BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources, and Coastal Engineering, Term Final (Spring)
Examination 2025: Oct - Nov 2025

Student Group: Earned Credit Hours > 108

Subject: EWCE 471, Coastal Engineering

Time: 3.00 hours **Full Marks: 180**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question-1** in **Section-A** and **Question-5** in **Section-B** are compulsory.
c. Answer any other **TWO** out of the remaining **THREE** questions from each section.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** and **abbreviations** used have their usual meanings.

SECTION-A

Question 1 **(Compulsory)**

a. Define: (i) Coastal zone, (ii)Estuary and (iii) Tidal flats **09**

b. A wall is located at a depth of 5 m at sea. A wave of 2.5 m height is propagating towards the wall. The period of the wave is 9 sec. The reflection coefficient of the wall is 1.0. Calculate the magnitude of non-breaking total wave force and total moment on the wall. When, **21**
(i) Wave crest hit the wall
(ii) Wave trough hit the wall
(Necessary graphs are given in Figure 1-3.)

Question 2

a. Draw water particle displacements from mean position for shallow water and deep water waves according to the linear wave theory. Also, differentiate between the pattern of particle displacement of shallow and deep water. **10**

b. A wave with a period of 6 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 200 m to a depth of 2 m. Find the wave celerity and wave length at depth of 200 m, 30m and 2 m. **15**

c. Explain the necessity of study of wave transformation in the field of coastal engineering. **05**

Question 3

a. Briefly explain the characteristics of mixed esturine systems. **05**

b. A beach has slope of 1V:10H and a deep water wave was propagating towards the shore with a wave height of 2.5 m and a wave period of 9 sec. Estimate the breaking wave height and breaking depth. Also find the breaker type. **20**
(Relevant nomographs are given in Figure 4-5)

c. Explain the significance of wave set-up in coastal water rise. **05**

Question 4

a. Explain the pressure distribution for non-breaking wave when, **10**
i) wave crest hit the wall and (ii) wave trough hit the wall.

b. Consider a wave that has a height of 2 m in water 2.2 m deep (below the mean water level) as it is about to break. The nearshore bottom slope through the surf zone is 0.02. Find the set down at the breaker point and the setup at the still water line contour of the shore. Assume shallow water wave conditions throughout. **15**

c. Describe the conditions required for survival of the coral in their environment. **05**

SECTION-B

Question 5 **(Compulsory)**

a. Explain how coastal developments can affect coastal zone processes with examples. **05**

b. Waves having a wave height of 2.5 m break on a flat beach at a wave breaking angle of 5˚. The fall velocity of the sediment is 15 cm/sec. Calculate the potential volumetric longshore transport rate along the beach. **10**

c. The site and wave conditions along a coastal shore line are as below: **15**
Significant wave height = 3 m
Time period of approaching waves = 8 sec
Depth of water = 4 m
Stability coefficient = 2
Layer coefficient = 1
Slope, Ø = 1 in 1.5

Design the armor layer, crest level and the under layer of a rubblemound seawall using rough quarry stone for construction. Use the attached Figure 6 and assume the reasonable value of any data, if not given.

Question 6

a. Discuss the process of delta formation. **10**

b. Describe how gravel, sand, silt and clay are deposited into different layers when a river flows into a sea with necessary figures. **12**

c. List down the prevailing issues and challenges in the coastal zone of Bangladesh according to BDP 2100. Describe the strategies that should be taken to reduce these problems. **08**

.

Question 7

a. Discuss with a mathematical explanation that between the Sun and the Moon which one has greater influence on the tides of the Earth. **10**

b. Describe the non-harmonic constants used for the prediction of the tide. **10**

c. Explain with necessary figures: **10**
i. Priming and lagging of tide
ii. Spring and neap tide

