Modeling and Simulation of Tsunami Using Virtual Reality Technology

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ABSTRACT

Tsunami kill many human beings and damages economic activities seriously, such as tsunami caused by the Great East Japan Earthquake in 2011. It is very important to develop useful modelling and simulation methods for tsunami waves in order to perform the planning and design for the community development and the prevention of disaster. The visualization is also important to understand the power of tsunami and to improve the consciousness of disaster prevention. Recently, the visualization using the virtual reality (VR) technology is becoming more popular for three dimensional numerical simulations [1].

In this presentation, the modelling, simulation and visualization methods are presented for tsunami waves. The stabilized finite element methods are employed for 2D and 3D tsunami simulations based on the shallow water equation [2], Boussinesq equation and Navier-Stokes equation. In order to realize an efficient tsunami simulation, a combination method using 2D and 3D models is presented. We also propose a visualization system linked to the evacuation simulation using virtual reality technology [3] to understand the power of tsunami and the importance of the evacuation. The present modelling, simulation and visualization methods are shown to be useful tools to realize the high quality computing for large scale tsunami simulation.

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