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Modelling and Risk Analysis (2)

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IMPROVEMENTS AND UPDATES IN THE NEW MASTER MODEL

Abstract

In this paper, the new version of the ESA MASTER model is introduced. The development of MASTER is completed and the release will be on March 19, 2019. A selection of the most important update work on the model is given. MASTER was developed by the Institute of Space Systems of the TU Braunschweig, commissioned by ESA, to establish the successor of MASTER-2009. The most important improvements on the new reference population include the number of fragmentation events, solid rocket motor firings and NaK release. These are the main driver for the accuracy of MASTER. It is shown which additional single fragmentation events need to be considered. Therefore, one of the most important steps of the update was to integrate all previously unrecognized events and the newly added events into the model since the last release and to align the resulting new population with both historical and current measurements. Whereas the generation of the debris is modeled statistically, its spatial distribution is modeled scientifically based on orbital mechanics. The improvements and additions as well as notable differences to the previous version of the model are presented in the context of an overview.