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Impulse water wave generation by a snow avalanche: Two shallow layers model

Mohamed Naaim
ETGR, IRSTEA, Saint-Martin d'Hères, France

If an avalanche enters a natural or manmade lake located close to inhabited area, the estimation of the consequences in terms of wave magnitude is required. Because the ratio of the density of snow to the density of the water is very low, the extrapolation of available scaling laws, established for landslides and debris flows, may lead to an over estimation of the wave magnitude. In this study, 3D CFD multiphase simulations and a two layers model (shallow equation for the slide and Serre equations for the water) simulations are conducted and their results compared to available experimental data issued from the literature. The evolution of the amplitude of the wave as a functions of the density ratio is studied using the two models and the prediction ability and the validity domain of each model are analyzed.