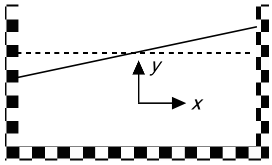
Solution:



In the coordinate system of the figure, we have for the centre of mass coordinates of the two triangular parts of the water

$$(x_1, y_1) = (L/3, h/2 + \xi/3) \quad (x_2, y_2) = (-L/3, h/2 - \xi/3).$$

For the entire water mass the centre of mass coordinates will then be

$$(x_{CoM}, y_{CoM}) = \left(\frac{\xi L}{6h}, \frac{\xi^2}{6h}\right)$$

Due to that the y component is quadratic in ξ will be much much smaller than the x component.

The velocities of the water mass are

$$(v_x, v_y) = \left(\frac{\dot{\xi} L}{6h}, \frac{\dot{\xi}\xi}{3h}\right),$$

and again the vertical component is much smaller the the horizontal one.

We now in our model neglect the vertical components. The total energy (kinetic + potential) will then be

$$W = W_K + W_P = \tfrac{1}{2} M \frac{\dot{\xi}^2 L^2}{36h^2} + Mg\frac{\xi^2}{6h^2}$$

For a harmonic oscillator we have

$$W = W_K + W_P = \tfrac{1}{2} m\dot{x}^2 + \tfrac{1}{2} m\omega^2 x^2$$

Identifying gives

$$\omega = \sqrt{\frac{12gh}{L}} \text{ or } T_{model} = \frac{\pi L}{\sqrt{3h}}.$$

Comparing with the experimental data we find $T_{experiment} \approx 1.1 \cdot T_{model}$, our model gives a slight underestimation of the oscillation period.

Applying our corrected model on the Vättern data we have that the oscillation period of the seiching is about 3 hours.

Many other models are possible and give equivalent results.