

基于GRACE卫星重力数据确定地球重力场模型WHU-GM-05

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摘要 基于卫星轨道运动的能量积分方程, 可导出利用卫星跟踪卫星数据求解地球重力场的实用公式. 本文在Jekeli给出的公式基础上导出了基于能量守恒方程利用两颗低-低卫星跟踪的扰动位差求解重力位系数的严密关系式. 基于两颗GRACE卫星的观测数据, 采用本文导出的严密能量积分方法求解得到120阶的GRACE地球重力场模型, 命名为WHU-GM-05; 将WHU-GM-05模型与国际上同类重力场模型EIGEN-GRACE系列和GGM02S分别在阶方差和大地水准面高等方面作了比较, 并与美国和中国的部分地区GPS水准观测值进行了精度分析. 结果表明基于本文推导的严密双星能量守恒方程得到的WHU-GM-05重力场模型精度与国际上同类重力场模型的精度相当.

关键词 [GRACE](#) [重力场模型](#) [能量守恒](#)

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Determination of earth gravity field model WHU-GM-05 using GRACE gravity data

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Abstract Based on the energy integral equation of satellite orbit-motion, some applied computation formulas for Earth gravity field recovery from satellite to satellite tracking data are presented, in which a strict expression of the difference of kinetic energy between two satellites on the same orbit in terms of KBR range-rate observation value is given. Using GRACE data from two satellites and the energy integral method, a gravity model up to degree 120 is derived, which is named WHU-GM-05. The tests of WHU-GM-05 series are performed by multi-comparisons, which include the comparisons between the model series and several analogous international geopotential models including EIGEN-GRACE series and GGM02S with respect to the corresponding degree variances and geoidal heights, and comparisons of the model geoidal heights with GPS leveling in the area of U.S. and China (some regions). The results show that the total accuracy of WHU-GM-05 is near to that of the models used in the comparisons.

Key words [GRACE](#); [Gravity filed model](#); [Energy conservation](#)

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