Effect of rate of change of external conditions on the transition from abnormal to normal steady-state convection ALBERT SHARIFULIN, Perm State Technical University, ANATOLY POLUDNITSIN, Perm State University — Steady-state thermal convection regimes in a closed cavity undergo bifurcation on smooth variation of the external parameters. Bifurcations originating from changes in the Rayleigh number and angle of cavity inclination are investigated in the present work. We experimentally investigate the influence of the crossing rate through bifurcation curve on the transition process. The experiments were conducted with tilted cubic cavity filled with air, as described in [1], for fixed values of the Rayleigh number and different speeds of the slope of the cavity. It was found that at low velocities the slope of the rate of inclination does not affect the critical angle, beyond which is about the spontaneous transition from the anomalous convection mode to normal one. With no low-speed tilting the region of existence of the anomalous flow is sufficiently increased, and the transition process, as well as at low speeds, the slope is in rapid rotation around the vertical axis of the mass of air that fills the cavity. Possibility of applications to atmospheric behavior explanation and to Earth's mantle one is discussed.

[1] A.N. Sharifulin, A.N. Poludnitsin A.N., A.S. Kravchuk Laboratory Scale Simulation of Nonlocal Generation of a Tropical Cyclone. Journal of Experimental and Theoretical Physics, 2008, Vol.107, No.6, pp.1090-1093.

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