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Numerical Modelling of Landslide-Generated Waves

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Landslides are one of the most dangerous natural hazards and each year they cause hundreds of casualties and millions of euros in damages worldwide. Landslides effects are even more critical when they trigger other natural hazards, such as tsunami waves in water reservoirs. Improving the current forecasting capabilities against these major natural hazards would help to reduce their catastrophic effects.

This talk aims to present the last advancements on the application of the Particle Finite Element Method (PFEM) [1] to the numerical simulation of this complex multi-hazard scenario. Specifically, the computational method will be used to predict landslide runout, impact on water reservoir, generation and propagation of waves in the water basin, and final runup. Thanks to the Lagrangian nature of the method, the PFEM is capable to track accurately the highly deforming shape of the landslide and water surface. Depending on the nature of the triggered material, different constitutive models are used to model the landslide runout [2].

The accuracy of the numerical predictions will be tested against large-scale laboratory tests and other numerical results in the literature. Particular attention will be devoted to analyzing the Vajont disaster [2, 3], which has been analyzed with a three-dimensional model. Preliminary results of a coupled PFEM-shallow water model will be also presented.

REFERENCES

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