3D Subsurface velocity structural model for strong ground motion simulationaround the 2004 mid Niigata prefecture earthquake

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A strong motion of 6 or 7 in the seismic intensity was observed at the K-NET and the JMA observation point of Ojiya City in the mid Niigata prefecture earthquake in 2004.

To investigate a cause of the strong motion in Ojiya City in detail, Furumura et al.(2005) made the 3D velocity structural model around the main shock area using P and S wave reflection method in the vicinity of the urban area, and interpreting geological features and borehole datum in addition.

This model has a very complex three dimensional shape, of which on the east side of Shibata-Koide tectonic line the maximum depth of the top (Uonuma) layer reaches 1500m and that of the basement reaches 6200m, while hard rocks appear on the surface on the west side.

Here, we tuned the velocity structure model by using the previous model as initial model, so that we have succeeded to construct a better model that can explain the feature of strong motion around the hypocenter region.

We used two methods, which are an inversion and a try-and-error method. In both methods, we selected M5-5.5 aftershocks as a point source. we used the re-determined the loci of the aftershock using the double-difference tomography method (Kato, 2005).

In the inversion work, we carried out inversions for the 2-D structures along profiles between observation stations and hypocenters (Hikima and Koketsu, 2006, this meeting).

In the tuning work by 3D wave motion simulation, three dimensional higher-order FDM (Furumura, 2002) was used. The calculation that used the initial value model was first done, the model by whom the results of obtaining next by inversion were integrated was made, and it made comparative study of the result. In addition, to explain the arrival time of P and S wave and the duration time of the surface waves, the hypocenter position, velocity of P and S wave, Q value, and the boundary shape between sedimentary layers has been adjusted by try and error.