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Development of the new EEW method available for the area near hypocenter

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1. Introduction

The Earthquake Early Warning system is expected for earthquake disaster mitigation. However, the method on this system has a problem that warning for the area near the hypocenter is not in time for the arrival of the strong ground motion. To solve the problem, we proposed the new seismic intensity (called 'Iap') computed from the vertical acceleration and the new EEW method using this intensity (Taya, et.al (2007)). This report is described the best threshold level of Iap warning and new methods of judging whether detected-shake is the earthquake (called 'Earthquake-Noise Judgment').

2. The best threshold level of Iap warning

In this analysis, 84 K-NET waveform data (for events of $M_j \geq 4.5$ and hypocentral distance $< 30\text{km}$) were used. The warning thresholds were set by 3.0~3.4. Timings of Iap warning were calculated. It was found that the new method could warn earlier than old one and could reduce unnecessary warnings if the warning threshold level was set by 3.4.

3. The new methods of Earthquake-Noise Judgment

The EEW seismograph might detect an abnormal shake that causes the false warning. To prevent the false warning, it must judge whether the detected-shake is the earthquake within very short time. In addition, waveforms of abnormal shake have some types. Therefore, the EEW seismograph must have some methods of Earthquake-Noise Judgment adapted to each waveform type. One of the feature of abnormal shake, the amplitude of the initial part of wave exceeds thousands Gals so rapidly. Aiming at this feature caused by electric noises, it was found that the detected-shake was considered to be a noise if the amplitude of the initial part of the wave exceeded the certain limit, defined by the maximum amplitude of the initial part of earthquakes.

4. Development of the new EEW seismograph

The new EEW seismograph based on SM-27 (made by RION Co.,Ltd.) was developed. Now it has been tested in the factory. It will be set up on the wayside of the Tokaido Shinkansen.

Keywords: Earthquake Early Warning, seismograph, Iap, Earthquake-Noise Judgment