

18th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Operations in Space Debris Environment, Situational Awareness (7)

Author: Prof. Yury Razoumny
RUDN University, Russian Federation, yury.razoumny@gmail.com

Dr. Sergei Kupreev
Peoples' Friendship University of Russia (RUDN University), Russian Federation, kupreev-sa@rudn.ru

THE MANEUVERING STRATEGIES TO AVOID THE COLLISION OF THE SPACECRAFT WITH
SPACE DEBRIS USING ON-BOARD SPACECRAFT ROLLAWAY TETHER SYSTEM

Abstract

The problem of avoidance of the spacecraft from the collision with space debris elements is considered. The maneuvers of the spacecraft using on-board rollaway tether system instead of traditional orbit altitude corrections are suggested. It is supposed that the spacecraft is equipped with special detachable orbital module fastened with spacecraft and unrolled from the spacecraft to create orbital tether system for avoiding the collision with the space debris element. The module is rolled up into the spacecraft after the tether system orbital maneuver is finished. The different strategies of tether system maneuvering to avoid the collision of the spacecraft with space debris are represented. It is shown that implementation of the on-board rollaway tether system described leads to fast separation of spacecraft and on-board module with creation temporary tether system using small values of velocity impulses. Different strategies of tether system maneuvering to avoid the collision with space debris are analyzed. The calculations of practical cases are represented showing that on-board rollaway tether system implementation leads to minimizing the characteristic velocity on-board resources comparing with traditional orbital maneuvering based on altitude correction.