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Influence of VOF technique, turbulence model and discretization scheme on the numerical simulation of the non-aerated, skimming flow in stepped spillways

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Abstract

An accurate description of the hydrodynamics in the non-aerated region of the skimming flow on stepped spillways is of outmost importance, particularly in small structures at large discharges. In addition, the flow features upstream of the inception point of air entrainment determine the flow behavior in the downstream self-aerated region. In this work, numerical models of the flow in the non-aerated region of stepped spillways have been developed using diverse turbulence closures and discretization schemes implemented in two CFD codes: *OpenFOAM* and *FLOW-3D*[®]. Partial VOF (Volume of Fluid) and “True” VOF (*TruVOF*) approaches are employed to capture the position of the free surface. The Standard, RNG and Realizable k - ϵ , in addition to the SST k - ω

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