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# Swash oscillation with highly nonlinear Boussinesq model for breaking waves

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In order to model the wave motion and, in turn, the flow, within the nearshore region, in the last decades the derivation and the application of *Boussinesq* type of models have been widely investigated and developed. However, in the framework of such depth integrated numerical models, the problems of modeling wave breaking and moving onshore boundary at the shoreline are not trivial and several approaches have been proposed to overcome these limits. With regard to the second problem, i.e. the shoreline boundary condition, several numerical techniques have been adopted, such as the porous beach method, also known as slot method ([4],[2]), or the extrapolating method proposed by [3]. In the present work an effort toward a more physical based model of the surf and the swash zone has been accomplished. In particular, starting from the work of [5], a new model of the shoreline boundary condition has been implemented. This kind of approach implies a more physically based description of the motion and therefore allows for a great flexibility of treating complex morphology of the beach profile to be faced. The shoreline boundary condition is developed with a fixed grid method with a wet-dry interface. In order to resolve the problems due to the numerical scheme during the onshore movement of the shoreline, a linear extrapolation [3] near the wet-dry boundary has been used and coupled with the shoreline equations [6]. Such a coupling has been introduced in order to guarantee a more physical behavior. To validate the model a classical test which adopts a monochromatic wave train over a plane beach has been performed. In particular the analytical solution derived by [1]

has been used for comparison. The comparison between the analytical and numerical horizontal shoreline movements, gives a fairly good agreement. Other tests on breaking of solitary, regular and irregular has been performed. The Solitary wave run-up is investigated by comparison with the experimental tests by [8].The results are in perfect agreement with the experimental data.The long wave motions induced by wave groups is investigated by comparing the numerical results with the experimental data of [7].

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