Water at 20°C flows in a 30 cm wide rectangular channel at a depth of 10 cm and a flowrate of $80,000 \text{ cm}^3/\text{s}$. Estimate (a) the Froude number and (b) the Reynolds number. Answer:

Anggap $\rho_{water} = 1000 \ kg/m^3$, $\mu = 0.001 \ kg/m \cdot s$, flowrate = 0.08 m³/s



EXAMPLE #03

An earthquake near the Kenai peninsula, Alaska, creates a single "tidal" wave called tsunami that propagates southward across the Pacific Ocean. If the average ocean depth is 4 km and seawater density is 1025 kg/m3, estimate the time of arrival of this tsunami in Hilo, Hawaii.

EXAMPLE #04

A rectangular channel is 2 m wide and contains water 3 m deep. If the slope is 0.85° and the lining is corrugated metal, estimate the discharge for uniform flow. Answer:



Roughness : corrugated metal , n = 0.022

The trapezoidal channel as shown below is made of brickwork and slopes at 1:500.

1. Determine the flowrate if the normal depth is 80 cm.

2. Determine the normal depth for which the flowrate will be 8 m3/s.

3. Let the surface be clean earth, which erodes if V exceeds 1.5 m/s. What is the maximum depth to avoid erosion?



EXAMPLE #06

Consider the flow under the sluice gate. If $y_1=10$ ft and all losses are neglected except the dissipation in the jump, calculate y2 and y3 and the percentage of dissipation, and sketch the flow to scale with the EGL included. The channel is horizontal and wide.



Water 30cm deep is in uniform flow down a 1° unfinished concrete slope when a hydraulic jump occurs. If the channel is very wide, estimate the water depth y2 downstream of the jump.



EXAMPLE #08

Water in horizontal channel accelerates smoothly over a bump and then undergoes a hydraulic jump. If $y_1 = 1$ m and $y_3 = 40$ cm, estimate (a) V_1 , (b) V_3 , (c) y_4 and (d) the bump height, *h*.



A 10 cm high bump in a wide horizontal water channel creates a hydraulic jump just upstream. Neglecting losses except in the jump, for case $y_3 = 30$ cm, estimate (a) V_4 , (b) y_4 , (c) V_1 and (d) y_1 .



EXAMPLE #10

Figure shows a horizontal flow of water through a sluice gate, a hydraulic jump, and over 6 ft sharp crested weir. Channel, gate, jump and weir are all 8 ft wide unfinished concrete. Determine (a) the flow rate, (b) the normal depth, (c) y_2 , (d) y_3 and (e) y_4 .

