We consider the classical algorithm in Clawpack with the minmod TVD limiter and solve the shallow water equations:

$$\partial_t h + \partial_x(hv_x) + \partial_y(hv_y) = 0, \tag{1a}$$

$$\partial_t(hv_x) + \partial_x(hv_x^2 + \frac{1}{2}gh^2) + \partial_y(hv_xv_y) = -gh\partial_x b, \tag{1b}$$

$$\partial_t(hv_y) + \partial_x(hv_xv_y) + \partial_y(hv_y^2 + \frac{1}{2}gh^2) = -gh\partial_y b, \tag{1c}$$

where $h$ is the water height, $hv = (hv_x, hv_y)$ the momentum, and

$$b(x,y) = \frac{1}{4} - \frac{1}{4}\sin(2\pi y) \tag{2}$$

is the variable bathymetry. The domain is given by $\Omega = [0, 100] \times [-0.5, 0.5]$.

## Generation of diffractons

To generate a diffracton we start with the following initial condition:

$$h(x,y) + b(x,y) = \frac{3}{4} + 0.05\exp\left(-\frac{x^2}{4}\right), \qquad hu(x,y) = hv(x,y) = 0$$

and impose solid wall boundary conditions at the left, bottom and top boundaries. The right boundary is set to outflow. At $t = 25$, we change the left and right boundaries to periodic boundary conditions. We compute the solution up to $t = 340$. The solution is a train of diffractons, we consider the largest one. To produce the diffracton, proceed as follows:

- **Generation of the diffracton.** Run create_diffracton/run_sw_eqns.py, which solves (**??**) up to a final time $t = 340$. The resolution is given by $\Delta x = \Delta y = 1/512$.
- **Isolation of the diffracton.** Inside cut_diffracton, create a folder called _output and copy create_diffracton/_output/*0340* to the newly created folder. Finally, run cut_diffracton/cut.py. The isolated diffracton will be placed in cut_diffracton/_output_cut_wave. The diffracton is isolated based on the water elevation $h + b$. We locate the peak of the wave and move to the left and right until $h + b - \eta^*$ is smaller than $10^{-12}$. Here $\eta^* = 0.75$ is the mean water level.
- Run cut_diffracton/export_diffracton.py to generate an h5 file with the isolated diffracton.

After following these steps, the data (in a h5 file) will be placed in cut_diffracton/. We place the diffracton in a smaller domain given by $\Omega = [0, 20]$. We use this diffracton as the initial condition for the pseudospectral simulations in the manuscript.

## Measurement of the speed of diffractons

We need to estimate the speed of the diffracton. We do that using $\Delta x = \Delta y = 1/512$ and run the simulations in the modified version of Clawpack in `https://github.com/manuel-quezada/pyclaw/tree/compute_L1_error_wrt_init_cond`. We proceed as follows:

- Inside propagate_cut_diffracton, create a folder called _output_refn0 and copy cut_diffracton/_output_small_domain/*refn0* into it.
- Change the name of the copied files from 'init_refn0...' to 'claw...'.
- Run propagate_cut_diffracton/prop_diffracton.py. Doing so will create a file called 'file.csv'.
- Run propagate_cut_diffracton/measure_speed.py to estimate the speed of the diffracton.