

Critical slowing down when the system is approaching a catastrophe

Sergeev V.N.

Institute of geosphere dynamics of Russian academy of sciences, Moscow, Russia

e-mail: victnsergeev@gmail.com

Critical slowing down when approaching a catastrophe is a phenomenon having a universal character [1-3], inherent in systems of various nature, evolving to a catastrophic change of their state. The essence of this phenomenon is that as the system approaches the catastrophe (due to random effects that are always present in the real system), the own oscillations of the determining parameters are excited with the frequency decreasing as the catastrophic threshold approaches. In the mathematical theory of catastrophes [4], “critical slowing down” is called one of the “flags” of a catastrophe, i.e. the event preceding it. The excited own oscillations of the determining parameters with decreasing frequency as the system approaches the catastrophic threshold can serve not only as a precursor, but also as a trigger for a catastrophe [5]. This is especially characteristic of active systems (systems in which dissipation is compensated by pumping) [3], in which, when approaching a catastrophe, the amplitude of the excited oscillations increases. In this case, the catastrophic threshold is reached earlier than in the absence of oscillations of the determining parameters.

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