# Feigenbaum-Sharkovskii-Magnitskii Scenario of Transition to Turbulence in the Rayleigh-Benard Convection

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The problem of turbulence arose more than hundred years ago to explain the nature of chaotic motion of the nonlinear continuous medium and to find ways for its description; so far it remains one of the most attractive and challenging problems of classical physics. This problem is named by Clay Mathematics Institute as one of seven millennium mathematical problems [1] and it is also in the list of 18 most significant mathematical problems of XXI century formulated by S.Smale [2].

During several last years the universal unified transition mechanism of space-time chaos in nonlinear partial differential equations was theoretically and experimentally proven in number of papers of the author [3-6, etc.]. The mechanism is developing by FSM (Feigenbaum-Sharkovskii-Magnitskii) scenario through subharmonic bifurcation cascade of stable cycles or stable two dimens-ional tori. The purpose of this paper is to show that the universal FSM scenario is developing also in viscous incompressible 3D fluid motion in Rayleigh-Benard convection in transition from laminar to turbulent regimes. The analysis indicated that in different test series laminar-turbulent transition follows either the subharmonic bifurcation cascade of two- dimensional tori or the subharmonic bifurcation cascade of limit cycles. Cycles up to the third period were found in the system that indicated the end of the Sharkovskii cascade. Thus, it seems reasonable, that there is no unified laminar-turbulent transition scenario, but all scenarios lay in the frameworks of the FSM-theory.

## References

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