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THE CONSTRUCTION OF THE CHARACTERISTICS OF SPATIAL DISTRIBUTION OF CATALOGED SPACE DEBRIS OBJECTS

Abstract

The purpose of a space debris environment engineering model is the realistic description of the man-made particulate environment surrounding the Earth and risk assessment for defined target orbits. This paper provides the construction of the characteristics of spatial distribution of cataloged space objects method for deriving spatial density and flux using two-line elements (TLE) data source. The method describes the space environment partitions distribution, the "volume cells", which have different approaches in such orbital debris environmental models like ESA MASTER model and RSA (Russian Space Agency) SDPA model (Space Debris Prediction and Analysis). Where, with the regard to SGP4 perturbation model, the main characteristics for spatial distribution of the objects are the distribution of the velocity and size of the objects were calculated. In addition, the collision probability of the particles in the debris cloud between themselves was considered. Finally, the results were compared to MASTER and SDPA engineering models for the assessment. Plus, the prospects of the method were considered to be used to assess the characteristics of orbital particles whose size is less than 10 cm (the uncatalogued objects) for future work. The key point of this work is the high reliability of the results and its assessment.