

## Modeling and Simulation of Tsunami Waves

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Tsunami disaster occur oftenly in the various parts of the world such as Smatora Island in 2004 and East Japan in 2011. Tsunami kills many human beings and damages economic activities seriously. It is very important to develop useful modeling and simulation methods for Tsunami waves in order to perform the planning and design for the community development and the prevention of disaster. The shallow water equation and the Boussinesq equation are effective mathematical models for practical computer simulation for Tsunami waves.

We propose stabilized finite element methods based on SUPG [1] and CIVA/SUPG for both shallow water equation and Boussinesq equation. The fluid force is evaluated by the numerical results and the effect of collapse of building is considered. The evacuation analysis is performed to predict the damage to human living. We also propose a pre- and post-processing system based on virtual reality technique to make the overall computational tool set a high-quality simulation environment.

### References

[1] S. Takase, S., K. Kashiya, S. Tanaka and T. E. Tezduyar: Space-time SUPG formulation of the shallow-water equations, Int. J. Numer. Meth. Fluids, Vol.64, pp.1379-1394, 2010.