

Method of setting design tsunami water level and guidelines on tsunami inundation simulations

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(Key Words) *Design tsunami, coastal dike, tsunami inundation simulation*

1. Outline

Under the interim report of the Committee for Technical Investigation of Countermeasures for Earthquakes and Tsunamis Based on lessons learned from the 2011 off the Pacific Coast of Tohoku Earthquake of the Central Disaster Management Council (June 26, 2011), the provision of coastal protection facilities to deal with a constant tsunami height which occurs relatively frequently will continue, and, by hypothesizing the top class tsunami, comprehensive countermeasures including all feasible methods, both structural and non-structural, will be taken. Regarding the former, ministries related to coastal protection has enacted a method of setting the water level for the design tsunami of coastal dikes. Regarding the latter, the Coast Division has, cooperatively with the Sea Coast Office of the Water and Disaster Management Bureau, Ministry of Land, Infrastructure, Transport and Tourism, prepared the guidelines on tsunami inundation simulations for tsunami countermeasures based on the 2011 off the Pacific Coast of Tohoku Earthquake. Prefectures were informed of both on July 8, 2011.

2. Method of setting design tsunami water level

The design tsunami, which is needed to provide coastal conservation facilities such as coastal dikes, is basically set for each region's coastline (dividing a coastal region into coherent coastlines considering natural conditions such as the shapes of bays, the distribution of coastal cliffs, etc.).

The water level of the design tsunami is set by the following procedure.

- The actual heights of past tsunami are organized.
- When it is not possible to obtain adequate data concerning actual tsunami heights, the tsunami height is calculated by a simulation.
- A graph is prepared plotting the year of the tsunami on the axis of abscissas and the tsunami height along the coastline on the axis of ordinates. The aggregation of tsunami hypothesized to arrive at a frequency of once in a few decades up to between 100 and 200 years is selected as the object tsunami group for the design tsunami water level

setting.

- By performing a simulation of tsunami in the object tsunami group on the condition that tsunami intrusion is prevented at the locations of dikes on the region's coastline, the tsunami water level distribution along the region's coastline is calculated to set the water level of the design tsunami.

3. Guidelines on tsunami inundation simulations

The guidelines present a standard method of performing fast and suitable tsunami inundation simulations in order to support the enactment of reconstruction and recovery plans for disaster regions.

The following are the major items in the guidelines.

- The object earthquake fault model is basically set by revising the optimum fault model from the perspective of tsunami (model verified as suitable over a wide area) so that it complies with the trace values along each region's coast.
- Topographical data are basically prepared based on high precision data obtained by a laser profiler after the Great East Japan Earthquake.
- A prediction simulation basically considers damage to structures caused by the earthquake motion and tsunami.
- In order to understand the run up of tsunami on the land, the plane distribution of maximum inundation depth etc. and the cross-shore distribution of the maximum water level on a typical section are output as the results of the simulation.

[Reference]

Guidelines on tsunami inundation simulations for tsunami countermeasures based on the 2011 off the Pacific Coast of Tohoku Earthquake.
<http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya110711.pdf>