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THE SOLEM EVOLUTION MODEL AND ITS UNCERTAINTY ANALYSIS

Abstract

The evolution model is important tool for future space debris environment status estimation and space debris population prediction. A LEO debris environment evolution model SOLEM(Space Objects Long-term Evolution Model) was established. The model simulates growing sources including future launches and collision breakups, as well as reducing sources including natural decay and post mission disposal. In this paper, the SOLEM model process was introduced, and also the model prediction uncertainties were analyzed. The sensitivities of SOLEM model to some variable factors were checked, such as evolution of solar and geomagnetic activity, parameterization of collision prediction algorithm, and parameter revision to break-up model considering the collision geometry. Besides, the variation of SOLEM model evolution results due to uncertainties were analyzed.