Paper ID: 52931
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17th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Joint Small Satellite/Space Debris Session to Promote the Long-Term Sustainability of Space (10-B4.10)

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AN OPEN-SOURCE ORBITAL SIMULATION AND MISSION ANALYSIS SOFTWARE FOR CUBESATS

Abstract

With the growing popularity of CubeSats as a relatively easy means of entry into the space sector by small, inexperienced teams, there is an increasing need for tools to simplify the design process and provide experience in the complex and inter-dependent aspects of space mission design. In addition, with this ongoing explosion in the spacecraft population in LEO in particular, it will be all the more important for teams to design missions compliant with orbital lifetime standards in order to mitigate the growth of the space debris population. In this paper, we present the OrbS software, a C program written primarily to model orbital decay in LEO. It grew to include accounting for the spacecraft's pointing scheme, thermal flux calculations, power generation from solar cells, and the prediction of communication pass statistics. Most notably, the code was employed during the design phase and successful Critical Design Review of the EIRSAT-1 mission. The use of C will allow users to add or integrate mission-specific functionality, allowing for as complete a mission analysis software as possible, while verifying compliance with requirements on orbital decay or alternative means of mission disposal.