# On some finite volume schemes applied to nonlinear dispersive wave equations

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The complete water wave problem remains a difficult task despite recent progresses in this field. Its intrinsic complexity and stiffness prevent from efficient simulations in complex and large domains. Consequently, a number of approximative models have been proposed. In the present work we consider weakly nonlinear/weakly dispersive wave regime which is modelled by the family of Boussinesq type equations [1]. In the present study we apply some finite volume schemes to these models.

Our numerical schemes are tested on various practical problems [2]. First, we consider some classical questions of soliton dynamics: solitary wave propagation, conservation of invariants, interactions, dispersive shock formation. A comparison with experiments on solitons head-on collision is also performed.

Finally, special attention is given to the run-up of long waves on a plane beach. We modify Peregrine's [1] system to derive a new nonlinear and dispersive system appropriate for the study of long wave runup. Validation by experimental data is presented for the run-up of non-breaking and breaking solitary waves on a plane beach. Some applications to tsunami wave modelling are also discussed.

## References

[1] PEREGRINE, D. H. 1967. Long waves on a beach, *J. Fluid Mech.*, **27**, 815–827.

[2] DUTYKH, D., KATSAOUNIS, TH. & MITSOTAKIS, D. 2010. On some finite volume schemes applied to nonlinear dispersive wave equations for the study of solitary waves and the runup of long waves in 1D, *to appear*.