

Large-scale Seismic Response Analysis of Structure Using Solid Finite Element Method

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The buildings must have an enough performance against the earthquake. Especially, important structure such as nuclear power buildings must be designed prudently and requires accurate assessment. To estimate the behavior of structures during earthquakes, the dynamic soil-structure interaction should be considered.

The accurate evaluation of seismic response of soil-structure by numerical simulation with high-fidelity model requires high resolution to both spatial and temporal domain. Numerical simulation with high resolution needs significant amount of computational time and memory usage. The development of parallel computer architecture and fast network system in recent years has dramatically been realizing the large-scale simulations. Numerical analysis will be a substitute, if it is able to evaluate damage.

In this presentation, we report large-scale seismic response analysis using solid finite element method for soil-structure interaction problem. For the problem of the seismic structure analysis, we implemented several numerical techniques to reduce the computational cost with parallel computing into the solid finite element code which is able to solve high fidelity model of a structure subjected to the ground motion.

Keywords: Seismic response analysis, Solid FEM, High performance computing, Soil-structure interaction.