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Generating a soliton splash through variational modelling and experiments ANNA KALOGIROU, ONNO BOKHOVE, University of Leeds — Mathematical modelling of water waves in tanks with wave generators is demonstrated by investigating variational methods asymptotically and numerically. A reduced potential flow water wave model is derived using variational techniques, which is based on the assumptions of waves with small amplitude and large wavelength. This model consists of a set of modified Benney-Luke equations describing the deviation from the still water surface $\eta(x, y, t)$ and the bottom potential $\Phi(x, y, t)$, and includes a time-dependent gravitional potential mimicking a removable "sluice gate". The asymptotic model is solved numerically using the automated system Firedrake. In particular, a (dis)continuous Galerkin finite element method is used, together with symplectic integrators for the time discretisation. As a validation, the numerical results are compared to a soliton splash experiment in a long water channel with a contraction at its end, resulting after a sluice gate is removed at a finite time.

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