UTILIZATION OF SUPER COMPUTER SIMULATION FOR EARTHQUAKE DISASTER MITIGIATION AND REDUCTION - TOWARDS TOKYO METROPOLIS SIMULATION USING MeSO-net -

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ABSTRACT :

The utilization of super computer simulation or High Performance Computing (HPC) that modern parallel computers have realized is a challenge to researchers in many fields of science and engineering. As for earthquake engineering, seamless simulation of all phases of earthquake hazard and disaster is a target of HPC, since it analyzes a whole urban area. Such seamless simulation could be an alternative of the present earthquake hazard and disaster estimation that uses empirical relations for ground motion and structure damages. We believe that the simulation-based estimation of earthquake hazard and disaster will be more scientifically rational, by increasing the quality of the seamless simulation results.

Integrated Earthquake Simulation (IES) is being developed as a candidate of the seamless simulation that takes advantage of HPC. At this moment, IES combines ground motion simulation, structural seismic response simulation, and mass evacuation simulations, by automatically constructing a specific urban area model for each simulation. Several examples are presented in this presentation. One example is Tokyo Metropolis simulation, in which more than 1,000,000 models are analyzed for buildings located there.

While HPS is a powerful tool for earthquake hazard and disaster estimation, we should not underestimate the quality of data that are input to the simulation for the estimation. This is because the quality of the simulation results are determined by the quality of the analysis method employed as well as the quality of the input data. Metropolitan Seismic Observation network (MeSO-net), a highly-dense seismic network installed in Tokyo, is able to provide information of highest reliability, about the ground motion distribution and the underground structure in Tokyo Metropolis. A research project which engages researchers of earthquake engineering, computational science, and data assimilation to MeSO-net, is being carried out. Current achievement of this project are explained in the presentation. It is expected that more reliable estimation of earthquake hazard and disaster will be made for a next large earthquake in Tokyo Metropolis, by utilizing HPC-based IES and MeSO-net information.