Disaster prevention

Development and installation of new type of river and tsunami embankment that withstands various forces, and evaluation of evacuation action under actual flood conditions

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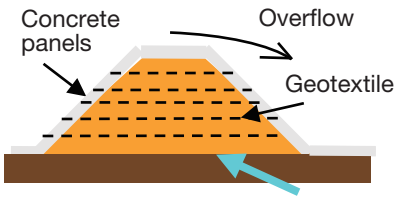
Purpose of Research

There is great concern about huge damage due to flood and debris flow caused by storms and tsunami compounded with earthquakes, all over the world. It is necessary to replace disaster prevention measures with disaster mitigation measures, but fundamental technology for disaster mitigation has not been sufficiently established. The present study aims to develop hardware and software measures of disaster mitigation which can deal with huge floods and compound disasters, and minimize the risks to life and property caused by flood and tsunami.

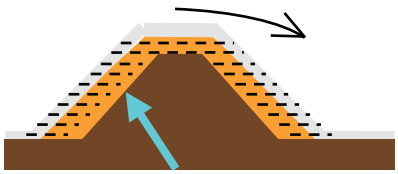
Summary of Research

One of the world's largest flow flumes

A new type (GRS) of river levee



<Full reinforcement>



Existing cross section

<Partial reinforcement>

Hardware Measures

Development and installation of new type of river and tsunami embankment that withstands overflow erosion of huge floods

Connecting many geotextile layers to concrete panels covering the embankment increases resistance against overflow erosion and earthquakes. A new type low-cost embankment effectively blocks huge floods with a steep slope and a small cross-section. Our laboratory recently built one of the world's largest wave testing channels (left photograph) in addition to a large wave maker for tsunami testing. Using this and a small flume, we conduct model tests to develop new types of levees that will actually protect against disasters.

Software Measures

Evaluation of evacuation action under actual flood conditions

To evaluate property of evacuation activities after floods and landslides, we conducted tests of flood evacuation, recreating flood conditions using the large-scale channel. Based on these experimental results, we developed models of flood evacuation that will save lives in an actual flood disaster.

Points

- **Embankments made with very earthquake-proof geosynthetic reinforced soil (GRS) and integrated with concrete covering the embankment, greatly increases resistance to flow erosion**
- **Embankments reinforced and made erosion resistant with a small cross-section at low cost**
- **Structure adapted to specific conditions (partial reinforcement, etc.)**

■Laboratory Apparatus:
Large-scale open channel
(length: 20 m, width: 10 m, height: 1.8 m)
Small open channel
(length: 4.0 m, width: 0.2 m, height: 0.4 m)
Two-dimensional wave flume with tsunami maker
(length: 36 m, width: 1.0 m, height: 1.2 m)

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