

A shallow water model for roof modeling in free surface flow

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This work is devoted to the modeling and the numerical resolution of a shallow water model with a supplementary congestion constraint describing a roof, see [1]. For example, the model can be applied to flows under the ice floe or the production of sustainable energy from wave power using buoys.

The model is derived from the Navier-Stokes equations and to overcome the difficulty of taking into account the congestion constraint numerically, a pseudo-compressibility relaxation is used. Eventually, a numerical scheme based on a Finite Volume method is proposed. In spite of the large celerity of the potential waves, the well-balanced property and the dissipation of mechanical energy, acting as a mathematical entropy are ensured under a non-restrictive CFL condition.

Simulations in one dimension for transcritical steady flow are carried out and numerical solutions are compared to several analytical solutions (stationary and non-stationary) for validation.

Références

- [1] E. GODLEWSKI, M. PARISOT, J. SAINTE-MARIE, AND F. WAHL, *Congested shallow water type model: roof modelling in free surface flow*, working paper or preprint, September 2016.

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