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Thermal convection in a rotating horizontal annulus[1] ALEXEY VJATKIN, ALEVTINA IVANOVA, VICTOR KOZLOV, Laboratory of vibrational hydromechanics, PSHPU — Thermal convection of viscous fluid in a coaxial horizontal gap rotating around its own axis is investigated experimentally. The temperature of inner boundary is higher than that of the outer one. The threshold of mean convection excitation is studied. It is found that, despite the stabilizing effect of the centrifugal force of inertia, the convection in the layer occurs in a threshold way at lowering the rotation velocity and is excited by thermovibrational mechanism. In viscous liquids crisis of heat transfer is associated with the appearance of vortices extended along the azimuth (three-dimensional structures), and the longitudinal two-dimensional rolls appear on the background of them. In the experiments with low-viscosity fluids the opposite sequence of convective processes development is observed. With the advent of convective structures their slow azimuthal drift relative to the cavity is registered. It is shown that the drift is associated with the azimuthal steady motion of the fluid, which is generated in Stokes layers near the boundaries. The increase of viscosity results in growth of wavelength of the longitudinal rolls and significant reduction of the velocity the drift of vortex system. Experimental results agree with theoretical predictions.

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