Author: I. KOSENKO
National Research University (Russia)
Title: *"Motion of a satellite with a variable mass distribution in a central field of Newtonian attraction"*

Abstract. Dynamics of a spacecraft with a variable mass distribution in a central field of Newtonian attraction is considered. Within the so-called "satellite approximation" the equations of spatial attitude motion are derived, in particular, from the Hamilton variational principle. The satellite multibody system mass center performs elliptic motion of arbitrary fixed eccentricity. Special rules of the mass redistribution providing prescribed in advance attitude motions are indicated. For detected classes of relative equilibria, existing under appropriate rules of the mass redistribution, necessary conditions of stability are investigated. Special attention is paid to investigation of stability for spatial motions of the attitude satellite dynamics. The obtained results are illustrated within Magnus' approach, presuming utilisation of moments of inertia as barycentric coordinates. There exist at least three observations related to dynamics of spacecrafts with a variable mass distribution. (a) First of all, there are effects related to "natural" mass redistribution due to crew motions, liquid sloshing, etc. These effects, and in particular, methods of compensation of appearing objectionable attitude motions were studied in numerous publications. (b) Another point relates to possibilities of using spacecraft's mass redistribution to provide propulsive motion of its center of mass. This idea belonging to Beletsky and Giverts was developed by Donov and was a subject of different discussions. (c) Later related problems were intensively studied, in particular, in frame of the satellite multibody system dynamics attitude motion.

Joint work with Prof. Alexander Burov and Prof. Anna Guerman.