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Implication of the Empirical Greens Functions for the Simulation of Strong Ground Motions for North Tehran Fault

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Empirical Green's Function is developed for estimating deterministically strong ground motion during the mainshock, using the records of small events such as foreshocks and aftershocks which occurred on the causative fault and their mechanism is similar to the target event. In this study, we are going to simulate the strong ground motion in Tehran area applying Empirical Green's Function (EGF). The base event (element event) in this approach is Tehran earthquake (09.03.2003) with M_w=4.1 and Target Events are Manjil (1990, Mw=7.3) and Avaj (2002, Mw=6.5) earthquakes, both have occurred in Alborz and Northern Central Iran Seismotectonic province in the north of Iran. "The North Tehran fault" assumed as unique causative fault that is potentially capable to cause great earthquakes. For each event, we considered different condition, with changing some characteristics of seismic sources or target events. Finally, we represent the results of 24 different scenarios, which can potentially occur in this region. The synthesized events for Bam and Ardebil earthquakes, which were made before synthesizing in Tehran, show similar acceleration time histories of synthesized strong motion whit the target events, but frequency domain of simulated events are generally lower than those of real earthquakes, which have occurred in 2003 and 1997.

EGF method, as proposed by Irikura (1984), was used in this study in order to syn-

thesize the strong ground motion in Tehran. This method needs some well estimated input data to simulate properly strong ground motion for a specified location. The results of simulating the strong ground motion for Bam and Ardebil have shown that the frequency domain of all synthesized motion are mostly lower than the real earthquakes; This difference is expressed by high frequency domain (greater than 10 Hz) of target event. But valuating the simulated time history shows closer results to the mainshock of the Bam and Ardebil earthquakes. Referring to the synthesized motion in Tehran, the PGA of response spectrums are occurred mostly in the same period and change slowly by changing the target event characteristics, but value of PGA varying from 8 to 18 m/s^2 in several scenarios. We have considered just north Tehran fault as a causative fault. A more comprehensive result may be obtained by synthesizing other active faults around Tehran. This study was affected by several undesirable parameters which can reduce the precision of the obtained results. The most important uncertainty in synthesizing process for Tehran was the lack of precise source data about the North Tehran Fault.