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Vibrational Dynamics of Light Body in Rotating Cavity with Liquid[1] NIKOLAI KOZLOV, STANISLAV SUBBOTIN, Laboratory of Vibrational Hydromechanics, PSHPU, Perm — Dynamics of a light body of cylindrical or spherical shape in a rotating cavity (cylindrical or spherical) with liquid is studied. The system is set at rotation, the body occupies a steady position near the cavity axis under the action of centrifugal force. Action of an external periodic force excites inertial oscillations of the body and, as consequence, its differential rotation. The mechanism of the latter is the generation of an average mass force in a viscous boundary layer on the oscillating body surface [Fluid Dyn. 43, 9 (2008); 47, 683 (2012)]. In experiments, two types of external action are used. Rotation of a horizontal cavity in the gravity field leads to circular body oscillations with the frequency of rotation; as a result the body rotates slower than the cavity. External vibration, perpendicular to the rotation axis, leads to a resonant excitation of intensive body oscillations; as a result the body spins in the cavity rotation direction (outrunning rotation), or in the opposite (lagging rotation). The eigenfrequency of rotating system is mainly determined by the ratio of vibration and rotation frequencies $n = \Omega_v/\Omega_r$. Body motion intensity is determined by the dimensionless acceleration $\Gamma = g/R_s\Omega_r^2$ or $\Gamma_v = b_v\Omega_v^2/R_s\Omega_r^2$.

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