

A new method for estimating measured seismic intensity of the 2003 Miyagi-ken Oki Earthquake using the questionnaire survey

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The purpose of the present study is to check the validity of the new seismic intensity calculation method proposed by Fukuzumi et al. (2002) by applying this method to the data in the 2003 Miyagi-ken Oki Earthquake.

Precise estimation of seismic intensity is crucial for preventing disasters related to earthquakes. Ohta et al. (1979) proposed a method for estimating seismic intensity through a questionnaire survey. This method has been widely used for many damaging earthquakes, and its reliability has been checked in the range from II to V in former JMA intensity scale. However, this method underestimates the calculated intensity in the range from VI to VII in JMA intensity scale for the 1995 Hyogo-ken Nanbu (Kobe) Earthquake. Although some studies modified this method, these studies did not consider a seismic intensity coefficient between measured seismic intensity and questionnaire survey data.

Fukuzumi et al. (2002) has proposed a new seismic intensity coefficient that gives better relationship between calculated and measured seismic intensity using the data of the 1995 Hyogo-ken Nanbu Earthquake, the 2000 Western Tottori Prefecture Earthquake and the 2001 Geiyo Earthquake. The seismic intensity coefficient was determined by observing the relationships between measured seismic intensities and category numbers. The category numbers are numbers that correspond to the choice of the questions and reflects the strength of an earthquake motion. In order to make a direct comparison between the measured seismic intensity and the questionnaire survey data, the questionnaire survey data within 1.5 km radius from each seismic observation point was used. Regression analysis was performed between the measured seismic intensity and an average value of the category number of each question. The value of the measured seismic intensity corresponding to certain category numbers was considered the seismic intensity coefficient for these category numbers.

As a result of applying the questionnaire seismic intensity calculating method based on this new seismic intensity coefficient to the questionnaire data of the 2003 Miyagi-ken Oki Earthquake, a high correlation is resulted between the questionnaire seismic intensity and the measured seismic intensity. Therefore, it can be claimed that the new method based on the seismic intensity coefficient by Fukuzumi et al. (2002) is effectively applicable to the 2003 Miyagi-ken Oki Earthquake as well.