USING THE EARTHQUAKE ENGINEERING INTENSITY SCALE TO IMPROVE URBAN AREA EARTHQUAKE EMERGENCY RESPONSE

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ABSTRACT

A preliminary study of automated spatial distribution estimation of earthquake damage in building stocks is presented. The purpose is to start developing a quantitative understanding of efficiency in current emergency-response approaches following a strong urban area earthquake. We used a pair of ground motion and building-tag color databases for the 1994 Northridge earthquake. The building-tag colors, which are issued by trained engineers, are taken as measures of perceived structural damage. We compared the performance of the ShakeMap Instrumental Intensity Scale (I_{mm}) (Wald et al 1999a) and the Earthquake Engineering Intensity Scale (EEIS) (Freeman et al 2004) in predicting spatial distribution of damage/no-damage states in short-period building stock in the greater Los Angeles metropolitan area. We used the ATC-38 (ATC 2001) data for local study and the City of Los Angeles initial damage database (City of Los Angeles, 1994) for regional study, along with publicly available strong-motion records utilized in Northridge earthquake ShakeMap generation. Our approach was to study correlation between ground shaking intensity (I_{mm} and EEIS) and building damage states. We suggest a procedure that might help improve success rate in predicting damage/no-damage spatial distributions in short buildings in the aftermath of strong urban-area earthquakes.

Introduction

Efficiency in emergency response in the aftermath of strong urban earthquakes is a most important topic. Unfortunately, limited information about state of matters reduces efficiency in successful emergency response. However, improvements in urban area strong-motion recording networks and building stock databases provide venues to move beyond traditional qualitative and generic estimations. Quantitative predictions including spatial distribution of likely damaged buildings is now a growing possibility.

In recent years, the authors have been developing an earthquake intensity scale for buildings, called the Earthquake Engineering Intensity Scale (Freeman et al 2002, 2003, and 2004). EEIS's intuitive graphical representation of damage potential of ground motion on different kinds of buildings has made it one of our favorite templates to study what might have

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