Question 8

a. State the criteria for designing coastal groins and breakwaters in terms of their length, cross-section, height, orientation and layout. **10**

b. Discuss the reasons for the failure of coastal project elements and mention the failure modes relevant to rubble mound breakwaters with a figure. **10**

c. Write down five differences between ports and harbors. **10**

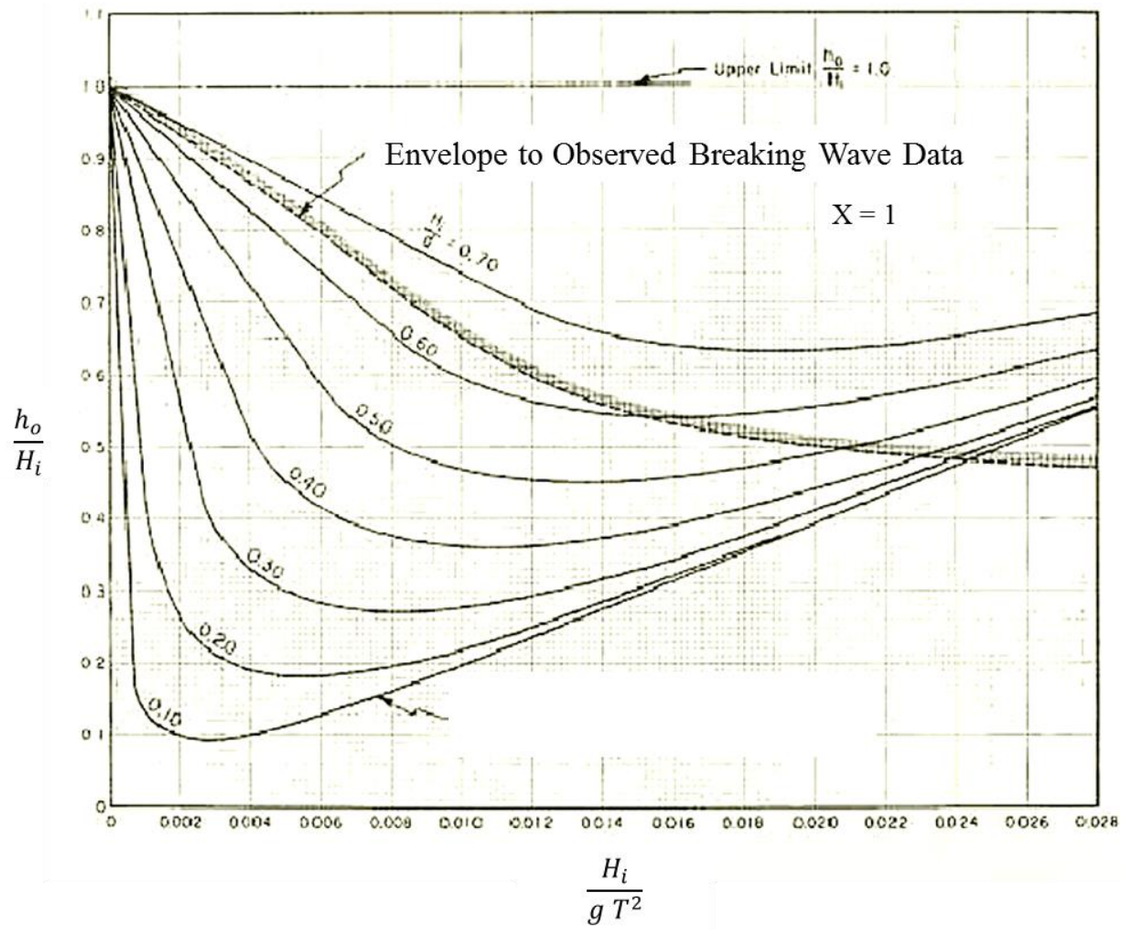


Figure 1: Nonbreaking waves; X = 1.0 (Figure for Question 1(b))

