

The study on sliding mode control for satellite attitude reorientation and vibration reduction of solar panels

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ABSTRACT

In this study, satellite attitude control and solar panel vibration are investigated. In order to carry out simulations with realistic configuration, the weights of the momentum wheels and solar panels are obtained from NSPO. The involved parameters include material properties, momentum wheel speeds and output torques, etc. We use SolidWorks to build a satellite model, including three momentum wheels, two solar panels, two triangle props. We use MATLAB to design a controller to control the satellite model in different cases in order to investigate the satellite tracking error and solar panel vibration. We do the satellite attitude control in accordance with Sliding Mode Control (SMC). This control scheme has advantages of robustness, high availability and high efficiency. Because the space is an adverse circumstance, it is extraordinary difficult to maintain or repair. Therefore, choosing a high availability controller is a major topic for aeronautical engineering. In addition to SMC, in this study we also compare two kinds of panel's material: rigid and flexible bodies. In this paper, we can observe the effects of vibration reduction with flexible body, and make the satellite attitude more stable ultimate.

Keywords : satellite attitude control、vibration reduction、Sliding Mode Control、Flexible body

Table of Contents

目錄 封面內頁 簽名頁 博碩士論文暨電子檔案上網授權書iii 中文摘要iv ABSTRACTv 誌謝iv 目錄v 圖目錄iv 表目錄iv 第一章 緒論1 1.1 前言1 1.2 文獻回顧2 1.3 研究動機與目的4 1.4 論文架構7 第二章 衛星機械結構、動力學與姿態理論11 2.1 衛星基本機械結構介紹與我國衛星發展11 2.2 座標定義15 2.2.1 慣性座標系16 2.2.2 本體座標系17 2.2.3 尤拉角之座標系轉換法18 2.3 運動學數學模型20 2.3.1 慣性矩20 2.3.2 體座標與慣性座標於重心、中心和角速度21 2.3.3 運動方程式23 2.4 姿態控制理論27 第三章 順滑模態控制器之設計與介紹30 3.1 順滑模態介紹30 3.2 順滑模態控制器設計與介紹31 第四章 衛星姿態控制減振模擬成效38 4.1 衛星本體未搭載太陽能板模擬結果44 4.2 衛星兩端搭載太陽能板模擬結果47 4.3 衛星兩端搭載太陽能板並給予干擾力模擬結果51 4.3.1 太陽能板尾端施予正向干擾力模擬結果53 4.3.2 衛星本體內部給予干擾力矩模擬結果55 4.4 衛星太陽能板材料置換彈性體後模擬結果58 4.4.1 彈性體材料性質與物理意義59 4.4.2 彈性體模擬條件設定60 4.5 彈性體模擬條件設定63 4.6 兩端太陽能板更改為彈性體給予干擾力模擬結果65 4.6.1 太陽能板尾端施予正向干擾力模擬結果66 4.6.2 太陽能板尾端施予干擾力矩模擬結果69 4.7 正向力振動模擬結果72 第五章 結論與未來展望76 參考文獻78

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