INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Spacecraft Orbital Characterization Kit (SpOCK)

TECHNOLOGY NUMBER: 2018-484

OVERVIEW

Comprehensive satellite mission analysis tool for orbit prediction and satellite applications

- Enhances orbit prediction and assesses satellite operational parameters for better mission analysis
- Used for satellite mission planning, collision risk assessment, solar energy calculation

BACKGROUND

Orbit prediction is essential for successful satellite operations, involving complex calculations performed by orbit propagators. Historically, these models have focused primarily on determining satellite positions, often neglecting other critical factors like energy generation or collision risks. Traditional orbit propagators may lack integrated functionality, leading users to rely on separate, disjointed tools for different aspects of mission analysis. This fragmentation can result in inefficiencies and increased potential for errors in planning and managing space missions. With the growing number of satellites and space debris, accurately predicting orbital paths and related metrics is more critical than ever. Researchers and mission planners have sought a more comprehensive tool that allows for real-time analysis of various operational parameters, including orbit dynamics, energy management, and collision risk, to optimize satellite mission performance and safety.

INNOVATION

The Spacecraft Orbital Characterization Kit (SpOCK) offers significant advances in orbit prediction and satellite mission analysis by integrating various critical functionalities into a single tool. Unlike traditional models, SpOCK not only predicts satellite orbits but also calculates energy generated by solar panels, identifies specular reflection points between satellites, and evaluates ground station coverage and collision risks. This comprehensive toolkit simplifies mission planning and enhances decision-making efficiency. Through its application in the NASA Cyclone Global Navigation Satellite System (CYGNSS) Earth Venture Mission, SpOCK has demonstrated its effectiveness in real-world scenarios. Its utility extends to educational purposes, providing students and researchers with an accessible and powerful resource for satellite analysis. This integration promotes a more cohesive approach to managing satellite operations, reducing the risks associated with fragmented mission analysis tools.

Technology ID

2018-484

Category

MOSS - Michigan Open Source Software

Inventor

Charles Denis Bussy-Virat
Aaron James Ridley
Joel W. Getchius

Learn more

ADDITIONAL INFORMATION

PROJECT LINKS:

- SpOCK Project Website

DEPARTMENT/LAB:

- Aaron J. Ridley, Computer Science

LICENSE:

- Apache 2.0