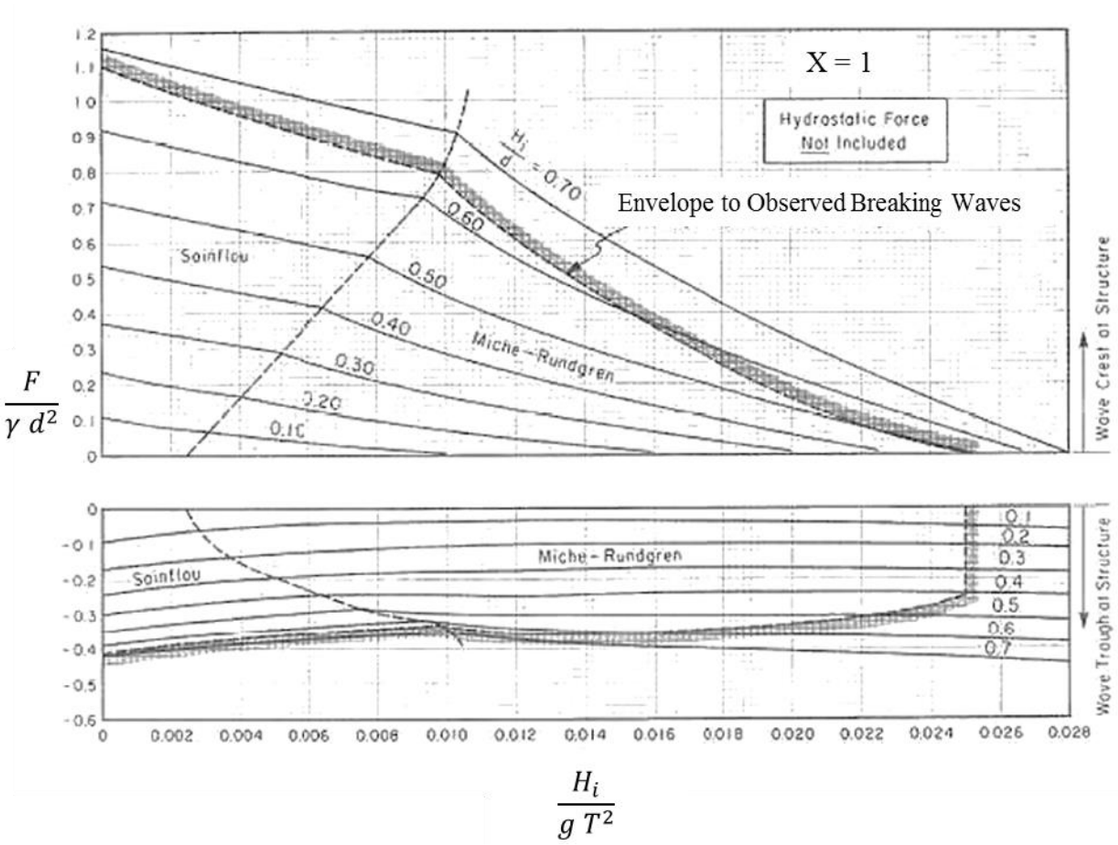


Figure 2: Nonbreaking wave Forces; X = 1.0 (Figure for Question 1(b))

