3-D modelling of subsurface structures and strong ground motion simulation

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Numerical simulations of strong ground motions require a 3-D structure model. A key problem for 3-D models is who supplies enormous funds of subsurface structural surveys. After Kobe earthquake, the science and technology agency undertook a project to make a guideline for surveys and executed at four regions. As the result of these surveys, the Education and Science ministry will plan to carry out the project of making 3-D models of large-scale sedimentary basins from a fiscal year of. So, The problem of the funds is substantially solved. Surveys by this project cannot produce 3-D sedimentary basin models enough to use for numerical simulation. We should use recordings accumulated by newly established networks for strong-ground-motion after Kobe earthquake

Predicted strong ground motions are fundamental information for earthquake disaster prevention and seismic structure design and studies related to the prediction of strong ground motions have been continued extensively. A main prediction method is numerical simulations. This requires a fault model, a subsurface structure model, and a simulation technique. Therefore, studies of methods inferring fault and subsurface-structural parameters and actual inference of these parameters are key research subjects in the field of the prediction of strong ground motions.

Study of development of new survey methods is not a main subject to make a subsurface-structural model usable for the numerical simulation up to above 2 Hz. Only existing survey methods are enough for it. A key problem is who supplies enormous funds of subsurface structural surveys for large-scale and highly populated sedimentary basins such as Kanto and Nohbi plains.

Strong effects of three-dimensional effects of subsurface structures on strong ground motions was confirmed by the Hyogo-ken Nanbu earthquake widely among not only researchers of strong ground motions but also persons who are interested in earthquake disaster prevention. Consequently, the science and technology agency undertook a project to make a guide line for surveys of 3-D modeling of large-scale sedimentary basins and executed it for three years from 1998 to 2000 at four regions Chiba Prefecture, southern Kanto region, Aichi Prefecture, and Kyoto City. As the result of the three year surveys, the Education and Science ministry will plan to carry out the project of making 3-D models of large-scale sedimentary basins from a fiscal year of 2001 in the guideline. So, the problem of the funds is substantially solved.

Surveys only by this project cannot produce 3-D sedimentary basin models enough to use for numerical simulation. We inevitably regard them as models to be revised and improved. After the Hyogo-ken Nanbu earthquake, networks for strong ground motion recordings were established densely by various organizations of central and municipal governments and a plenty of seismograms of moderate-size earthquake events have been accumulated. We should use these recordings to improve 3-D basin models. Specifically, we perform the inversion using these seismograms, regarding the models produced by the surveys as initial ones. As a natural consequence, high-speed and high-precision simulation method as well as waveform and travel-time inversion techniques for 3-D structures have to be developed.