

SSS023-P17

Room:Convention Hall

Time:May 24 16:15-18:45

Long-Period Ground Motion in the Tokyo Bay area from the Chichi-jima Kinkai earthquake ($M_j=7.4$) of Dec. 22, 2010.

Tomiichi Uetake^{1*}

¹Tokyo Electric Power Company

The shallow large event of $M_j=7.4$ occurred in Chichi-jima kinkai region on Dec. 22, 2010. The ground motion records of the event observed in the Tokyo bay area had long duration and were rich in the long-period motions. In this article, the characteristics of the records were described.

Tokyo Electric Power Company has 13 observation stations around the Tokyo bay area. 5 stations are located on the east shore and 8 stations are located on the west shore. The velocity type sensors are used in observation. The event trigger system was adopted for recording the data. Sensors had been installed on the basement of low-storied buildings and this condition did not disturb the observation of the long-period ground motions. The epicenter distance was ranged from 990 km to 1,030 km and the azimuth was ranged from 337 to 340 degree.

The duration time of the records was over 1,800 s and many later arrivals were identified. The waveform characteristics are different between the eastern side and western side. There were large later arrivals about 180 s after S wave arrival in the waveforms of eastern side and the characteristics of this wave packet were different among the observation points. On the other hand, there were no significant later arrival in the waveforms of west side. The peak velocities of the horizontal motion were 1.1-1.7cm/s in the east side and 0.5-0.8 cm/s in the west side. On the other hand, as for the up-down motion, the peak velocities were 0.2-0.3 cm/s at all stations. Peak ground velocity was recorded in the later arrival part composed of surface waves more than 180 s after the S wave arrival.

The results of multiple filter analysis showed that the later arrivals consisted of the motion in period of around 10 s. The predominant period of Ooi station in west side was about 8 s and that of Anesaki station in the east side was longer than 10 s.

The smoothed peak in period range from 8 to 12 s was shown in the velocity response spectra of 5% damping factor of the west side stations. The steep peak at period of 10 s was shown in the velocity response spectra of the east side stations. The peak value of east side stations were 6-9 cm/s and it was more than double in comparison with the peak value of west side. This difference became more remarkable in the response spectra with low damping factor. In the response spectrum with 0.1% damping factor, the peak value was around 10cm/s at the stations in west side but the value at the stations in the east side reached 30cm/s. But no significant peak was shown in the vertical component, and the response value of the vertical motion was small in comparison with the horizontal motion. It is around 2cm/s in case of 0.1% damping factor and 1cm/s in case of 5% damping factor.

In addition, the peak response time of response waveform with low-damping factor showed the large delay from the peak value time of velocity and acceleration. The duration of acceleration wave form was about 1 minutes, it was important that the peak response of the structure with low-damping factor was late for many minutes from the peak acceleration time.

Keywords: Long-period Ground Motion, Tokyo Bay Area, Chichi-jima Kinkai Earthquake, Response Spectrum