E09

Routing Debris Flow with Limestone

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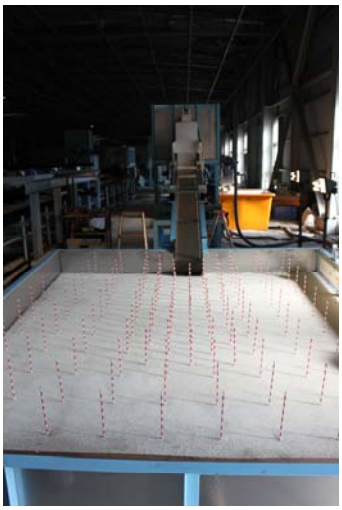
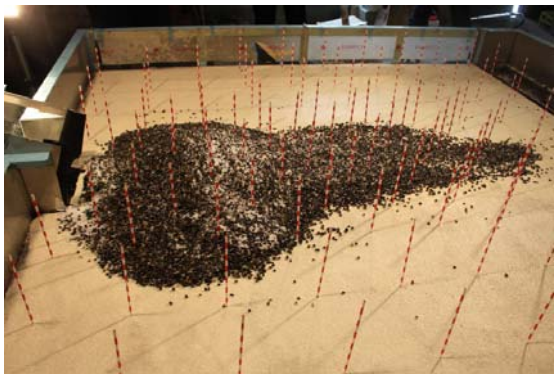
Debris flows are very to extremely rapid flows of saturated granular soils. Two main types of debris flow are generally recognized: Open slope debris flows and channelized debris flows. Debris flows are also known as one of the most dangerous mass wasting events. It is extremely destructive to life and property. They can occur suddenly and inundate entire towns in a matter of minutes. Debris flows can take place rapidly that there is really no way to be alerted and evacuate before disaster strikes. In the recent decade, several debris flow events have occurred and caused hundreds of deaths, missing or injured people and damaged many facilities. Consequently, there is a strong need to devise a method to evaluate the possible debris flow hazard areas.

To prevent and mitigate disaster effectively, it is necessary to understand the triggering factors that initiate the occurrence of debris flow. To comprehend precisely this problem, a physical setup of a debris flow model was carried out at Ujigawa Open Laboratory. The physical model apparatus is composed of three main components: a flume open channel which is inclined on the solid bottom plane ranging between 0° and 45°, a deposition area which can be adjusted within 0° to 7° and water intake box. To understand the particle segregation and movement mechanism of the limestone grain (2.5 mm and 6 mm) flow, a high-speed video camera (HSVC) is used to capture a video footage during short intervals of 0-9s. Besides using HSVC, video recordings of the tests were performed to analyze debris flow characteristics. Figure 1(a) and (b) shows the full scale physical model and the example of the limestone deposition.

This paper presents and discusses about the routing of limestone grains at two different slope angles which are 18° (mild) and 25° (steep). Results of the deposition patterns for each case will be discussed. Furthermore, more precise and reliable estimation of debris flow characteristics and deposition patterns can be made, therefore can help prevent lost of life, infrastructure and property damage.



1(a)



1(b)

Figure 1: (a) Full scale of the debris flow physical model (b) the example of the limestone deposition.