

INTRODUCTION TO COASTAL HYDRAULICS

HOMEWORK 2

Question 1

A wave with a period of $T=8$ sec is propagating from deep water into shallow water. The bottom contours are essentially straight and parallel to the shoreline. Wave approaches the shore with an angle of $\alpha_0=40^\circ$ in deep water. Calculate the wave incident angle at a depth of 8 m.

Question 2

A wave with a period of 8 s propagates toward the shore from deep water. The wave crests in deep water are oriented at an angle of 45° with the shoreline. Wave height is 4 m at water depth of 20 m. Calculate deep water wave height.

Question 3

A wave having a height of 3 m and a period of 8 s is propagating toward the shore over a water depth of 30 m. The same wave has an angle of $\alpha_0=60^\circ$ with shoreline in deep water. Calculate wave parameters in water 10 m deep (H_{10} , L_{10} , α_{10} , $c_{10}=?$).

Question 4

A wave in deep water has the following characteristics: $H_0=4$ m, $T=10$ sec (Bathymetry lines are straight and parallel to the shoreline). Calculate breaking wave height, breaking depth and breaking type for the sea bottom slope of $1/20$.

Question 5

A wave with a period of $T=8$ sec and a height of $H=3$ m propagates from deep water into shallow water. (Bathymetry lines are straight and parallel to the shoreline, $s=m=1/50$). If the wave incident angle is:

- a) $\alpha=30^\circ$
- b) $\alpha=45^\circ$

Determine the breaking wave height, breaking depth and breaking type.

Question 6

A wave having a period of 9 s breaks with an approaching angle of 20° and a height of $H_b=4$ m. Determine the breaking depth and the deep water wave height ($s=m=0.03$).

Question 7

A wave with a period of 8 s and a height of 4 m propagates toward the shore from deep water. The wave crests in deep water are oriented at an angle of 45° with the shoreline. Specific weight of the sea water is 10.20 kN/m^3 and the bottom slope is $1/30$.

Determine the deep water conditions and perform the shoaling calculations using GODA method. In these calculations, write the shoaling expressions and make the calculation by explaining the significant and maximum wave heights at -10m and then determine the significant and maximum wave heights for all depths with the help of "excel". Draw the change of wave heights with depth.