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A QUICK METHOD OF FORECASTING OF CONFLICTING APPROACHES OF ORBITAL
OBJECTS AND CALCULATION OF PARAMETERS OF AN APPROACH

Abstract

Traditional approach to forecasting mechanical conflicts (collisions) between orbital objects is based on modeling their motion and current distances between them. It requires substantial time, which, in case of multiple objects, makes quick forecasting problematic. Earlier we presented a method of quick forecasting (the basis method) without direct modeling of motion. In that method nodes of mechanical conflicts (pairs of segments of trajectories located at distances making collisions possible) are modeled. A conflict is forecasted with a safety margin for deviations of objects from known orbits.

A method allowing of improving accuracy of the basis method has been developed. On the preliminary stage, for a conflict node we determine: 1) current locations on trajectories of the closest points of conflict nodes and dangerous segments of trajectories; 2) periods of time, when objects are in those points. On the finalizing stage parameters of dangerous approach are calculated: 1) the minimal distance of closing in; 2) the interval of time, during which the approaching is dangerous; 3) relative velocities of the orbital objects at the minimal distance between them.

Time spent on forecasting basing on this method is by an order of magnitude smaller than in methods based on modeling of motion.