Tsunami Simulation using the Smoothed-Particle Hydrodynamics Method with High Performance Computer

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ABSTRACT

We have developed a tsunami simulator integrating a 3-D fluid simulation technology that runs on large-scale parallel computers using smoothed-particle hydrodynamics (SPH) method, together with a 2-D tsunami propagation simulation technique using a nonlinear shallow water wave model.

We use the 2-D simulation to calculate tsunami propagation of scale of about 1000km from epicenter to near shore. The 3-D SPH method can be used to calculate the force that a tsunami can exert on a building, and to simulate flooding patterns in urban area of at most km scale. With our simulator we can see three dimensional fluid feature such as complex changes a tsunami undergoes as it interacts with coastal topography or structures.

The authors utilize the simulator in the third of five fields of the Strategic Programs for Innovative Research, "Advanced Prediction Researches for Natural Disaster Prevention and Reduction," for the theme "Improvement of the tsunami forecasting system on the HPCI computer." We are going to apply it to a real problem of the disaster prevention in future.

Example of tsunami simulation with our method

REFERENCES
