One Model of the Three-Body Problem

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ABSTRACT

It is considered the translational-rotational motion of two viscoelastic spheres in the central gravitation field of the massive material point. Its mass is significantly greater than the mass of the first body. The mass of the second body is considerably less than the mass of the first one. The distance between the bodies is much more then their radii and is much less then the distance from their barycenter to the massive point. The bodies are homogeneous and isotropic. Their axes of rotation are perpendicular to the plane of orbit. Their deformed state is described by the classical theory of elasticity for small deformations. The Kelvin – Voigt model is taken as a model of viscous forces. The bodies are revolving around their barycenter on quasi-circular orbits with changing radii of orbits. Their barycenter is moving also on the quasi-circular orbit around the massive point. The equations of motion are written in the form of Routh. The method of separation of motions and averaging in systems with infinite number of degrees of freedom was used for solving the equations of motion.

After some cumbersome transfomations the system of evolution equations was obtained. It was numerically integrated and the graphical picture of evolution of the translational-rotational motion of two viscoelastic bodies was represented.

The stationary solutions of the evolution system were found and their stability was investigated.

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