AN EFFICIENT NON-HYDROSTATIC APPROACH FOR DISPERSIVE WATER WAVES

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Abstract. We propose to study non-hydrostatic shallow water type systems. Usually, a layer averaged model is introduced that includes dispersive effects via a non-hydostatic pressure term. This type of models may be generalized by using a multilayer approach. Here we propose first to study a one layer depth-integrated non-hydrostatic system. An efficient numerical scheme will be proposed in order to solve such system.

In order to improve the dispersion relations of the system, a generalization will be proposed based on a two-layer system including three free parameters: two of them related to the representation of the pressure at the interface and a third one that controls the relative position of the interface with respect to the total height. These parameters are then optimized in order to improve the dispersive properties of the resulting system. The optimized model shows good linear wave characteristics up to $kH \approx 10$, that can be improved for long waves.

Keywords: Shallow water equations, non-hydrostatic, dispersive equations

References

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