



Heiner Klinkrad

Space Debris

Models and Risk Analysis

Reihe: Astronautical Engineering

- Provides the reader with a detailed analysis of the sources of the current on-orbit space debris environment
- Details the mathematical description of risk analysis and debris environment modelling techniques, for all currently known debris sources
- Gives examples of the analysis of on-orbit collision avoidance, with historic examples
- Analyses re-entries of hazardous objects with historic examples
- Demonstrates the effects of debris mitigation measures on the long-term risk evaluation and environment stability

In Space Debris Models and Risk Analysis the authors will provide the reader with a comprehensive background to understand the various sources of space debris, and to assess associated risks due to the current and future space debris environment. Apart from the non-trackable objects produced by historic on-orbit fragmentation events, several other sources of space debris will be outlined. Models will be described to allow the generation and propagation of the different debris families and permit the assessment of the associated collision risk on representative target orbits for present and future conditions. Using traffic models and possible mitigation practices, the future evolution of the space debris environment will be forecast. For large-size, trackable objects methods will be described for conjunction event predictions and related risk assessments. For hazardous re-entry objects, procedures will be outlined to enable the prediction of re-entry times and likely impact areas, to assess uncertainties in these factors, and to quantify the risk due to ground impact. Models will also be described for meteoroids, which prevail over space debris at small particle sizes.

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