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Ground-Motion Prediction Equations of Spectral Ordinates and Arias Intensity for Iran

G. GHODRATI AMIRI[1], M. KHORASANI[2], R. MIRZA HESSABI[2], and S. A. RAZAVIAN AMREI[2]

[1]Center of Excellence for Fundamental Studies in Structural Engineering, School of Civil Engineering, Iran University of Science & Technology, Tehran, Iran
[2]School of Civil Engineering, Iran University of Science & Technology, Tehran, Iran

The purpose of this study is to complete the previous research publication of the first author on the subject of ground-motion prediction equations (GMPEs) for Iran [Ghodrati Amiri et al., 2007]. Several studies are being conducted to systematically assess the seismic hazards of areas within the seismic zones of Iran. Therefore, there is an inevitable need for appropriate GMPEs of spectral ordinates. Similarly, suitable relations of Arias intensity (AI) for this region are useful to capture the potential destructiveness of an earthquake. This article derives new relations using the strong-motion database for two seismic zones of Zagros and Alborz-Central Iran according to tectonic conditions, following a new processing of all of the records. A total of 725 strong-motion accelerograms recorded from 379 earthquakes with magnitudes between 4.0 and 7.7 and with hypocentral distances larger then 5 kilometers and mostly smaller than 200 kilometers are used to obtain equations. Analogous to the previous study, relations are derived for soil and rock site conditions to obtain better results. Each record is individually filtered and then the needed parameters are extracted from the earthquake acceleration record data. Finally, the relationships between the spectral acceleration (SA), Arias intensity (AI), and earthquake parameters are obtained. The earthquake independent parameters chosen are hypocentral distance and magnitude in order to make it easier to use the relationships for seismic hazard analysis. The predictions are found to be consistent with those from previous studies in this field.

Keywords Ground-Motion Prediction Equation; Spectral Ordinates; Aria Intensity; Rock; Soil; Iran

1. Introduction

The purpose of this study is to complete the previous research publication of the first author on the subject of attenuation relationships for Iran [Ghodrati Amiri *et al.*, 2007]. It is clear that an increase in the amount of available strong-motion data, should increase the accuracy and reliability of the derived GMPEs. Therefore, expanding the database to include records from earthquakes that occurred from 2004–2007 and carefully reviewing and reassessing all the records together (combining the previous and present study) has improved the strong-motion databank of this study.

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Address correspondence to G. Ghodrati Amiri, *Center of Excellence for Fundamental Studies in Structural Engineering, School of Civil Engineering, Iran University of Science & Technology, Tehran, Iran* E-mail: ghodrati@iust.ac.ir

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