地球物理学进展　2007 22 (1): 73-79　ISSN: 11-2982/P　CN: 1004-2903

论文

重力场恢复中的基于星载GPS的低轨卫星简化动力学定轨方法研究

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收稿日期 2006-9-19　修回日期 2006-12-30　网络版发布日期　接受日期

摘要　低轨重力卫星轨道的精确确定是获得精密地球重力场模型的前提, 而精密重力场模型又是获得高精度定轨结果的保证.本文简述了利用卫星重力方法恢复地球重力场及简化动力学方法确定低轨卫星轨道的数学模型，并简单分析和比较现有的几种重力场模型.用CHAMP实测数据，结合现有的重力场模型，系统分析、研究了不同阶次、不同重力场模型对低轨卫星定轨精度的影响；研究了不同间隔的随机速度脉冲在简化动力学方法中对模型误差的吸收、调节作用.计算结果表明，在定轨中，选择合理阶数的、较精确的重力场模型及合理间隔的随机脉冲参数，不但可以提高计算效率，更能提高定轨精度.

关键词　重力场恢复　低轨卫星定轨　简化动力学方法　重力场模型　随机脉冲

分类号

DOI:

GPS-based reduced-dynamic orbit determination for gravity field revovery

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Received 2006-9-19 Revised 2006-12-30 Online Accepted

Abstract Precise satellite orbit determination is a first prerequisite for gravity field recovery and measuring its variations in time. On the other hand, the precision gravity model is important guarantees for obtaining high precision orbiting results using the dynamic or reduced-dynamic orbit determination method. The paper briefly discussed the mathematical model of gravity recovery based on the energy conservation law and model of reduced-dynamic orbit determination, than analyzed and compared existing gravity models. At last, the impacts of different order and different gravity models on the orbit determination accuracy were systematically studied and compared with the real GPS observations from onboard receiver on CHAMP satellite, and the impacts of different predefined interval pseudo-stochastic velocity pulses on absorbing and adjusting the un-modeled dynamic force errors were also analyzed. The results show that the selection of proper order, right gravity model and appropriate predefined interval pseudo-stochastic pulses can not only boost the computational efficiency but also greatly improve the accuracy of orbit determination.

Key words

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