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地形/均衡重力场模型构制及其拟稳分析

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Construction and quasi-stable analysis of topographic/isostatic potential coefficients of gravity field

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摘要

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摘要

重力空白区数据填补的一个主要方法是基于地壳均衡理论进行的, 该方法亦用于EGM系列模型的构建中. 本文研究了地形数据在构制地形/均衡重力场模型中的应用, 分析了补偿深度对Airy位模型和面凝聚位模型的影响, 给出二者的最佳补偿深度分别为50 km和40 km. 以纯卫星重力模型为参考, 后者在前120阶的精度要高于前者, 但在121~250阶的精度较低, 组合模型精度高于单一模型精度. 对地形/均衡地球重力场模型进行了EGM2008拟稳分析, 研究了不同分辨率基准的拟稳效果, 分析表明: 30'分辨率的拟稳基准所得拟稳模型对应的阶方差与参考阶方差曲线直到360阶都有较好的一致性, 以EGM2008为基准, 其相对累计大地水准面高误差在140阶时为6.83cm, 相对累计重力异常误差在220阶时为1.10 mGal.

关键词 [地壳均衡模型](#), [地形/均衡位模型](#), [拟稳基准](#), [地形模型](#), [补偿深度](#)

Abstract:

Isostasy is a key method in the gravity data extrapolation where no measurement information is available, which has already been used in the establishment of the Earth's Gravity Models(EGM). Based on topographic data, the construction of topographic/isostatic (t/i) EGM was studied here. The depths of compensation of the two isostatic models were analyzed to show the proper ones are 50 km and 40 km, respectively. According to gravity model from satellite gradiometry data only, the precision of layer condensation model is better than that of the Airy model in low frequencies till degree 120, while on the contrary between degree 121 and 250. Besides, combined model is better than any single model. Then, based on EGM2008, the quasi-stable analysis of the t/i potential model was made with gravity anomalies of various resolutions. It shows that the t/i spectrum of the quasi-stable model with 30' datum almost meets with that of EGM2008 up to degree 360. Compared to EGM2008, the relative accumulative geoid height error up to degree 140 is 6.83cm while the relative accumulative gravity anomaly error up to degree 220 is 1.10 mGal.

Keywords [Isostatic model](#), [Topographic/isostatic potential model](#), [Quasi-stable datum](#), [Topographic model](#), [Depth of compensation](#)

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