Stability of rolling particles between elastic plates

M. A. Guzev

Institute for Applied Mathematics, FEB RAS, Radio 7, Vladivostok, 690041, Russia

Abstract

In many applications stability of systems with rotating non-spherical particles is of essence. We show that in the simplest case such systems can be modelled as a system of two linked oscillators (masses on rods) and a modified system of these oscillators whose rods intersect and slide without friction relative to each other. The oscillators are linked by a linear elastic spring and posed vertically in a uniform gravity field. We demonstrate that both models have symmetrical and asymmetrical equilibrium solutions depending on the spring stiffness and distance between the oscillators' suspension centres (points of contacts of the particles). Relations of these parameters are obtained identifying the stability region at the upper and bottom oscillator positions.