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## 高频GPS双差残差模型监测强震地表运动

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Ground motion monitoring during strong shake with high-rate GPS double-differenced residual model

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摘要

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### 摘要

根据震时地表震动持续时间短的特点,以及双差残差的相关性,提出了基于双差残差建模的高频GPS强震位移监测方法.首先对震前若干历元各双差残差进行建模,地震发生后,利用模型对各双差残差进行预报,最后利用预报残差实现短时间尺度内的位移解算.利用一条长约1100 km基线的静态数据和El Mayor-Cucapah 7.2级地震的94个测站数据进行试验分析,结果表明,5 min预测时间内,静态数据的动态位移在N、E、U三个方向的定位中误差分别为6 mm、6 mm和13 mm,地震数据的解算结果与实际情况有较好的一致性.

关键词 高频GPS, 双差残差模型, 强震地面运动, 实时动态监测

### Abstract:

Due to the short lasting time of the ground motion and the correlation of the double-differenced (DD) residuals, a new high-rate GPS ground motion monitoring method is proposed based on DD residual modeling for strong shake. Firstly, the DD residual is modeled with epochs of data before the earthquake, then the model is used to predict the DD residual after the earthquake start, and finally the displacement is accomplished with the predicted residual in short time scale. 1 Hz GPS data from a static baseline about 1100 km and 94 sites in El Mayor-Cucapah  $M_w$ 7.2 earthquake is tested, and the experimental results show that the positioning precision of N, E and U can reach 6 mm, 6 mm and 13 mm for the static data, and the results derived from earthquake data coincide with the actual situation well, within 5 predicted minutes.

Keywords High-rate GPS, Double differenced residual model, Strong shake ground motion, Realtime kinematic monitoring

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