

传感器与信号处理

单星InSAR系统基线模型的误差传播与精度反演

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摘要:

基于由光学手段测得的单颗干涉合成孔径雷达卫星的支撑臂矢量, 通过转换关系建立空间基线模型。综合考虑基线模型在安装、测量和卫星在轨飞行等各环节的误差源, 包含卫星姿态误差、外部副天线姿态误差、安装位置地面标定残差、卫星与天线在轨变形量、测量系统轴向标定残差以及硬件设备的测量误差等。分析各自的误差特性, 给出多种因素误差源对于空间基线的误差传播机理, 推导传播过程中的误差演化特性; 基于理论推演的结果给出测量设备合

关键词: 干涉合成孔径雷达 空间基线 误差传播 精度反演 安装部位

Error propagation and precision inversion of baseline model for single satellite InSAR systems

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Abstract:

Based on the mast vector measured by the optical approach on the single interferometric synthetic aperture radar satellite, the spatial baseline model is established by the conversion relationship. Various error sources during the phases of installation, measurement and on orbit flight are taken into account, such as satellite attitude error, outer antenna attitude error, installation position on ground calibration residual, satellite and antennas on orbit distortion, measurement system axes calibration residual, measurement error of hardware. The characteristics of the error sources are analyzed, and the error propagation mechanism from the error sources to the spatial baseline is presented. The error involvement features of the propagation procedure are derived. The optimal installation positions of the measurement equipment and the cooperating targets are also obtained based on the theoretical deduction. An example of precision inversion strategy of the baseline length is illustrated from the perspective of inverse problems. The idea can be applied to support the design of baseline measurement scheme, installation scheme, processing algorithms, etc.

Keywords: interferometric synthetic aperture radar spatial baseline error propagation precision inversion installation position

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