

Vibration test of the seismometer using mobile information terminal on the 3-D Full-Scale Earthquake Testing Facility

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A MEMS(Micro Electro Mechanical Systems) acceleration sensor is commonly used on many mobile terminal devices such as smartphone, personal stereo, and tablet PC, because it is compact, lightweight, and cheap. If we use MEMS sensors to make observations of strong motion, we could know more detailed information of damaged area, and send more rapidly realtime earthquake information.

Yoshida et al. (2011) developed an experimental sensor network of earthquake observation using iPhone/iPad/iPod-touch named "i-Jishin", and released at App Store in August, 2010.

Naito et al. (2011) installed "i-Jishin" on the base and observed in parallel with K-NET02 seismometer. They compared same seismic waves, and concluded over 3 regarding JMA-shindo fit within the margin of 0.1, but up to 2 it becomes overestimate.

To confirm if it have a performance that applies for strong motion observation, we set up 12 machines of iPod-touches on the E-Defense, and observed 10 different kind of seismic waves and white noises.

We fixed iPod-touches on the floor, wall, and desks using adhesive double coated tape. And we charged energy with an external battery, corrected time with an NTP server.

As a result, we acquired all data that was exceeded the trigger level. And the data was comparable to servo type accelerator on the same floor.

The response spectrum showed nonlinear characteristics depending on vibration levels and layers when it shook at strong motion such as JMA Kobe.

Recorded data has some differences depending on a location setting. When we set "i-Jishin" we must set on the floor or on the wall tightly, and be careful not to conflict with surroundings.

On another time, We have made a vibration test on the shaking table and examined in parallel with other standard seismometer. At next time, we will release detail about this examination.

We are aiming to examine a performance of "i-Jishin" as a seismometer in detail, and going to conduct demonstration experiments of cloud MEMS sensor network.

Keywords: MEMS, Sensor Network, Cloud, mobile terminal, i-Jishin, E-Defense