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应用分力合成主动振动抑制方法的最优飞行器大角度机动控制策略

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OPTIMAL LARGE ANGLE MANEUVER CONTROL STRATEGY OF SPACECRAFT WITH COMPONENT SYNTHESIS ACTIVE VIBRATION SUPPRESSION METHOD

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摘要

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摘要 针对当代带大型挠性附件的空间飞行器,提出了分力合成主动振动抑制方法,并且分析了方法的鲁棒性。该方法可以保证挠性飞行器在实现指定的刚体运动的同时,抑制掉对系统影响较大的挠性振动模态,对频率不确定性的鲁棒性使得该方法易于工程实践。对于使用常幅值力矩喷气执行机构的航天器,设计了应用分力合成方法的时间-燃料最优机动控制律,数值仿真结果验证了方法的有效性。

关键词: 分力合成主动振动抑制方法 最优控制 鲁棒性 大角度机动

Abstract: This paper puts forward a component synthesis active vibration suppression (CSVS) method for spacecraft with the large flexible appendage and analyzes its robustness to uncertainty in modeling parameters. This method can eliminate unwanted flexible vibration modes while achieves desired rigid motion; the robustness makes it practical in engineering. For a kind of spacecraft with constant amplitude reaction jet actuators, time-fuel optimal maneuver control strategies are designed using CSVS method. Simulation results validate this method.

Keywords: component synthesis active vibration suppression method optimal control robustness large angle maneuver

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