continuum mechanics  $\rightarrow$  standing waves

## **Shore Waves**

Consider waves near the shore of some beach, where the height of the ocean, which extends for  $x \ge 0$  is approximately given by



You can neglect dynamics in the direction perpendicular to the shore.

(a) Show that the normal modes of the system are

$$\zeta(x,t) \sim \mathcal{J}_0\left(2\omega\sqrt{\frac{x}{g\kappa}}\right) \mathrm{e}^{-\mathrm{i}\omega t}.$$

(b) Sketch these solutions for large and small x (relative to what?).

Now, consider a triangular river of width 2a and depth d as sketched below:



- (c) Determine an expression for the normal modes and their associated frequencies.
- (d) Sketch the normal modes for the lowest 2 (nontrivial) eigenfrequencies.