

Particle Movement on the External Surface of the Cone that Rotates Around the Vertical Axis

Tatiana Volina¹[0000-0001-8610-2208],
Serhii Pylypaka¹[0000-0002-1496-4615],
Victor Nesvidomin¹[0000-0002-1495-1718],
Iryna Rybenko²[0000-0001-7795-1689],
Larysa Sierykh³[0000-0001-5290-8596]

¹ National University of Life and Environmental Sciences of Ukraine, 15, Heroyiv
Oborony St., Kyiv, 03041, Ukraine

² Sumy National Agrarian University, 160, Kondratieva St., Sumy, 40021, Ukraine

³ Sumy Regional Institute of Postgraduate Pedagogical Education, 5, Rymskogo-
Korsakova St., Sumy, 40007, Ukraine

The relative movement of a particle along the rough outer surface of a cone rotating around a vertical axis with a given angular velocity is considered in the article. Differential equations of the particle movement in projections on the axis of a fixed coordinate system are received and solved by numerical methods. The particle's initial velocity at the moment of contact with the surface of the cone after falling from a certain height is considered. The relative trajectories of particles sliding along the cone's surface and the absolute trajectories of its movement towards the fixed coordinate system are constructed. Visualization of other kinematic characteristics has also been made. The obtained formula allows determining the limiting value of the angular velocity, which depends on the angle of inclination of the generatrices, the coefficient of friction, and the distance from the vertex of the cone to the particle. It is also valid for a flat disk for zero angles of generatrices' inclination.

Part VII Process Engineering