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General boundary conditions for a dispersive Boussinesq-type wave model with varying topography

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Nonlinear and dispersive effects play an important role in the transformation of water waves as they propagate towards the shore. This makes the Boussinesq-Abbott model a pertinent choice to study wave fields in natural coastal environments. However the presence of high order derivatives impedes the good handling of boundary conditions, which is crucial if one wishes to generate and evacuate waves from the computational domain. In order to raise this difficulty, an equivalent reformulation of this model has recently been proposed in the literature for the case of a flat bottom. This rewriting consists to get rid of the dispersive operator in exchange of a nonlocal flux and a dispersive boundary layer, and allows to efficiently prescribe the elevation of the free surface at the borders of the domain.
The goal of this work is to extend this approach to the case of a varying bottom, while allowing to enforce more general boundary conditions. Once the nonlocal formulation of the model is established, numerical schemes of order 1 and 2 are proposed and validated through numerical experiments. The impact of different boundary conditions on the solutions is also investigated.

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