Summary

PHYSICAL AND NUMERICAL MODELLING OF SUBMARINE LANDSLIDES

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Due to ever increasing human activity in coastal or offshore area, submarine landslides have attracted increasing attentions. Submarine landslides have significant impacts on offshore and coastal facilities. The unique characteristics of submarine landslides involves large mass movements and long travel distances on very gentle slopes. This is due to ambient water involved during submarine landslides caused the significantly lower shear strength compared to the onshore cases. This dissertation is concerned with investigating a strength relationship suitable in a wide range of soil water content, and several strength tests were carried out, including the fall cone test, the cam-shear test, and the viscometer test. In addition, to observe how the slide flow behaviour changes at a variety of water contents, a series of tests were conducted including 1g and centrifuge tests of submarine landslide flows. The model slopes were instrumented with miniature sensors for measurements of pore pressures at different locations beneath the landslide flow, and a series of digital cameras were used to capture the landslide flow in flight. Based on data from this physical modelling, an analytical model to predict run-out distance is presented. Numerical studies were also carried out in order to compare the results obtained with the data from physical modelling. The 1D Finite Element Method (FEM) is used in the numerical simulations to deal with large scale submarine landslide, and the performance of the developed code is evaluated by comparison with the 1g test results.