

Examination of the earthquake damage assessment using the strong ground motions and damage reports

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An earthquake sometimes causes a disaster, and does damage to society. In the case of an outbreak disaster such as an earthquake disaster, disaster prevention organizations including administration must immediately and appropriately deal with a tense situation, and the quickness greatly influences the scale of damage. Therefore, for disaster reduction, it is important to assess the outline of damage and deal with the situation quickly and appropriately at the time of occurrence. Earthquake damage might be excessively assessed using the present conventional procedures, although it plays an important role when presuming the outline of damage. This is because the conventional damage assessment formula is computed based on the data of the area that was strong as for especially the earthquake motion and is not reflecting the information on the whole damage region in a massive earthquake. In case of a small-scale earthquake less damaged area under a massive earthquake that was not considered in the conventional assessments, it becomes extrapolative assessment and excessive damage might be assumed. In order to solve these problems, it is necessary using the earthquake motion data of the wide area covering the whole damage region and an adjoining land region to perform damage assessment based on a certain valuation basis.

The observation for strong ground motion has been improved since the 1995 Hyogo-ken Nanbu Earthquake which caused the unprecedented large disaster. National Research Institute for Earth Science and Disaster Prevention is doing national deployment of the Kyoshin Network (K-net) and the Digital Strong-Motion Seismograph Network (KiK-net) as a homogeneous, dense, and quality observation network for strong ground motion. With both these observation networks, a strong-motion seismograph is installed at intervals of about 25 km, and about 1000 point and about 500 point are working now, respectively. In KiK-net, the strong-motion seismograph is installed not only ground surface, but also on the basement layer, and the observation waveform is exhibited on the Internet. Moreover, the Fire and Disaster Management Agency exhibits the damage report of various calamities including an earthquake on the Internet. In this study, the determination of the value 'Threshold' from which damage begins was tried using the relationship between widely recorded earthquake motion data and a damage distribution, in order to overcome the problem of damage assessment. This value serves as an index to a disaster prevention person's in charge action start in the occurrence of disaster, and may serve as a new definition that has an important meaning for dealing with disasters. The Geiyo Earthquake which occurred in Aki Nada on March 25, 2001 was chosen as the candidate for analysis, and the strong ground motion seismograms by KiK-net were used. As parameters for calculating a threshold, the peak ground acceleration (PGA), the peak ground velocity (PGV), and seismic intensity, were adopted. Consequently, a good relation is especially obtained between the building damage more than partially destruction and the seismic intensity (threshold of 3.1), and the human damage more than slight injury and the seismic intensity (threshold of 3.7). To improve the accuracy of a threshold, more earthquakes must be analyzed.