

WCSPH for modelling multiphase flows and natural hazards

Among the meshless particle methods, SPH is successfully applied to simulate complex multiphase flows with impact involving fluids with high-density ratio [1] as well as landslide-water interactions [2], [3].

These problems are of great concern in the field of hydraulic engineering dealing with water related natural hazards, such as landslide induced tsunami in artificial reservoir, intense rainfall induced shallow landslides.

This contribution aims at providing an overview on the recent applications of the standard weakly compressible SPH approach for modelling these kinds of multiphase flows, including validation of FOSS code SPHERA [4].

The relevant aspects related with interface treatment and numerical instability in high density multiphase flow will be discussed. Advanced modelling aspects connected with the SPH simulation of non-Newtonian fast dense granular flows and the interaction with pore water and stored water will be illustrated. The problem of tuning the physical parameters is also discussed.

References

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- [3] S. Manenti, S. Sibilla, M. Gallati, G. Agate, R. Guandalini. SPH Simulation of Sediment Flushing Induced by a Rapid Water Flow. *J. of Hydr. Eng.* 2012, Vol. 138, No. 3, pp. 272-284, March 1 (2012) ISSN 0733-9429/2012/3-0-0 DOI:10.1061/(ASCE)HY.1943-7900.0000516
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