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论文

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关于剩磁对卫星姿态确定与控制影响的研究

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Effects of Remanence on Attitude Determination and Control of Satellites

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摘要

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摘要 讨论了稳态剩磁对地磁姿态确定与控制系统的性能的影响。对某些卫星来说,星上的直流电设备单元会产生一个支配性的稳定磁场。文中提出一个姿态确定滤波器对剩磁场的影... 估计,然后从剩磁矩指向、大小及伸杆长度3方面分析了剩磁干扰力矩对姿态控制精度的影响。通过计算机仿真发现:该滤波器能有效消除剩磁场对姿态确定的影响;不同指向的剩磁矩令三轴控制精度出现较大的起伏,而不断增大的剩磁量则使控制偏差呈正比例增大,伸杆长度的影响却很微小。

关键词: 剩磁 姿态确定与控制 计算机仿真 小卫星

Abstract: The paper discusses how a steady remanence affects the performance of an attitude determination and control system using geomagnetism. For some small satellites, their direct current sets create a dominant remanent dipole moment. An attitude filter is developed to evaluate the effects of the remanent field on the attitude determination; furthermore, the effects of the remanent disturbance torque on the attitude control are discussed from the orientation and the magnitude of the remanent dipole moment, as well as the distance between the magnetometer and the satellite's center. Via the computer simulations, the filter shows an ability to effectively remove the effects on attitude determination; moreover, the varying orientation causes the three-axis control accuracy to vary in a relatively large range and the increasing magnitude makes the control errors increase proportionally, though the effect of the distance is not significant.

Keywords: remanence attitude determination and control computer simulation small satellite

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