Paper ID: 35477
oral

SPACE SYSTEMS SYMPOSIUM (D1)
Interactive Presentations (IP)

Author: Dr. Vladimir Ten
Ghalam LLP, Kazakhstan, vladimir.ten@gmail.com

Mr. Baubek Oralmagambetov
Ghalam LLP, Kazakhstan, b.oralmagambetov@ghalam.kz
Dr. Sergey Murushkin
Ghalam LLP, Kazakhstan, s.murushkin@gharysh.kz
Mr. Arman Bekembayev
Ghalam LLP, Kazakhstan, a.bekem@gmail.com

ABSOLUTE PASSIVE MODE PECULIARITIES AND APPLICATIONS FOR LEO MISSIONS

Abstract

Some high priority factors may drive the design of the whole spacecraft in the early stages of development. One of these mission-driving factors is the safe mode configuration in terms of attitude, power and thermal state of the spacecraft. The simplest and most robust approach from the implementation point of view is the so-called passive safe mode where the spacecraft is left powered off in random tumble.

This paper analyzes power and thermal aspects of absolute passive safe mode i.e. spacecraft behavior in the absence of active or passive control (even without magnetic or gravitational stabilization). Analysis involves Monte-Carlo based approaches and provides universal patterns and rules discovered in the process.

The research takes advantage of using orbit and design data from two different missions KazEOSat-2 (launched in 2014) and KazSTSat (to be launched in 2017) for the analysis. Following mission characteristics and preconditions are taken into consideration:

- influence of orbit characteristics
- spacecraft inertia properties
- solar arrays structural allocation

The paper also provides an approach to find driving design cases from the simulation range.