

長週期特徵地震衝擊評估與防災應用模式研究

Research on impact assessment and prevention for long-period earthquake

主管單位：國家災害防救科技中心

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摘要

現行建物的地震衝擊分析主要以結構易損性分析方法為主，但在日本 311 大地震後，許多研究已發現到高樓建築、隔震建築或建築內部功能性設施受到長周期地震動的影響相對明顯，而此種效應就目前普遍使用之結構易損性曲線與相關參數上，尚少有考量。本計畫擬透過簡化建物三維動力分析模型，並藉由結合本中心建立之建物耐震屬性三維化資料庫，開發動態分析防災應用模式，並以一示範都會區建立遠域長周期地震衝擊評估方法，據以掌握長周期地震之威脅。

此外，本計畫並擬透過與相關研究單位合作，以協定相同地動模擬資料格式方式，考量地震防災評估需求精度，針對三維地震波模擬技術進行整合應用，並擇定一都會區為示範研究區域，評估合理之都會區可能長周期地動風險來源與建立數值模擬結果，並開發地震衝擊三維化展示圖台，作為相關評估結果視覺化展示工具。

關鍵詞：地震衝擊、長週期特徵地震、動力分析

Abstract

In urban areas, simulation of structural dynamic responses under earthquake is crucial in emergency response planning. Multidimensional visualization of earthquakes is a current trend in simulation. In this study, a dynamic, multidimensional simulation method for analyzing impacts on to buildings was developed. The method employs three-dimensional dynamic analysis and data from a seismic capacity database. High-performance computing is applied to a polygonal model, seismic capacity data are analyzed, and the seismic response of each building in an urban environment is calculated.

Thus, in this study, the multidimensional urban earthquake impact simulation (MDUES) platform was established. The MDUES enables long-period earthquake impact analysis, simulation of the seismic responses of buildings in three dimensions, and visualization of the disaster risks and impact on a specified area. In summary, simulating structural seismic responses in urban settings necessitates careful examination of the characteristics of ground and building motion, and the outcomes of such analysis can provide a crucial reference for

city planning, post-earthquake rescue operations, and seismic damage assessment.

Keywords : earthquake impact, long-period earthquakes, dynamic analysis