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Dynamics of a Rotor Rolling Along a Circular Surface

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The work is devoted to investigation of the dynamics of centrifugal-vibrational concentrator (CVC) – recently invented device for separating particles of granular materials according to their densities. Dynamical scheme of the CVC is an axially symmetric rigid body rolling along a circular surface. Experience shows that optimal motion of the CVC is a regular precession of the body along an inner surface of the hub without sliding. In presented work parameters of such motion and conditions of its stability are determined. Transient motions at different types of friction are also considered. It is shown that together with cumbersome conditions of stability the simple condition sufficient for stability could be obtained. Considered motion exists in the system in conservative case and in the case when forces of dry and viscous friction are taken into account. It is shown that stability has not gyroscopic character and forces of friction could not break stability.

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