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Space Debris Environment Engineering Model SDEEM 2019

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Abstract

Space debris environment is one of the major threats against on-orbit spacecraft and human space activities. As one of the significant foundation works for space safety system, the space debris environment engineering model is able to provide the assessment of space debris environment spatial-temporal distribution. Space debris environment engineering model is an important fundamental data source of spacecraft risk assessment and protection structure.

SDEEM 2019 is a LEO-to-GTO Space Debris Environment Engineering Model.

Compared to its previous version SDEEM 2015, the modeling technology of SDEEM 2019 is largely improved, and the software is more flexible. Some of the major improvements include:

- (1) Extension of orbital range. The orbital range of SDEEM 2015 is 200 to 2000 km, while for SDEEM 2019 it is 200 to 42000 km.
- (2) Modeling technique improvement in GEO region. Spatial density and flux are presented under ECEF (Earth Centered Earth Fixed) coordinate system in GEO region, in order to enhance the pertinence in this particular region.
- (3) The effect of large constellations and unexpected breakups are analyzed. The analysis process of the effect of Large Satellite Constellation and unexpected breakup events on space debris environment is presented.
- (4) Interface design for user-defined space debris population. The SDEEM 2019 software is able to analyze any user-defined space debris population as long as the data form meets its specification, in order to present timely response to Large Satellite Constellation and unexpected breakup events.

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