PRELIMINARY SEISMIC MICROZONATION Of BOJNORD USING MICROTREMORS

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ABSTRACT

Seismic hazard assessment of big cities is imperative to mitigate the potential damage and loss of life due to earthquakes. Local ground conditions substantially affect the characteristics of incoming seismic waves during earthquakes. Soft soil deposits amplify certain frequencies of ground motion and extend the duration of the motion, thereby increasing earthquake damage. Seismic waves are trapped in the soft soil layer and multi-reflection phenomenon occurs. As a result, the ground vibrates severely with a specific dominant period. This period is called the predominant period of the ground, and the vibration of structures on the surface is highly influenced by it.

Microtremor observations can be used to determine the dynamic properties of a site and, hence, can be used for microzonation. In order to clarify the surface ground motion characteristics at Bojnord City, a microtremor measurement grid has been designed. Different 1-hour microtremor measurings during day and night have been carried out. The horizontal to vertical spectral ratio technique, also called Nakamura's method (Nakamura, 1989) or HVNR was used as a principal data processing procedure in order to extract the experimental transfer function of the site. Fundamental frequencies of the sites using HVNR have been extracted. Following this extraction, the city zonation considering the low-rise, mid-rise and high rise building has been carried out and finally distribution maps of site periods and peak ground acceleration throughout the city were developed.

INTRODUCTION

Seismic microzonation and seismic vulnerability assessment of building stock at a certain location is of importance in order to reduce the potential damage from future earthquakes. Seismic microzonation is considered as an important tool for earthquake mitigation which provides a basis for site-specific hazard analysis. It provides information regarding the use of different areas of a city in an order such that structural, geological, seismologic and geotechnical factors can be considered. In the recent years microzonation is becoming more popular and has been started to be applied in different areas of the world (Haghshenas et al., 2008).

Different seismic events have been occured in Iran which have left large casualties in the recent decades. Lack of suitable development and difficulties in earthquake risk management have led to lots of human and physical damages in these events. These tragedies made the government believe that seismic hazard zonation and microzonation of vulnerable inhabited cities for appropriate urban planning are necessary actions for earthquake risk mitigation in the country (Khandan Bakavoli et al., 2011).