

Structural Collapse Analysis of a Steel Building Subjected under Seismic Excitation, Tsunami Force, and Debris Collision

***Kyohei Kuroda¹, Yuan Qi Dong¹, and Daigoro Isobe²**

¹Graduate School, University of Tsukuba, 1-1-1 Tennodai, Tsukuba-shi, Ibaraki 305-8573, Japan

²Division of Engineering Mechanics and Energy, Faculty of Engineering Information and Systems, University of Tsukuba, 1-1-1 Tennodai, Tsukuba-shi, Ibaraki 305-8573, Japan

*Corresponding author: s1320923@u.tsukuba.ac.jp

The Great East Japan Earthquake and the following tsunami which occurred on the 11th of March, 2011, caused a big disaster along the ocean-side of Tohoku area. The big tsunami carried different kinds of debris such as ships and cars up the stream, which caused additional damages to the buildings in the area. In this study, a structural collapse analysis of a steel building is performed using a finite element code based upon the ASI-Gauss technique. A seismic excitation recorded in Kesenuma-shi is first applied to the steel building model, followed by an input of the fluid force and buoyant force due to tsunami wave. At the last phase of the analysis, debris model with a velocity is collided and the collapse behavior of the building is investigated. The damages produced by the tsunami and the collision of the debris are compared by changing the inundation height.

Keywords: Structural collapse analysis, Tsunami, Debris collision, ASI-Gauss technique