Based on the harmonic balance method, the boundaries of instability regions for a body with a fixed point and periodically changing moments of inertia are analytically constructed.

A numerical assessment of stability of plane-parallel motions of a balanced spherical body with periodically changing moments of inertia and gyrostatic moment, rolling on a plane without slipping and spinning, is performed. Together with the co-author, a computer analysis of motion of a balanced spherical body with periodically changing moments of inertia and gyrostatic moment was performed, and the dynamics were shown to be non-conservative.

The author performed an analysis of stability of the upper equilibrium position of an unbalanced spherical body moving along a plane without slipping and spinning due to a periodically changing gyrostatic moment, and together with co-authors, an analysis was made of stability of the lower equilibrium position of an unbalanced spherical body moving along a plane without slipping.

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