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## 近断层强地震动场预测

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### Prediction of near-fault strong ground motion field

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摘要

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摘要 以1997年4月11日新疆伽师地震( $M_w$  6.1)为例,详细介绍了近断层强地震动场的预测方法.首先,用有限断层震源建模方法建立了该次地震的震源模型;然后,基于动力学拐角频率的地震动随机模拟方法,模拟了该次地震仅有主震加速度记录、且位于巨厚土层上的三个台站的加速度时程,并用实际地震记录进行了验证.在此基础上,基于预测的近断层77个节点的加速度时程的峰值绘制了该次地震的加速度场.结果表明,上述方法模拟的加速度时程在0.5 Hz以上的高频段是可行的、实用的;预测的近断层加速度场具有非常明显的上盘效应.地表最大加速度的范围与断层面上最大凹凸体位置相对应,说明与断层面上凹凸体相对应的地面上的建(构)筑物将会遭受到较为严重的震害.

关键词 近断层, 地震动场, 有限断层震源模型, 路径效应, 场地效应, 伽师地震

Abstract: Taking 1997 Jiashi earthquake ( $M_w$  6.1), Xinjiang, China as an example, a method for predicting near-fault strong ground motion field was introduced in detail. Firstly, the earthquake source model of the earthquake was established based on the finite fault source modeling method. Secondly, acceleration time histories of the three stations above huge thick sediment strata with main-shock records during the earthquake were simulated based on the stochastic method of ground motions with the dynamic corner frequency; and the results were validated by comparison of response and Fourier spectra between simulated and recorded acceleration time histories. Finally, the acceleration field of the earthquake was drawn based on PGA of the predicted acceleration time histories of 77 near-fault nodes. The results show that simulated acceleration time histories are feasible and practical when frequency is more than 0.5 Hz, and the acceleration field shows very obvious hanging wall effects. The maximum PGA area on ground surface corresponds to the maximum asperity area, and this means that buildings and other engineering structures on ground surface corresponding to the maximum asperity area on the earthquake fault may suffer severe damage.

Keywords Near fault, Ground motion field, Finite fault source model, Path effect, Site effect, Jiashi earthquake

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