Passive ACS Simulation Development Work Plan

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February, 2021

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Revision Control:

Version	Author	Changes	Date
0.0	Gabriel M. Marcelino	Document creation	2021/02/04
0.1	Matheus Wagner	Document simplification	2021/02/10

CHAPTER 1

Objective

The objective of this work is to simulate the passive attitude control system of a CubeSat aiming at understanding how the parameters of the system, like the positioning of the magnetic devices, the size of the satellite or the sizing of the system, affect the stabilization process and the performance of the communication links in an pre–established orbit.

CHAPTER 2

Work Plan

To achieve the proposed objective, the following tasks must be concluded:

1. Develop a model for the mechanical damping effect of the hysteresis loss.

2. Choose a simplified model for the geomagnetic field.

3. Choose a simplified model for the orbital dynamics.

4. Couple Euler's equations of motion for rigid bodies with the magnetic phenomena and with the orbit propagation model.

5. Define a post-processing strategy to analyze the effects of the attitude control on the communication links.

6. Write a report regarding the system performance evaluated with the simplified models.

7. Refine the geomagnetic field model.

8. Refine the orbit propagation model.

9. Refine the communication link analysis strategy.

10. Write a report regarding the system performance evaluated with the refined models.

11. Run a parametric analysis to search for better configurations of the attitude control system.

12. Write a report regarding the results of the parametric analysis and providing a conclusion about the necessity of a redesign.