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Flows in rotating cavity excited by oscillating solid core[1]
STANISLAV SUBBOTIN, VICTOR KOZLOV, NIKOLAI KOZLOV, Laboratory of Vibrational Hydromechanics, PSHPU — The flow excited by oscillations of free core in a rotating about horizontal axis cavity filled with liquid is experimentally investigated. The core is lighter than the liquid and is located near the rotation axis under the action of centrifugal force. The action of the gravity force field on the rotating system leads to the tidal oscillations of the core. As a result of the pulsating motion in the Stokes boundary layer the average mass force arises, spinning the core relative to the cavity. The phenomenon of the differential rotation was called a "vibrational hydrodynamic top" [Dokl. Phys. **5**2, 458 (2007)]. The core differential rotation leads to the formation of the flow in the form of a Taylor column. At slow differential rotation the column has the shape of a circular cylinder. Different types of instability manifest themselves: firstly – the excitation of 2D vortex system inside the column; secondly – the excitation of 2D azimuthal waves on the column boundary [Dokl. Phys. **5**9, 40 (2014)]. The nonlinear interaction of different instability modes resulting in synchronization of phase velocities and wave numbers is found. The stability of the structures of different type is determined by Reynolds number.

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