

### [CFD Modelling of Breaching-generated Turbidity Currents]

#### Introduction

A flow slide occurs when a large, subaqueous soil mass is destabilized and accelerates down slope, then eventually redeposits as a milder slope. This phenomenon poses severe risk for subaqueous structures and flood defenses along coastlines and riverbanks, which is able to undermine an entire hydraulic structure, resulting in significant unwanted consequences.

Breaching is a gradual, retrogressive failure of a steep subaqueous slope, greater than the angle of repose. This type of failure usually takes place in densely-packed sand due to its dilative behaviour under shear. Breaching flow slides are accompanied by the generation of turbidity currents. This current is driven by excess density versus the ambient fluid; it may increase erosion of the sand surface, picking up more sediment into suspension, thereby increasing speed and erosion potential.

Measurements of breaching-generated turbidity currents are substantial for understanding the interaction between the turbidity current and the slope surface as well as for the validation of numerical models. Therefore, laboratory experiments are being conducted in TU-Delft water lab (see the figure below).



Figure 1: The experiment in progress

#### Aim

To investigate the breaching-generated turbidity current.

#### Work

The MSc student will carry out numerical simulations with a 3D computational fluid dynamics (CFD) model, where the turbulent behaviour is captured by large eddy simulation (LES). The numerical results will be validated with the new laboratory measurements.

#### Supervisors:

Dr. ir. Robert Jan Labeur

Ir. Said Alhaddad

#### More information:

Said Alhaddad, E: S.M.S.Alhaddad@tudelft.nl, office: 2.92.1 (CiTG).