Z. Lin, R.B. White, Phys. of Plasmas **7** 3129 (2000).