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论文

直接地理编码与星载干涉SAR测高不确定度的等效性分析

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摘要
现有的考虑地球曲率影响的INSAR测高模型主要有星载干涉SAR测高模型和直接地理编码两种。星载干涉SAR测高模型首先利用SAR干涉获取非模糊干涉相位，然后根据考虑地球曲率的空间几何关系直接计算地形高度。而直接地理编码模型则是在SAR干涉获取非模糊干涉相位的基础上，利用两个斜距方程和一个多普勒方程给出地面点的3维坐标值。由于两种模型得到地形高程的途径不同，因此很难直接比较这两种模型的地形测高不确定度。该文在采用矩阵形式推导出直接地理编码模型地形高程不确定度显示表达式的基础上，通过引入斜距平面坐标系，定量化地证明了直接地理编码模型的高程测量不确定度公式与考虑地球曲率的SAR干涉测高模型的测高不确定度公式是相同的，从而说明了这两种模型在用于地形高程测量时具有相同的精度。最后采用计算机仿真验证了理论分析的正确性。

关键词 SAR 干涉 测高模型 不确定度分析

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The Equivalent Analysis of Direct Geocoding Model and Spaceborne INSAR Altitude Model in Height Uncertainty

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Abstract
The height measurement models considering earth curvature of INSAR mainly consist of two kinds- spaceborne interferometric SAR height measurement model and direct geocoding model. Spaceborne interferometric SAR height measurement model gets unambiguous interferometric phases through interferometric SAR, then calculates the terrain height by the spatial geometry considering earth curvature. Direct geocoding model obtains the three-dimensional coordinates using two slant range equations and one Doppler equation, based on the unambiguous interferometric phases. Because the methods getting the terrain height in the two models are different, it is difficult to compare the height measurement uncertainties of the models. Based on matrix theory, the explicit expressions of height uncertainty of direct gecoding model are presented. And it is proven that the height measurement uncertainty formulas of direct geocoding model are the same as that of spaceborne interferometric SAR height measurement model after introducing a new slane range plane coordinate system. Then it is proposed that these two models would lead to the same precision in height measurement. Finally, computer simulation is employed to validate the correctness of the theory analysis.

Key words SAR Interferometry Height measurement model Uncertainty analysis

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