Real Time Estimation of Seismic Intensity Distribution Map for the Earthquake Disaster Prevention in the Tokyo Metropolitan Area.

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The Tokyo Metropolitan Area (TMA), which is located at a complicated seismo-tectonic area, has been hit by disastrous earthquakes of M ˜7- 8 throughout recorded history. The Headquarters for Earthquake Research Promotion of Japan issued a long-term forecast that M ˜ 7 has a 70% occurrence probability in the Kanto basin within 30 years. In response to the earthquake disaster mitigation, the Japanese government has been distributed more than 4000 strong-motion stations all over Japan. 73 instrumental measurement intensity observation stations are located in the TMA at an interstation distance of ˜ 2-3 km which make it possible for the quick estimation and information dissemination related to disaster mitigation such as earthquake early warnings (EEW), seismic intensity distribution, and etc.

Recently, Kagawa (2018) presented a method to issue the real-time strong motion prediction and maximum intensity distribution maps of 1-km mesh for the whole area of Tottori prefecture by applying the Propagation of Local Un-dumped Method (PLUM) (Hoshiba, 2013a ;Kodera, 2016) to receive seismic intensity packet data on every second. The method performs well at regions where the seismic network distributed densely such as an interstation distance of 5-6 km, whereas it is overestimated the intensity at regions where the network distribution sparsely, such mountain regions, of interstation distance is greater than 15 km.

In this study, we applied the PLUM method of Kagawa (2018) in three cases. The first case, we use data recorded during the 2011 Tohoku earthquake (Mw 9.1) by the intensity observation network in the TMA. In the second case, we use simulated strong-ground motion from a scenario earthquake proposed by the Central Disaster Management Council. Its proposed magnitude of M˜7 and the focal depth is located at ˜ 50-60 km, which is considered as inter-mediate depth event located underneath the TMA. In the third case, we applied the method for data strong-ground motion data simulated using the source parameters of the 1923 Great Kanto earthquake (M 7.9). Also, we show the PGA estimation method by using the P-wave maximum amplitude until the S-wave arriving. We present our results as movie showing the intensity distribution of 250- meters mesh for the TMA at every second. In addition, we show the maximum intensity distribution maps for disaster management in real-time. Our results show the importance of deploying a real-time system at the TMA for earthquake disaster mitigation.

Keywords: Earthquake disaster prevention for tokyo, High Density Measurement instrumental Observation network data, Presumption of PGA by PLUM method , Real Time Stong Motion Prediction