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引力梯度归算的模拟计算

于锦海[1,2], 万晓云[1,2]*

1. 中国科学院研究生院地球科学学院,北京 100049;
2. 中国科学院计算地球动力学实验室,北京 100049

Reduction for gradiometry and corresponding imitation

YU Jin-Hai[1,2], WAN Xiao-Yun[1,2]*

1. College of Earch Science, Graduate University of Chinese Academy Sciences, Beijing 100049, China;
2. Laboratory of Computational Geodynamics, Chinese Academy of Sciences, Beijing 100049, China

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摘要 引入引力梯度不变量后可将GOCE卫星观测数据简化成扰动位的径向二阶导数边界条件,由于卫星轨道不规则性给解算带来了很大的困难,因此解算过程中需要将在轨道上建立的边界条件延拓到如平均球面这样的规则曲面上来,由此便需要对引力梯度的延拓或归算等问题展开研究.本文依据Taylor展开讨论了引力梯度的归算方法,并针对EGM2008模型进行了模拟计算,结果表明本文给出的归算方法便于实施、提高精度效果明显,能有效地恢复引力场的位系数.顾及到GOCE引力梯度数据的实际观测精度,建议实施二次归算.

关键词: GOCE卫星计划 引力梯度不变量 卫星轨道 引力梯度归算

Abstract: The boundary conditions for the second derivative of the disturbed potential along radial direction can be established on the satellite orbit from GOCE's gravitational gradient measurements after introducing the invariants of the gradient tensor. Because of the irregularity of the orbit surface, it is necessary to extend the boundary conditions on the orbit surface onto some regular surface such as the average sphere of the orbit. Some continuation methods of gradiometry are proposed with the help of Taylor expansion in the paper, and simulations are done for EGM2008 model. The computational results illustrate that the given continuation algorithm can efficiently correct the boundary values on the orbit surface and recover the spherical harmonic coefficients of the gravitational field. Considering applications in dealing with GOCE data, it is suggested to do twice gradiometry reductions consecutively.

Keywords: GOCE mission Invariants of gradiometry Satellite orbit Reduction for gradiometry

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About author: 于锦海,男,1961年生,理学博士,现为中国科学院研究生院地球科学学院教授,博士生导师.主要从事大地测量与地球重力学等方面的教学和研究工作.E-mail:yujinhai@gucas.ac.cn

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