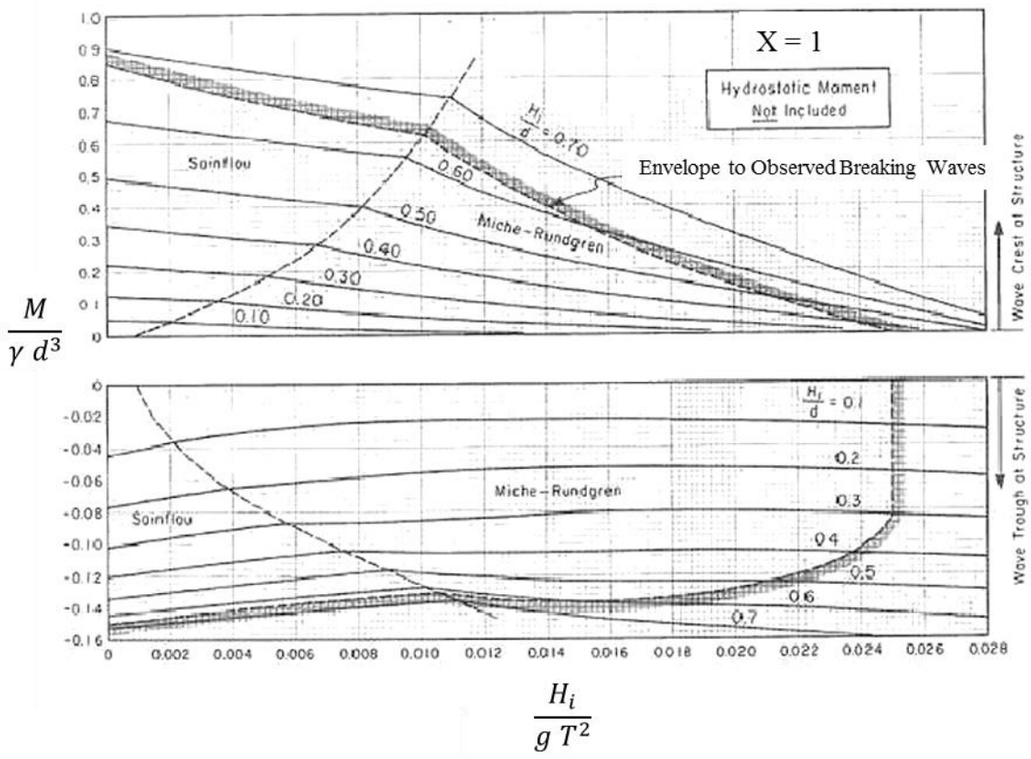


Figure 3: Nonbreaking wave Moments; X = 1.0 (Figure for Question 1(b))

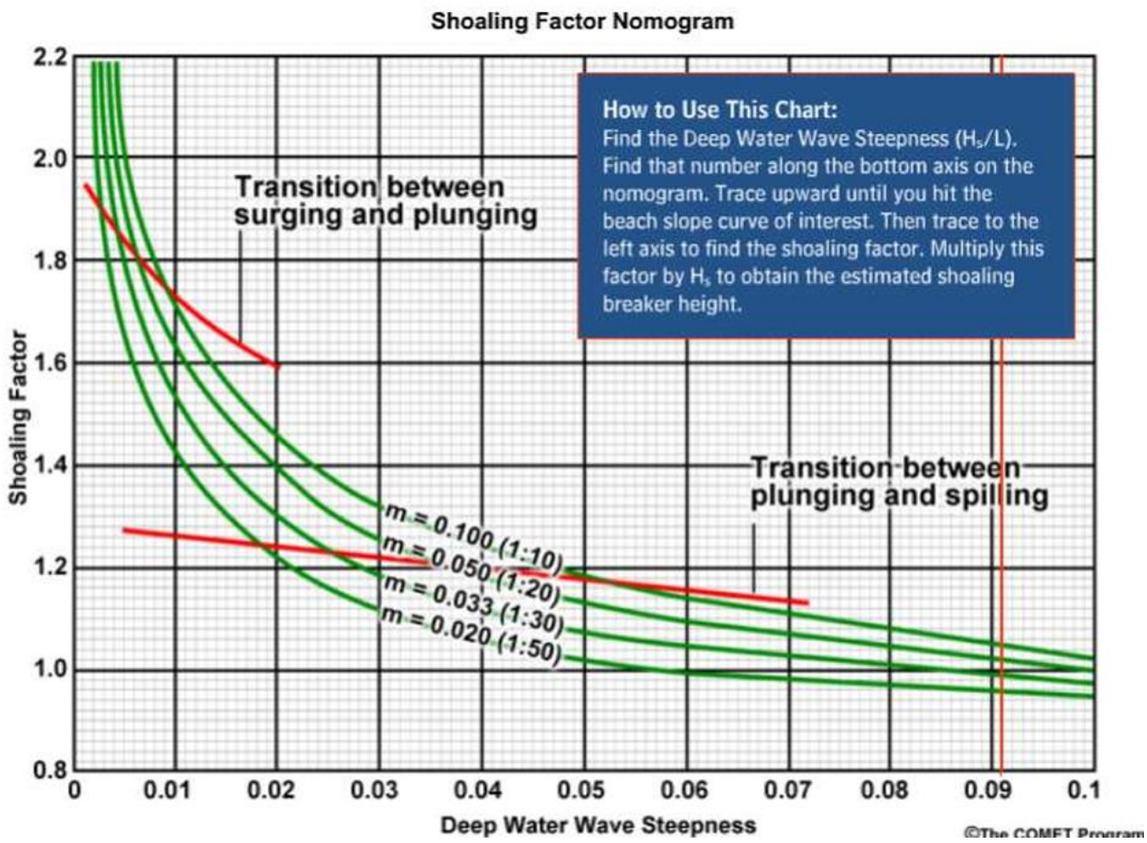


Figure 4: Shoaling Factor Nomogram (Figure for Question 3(b))

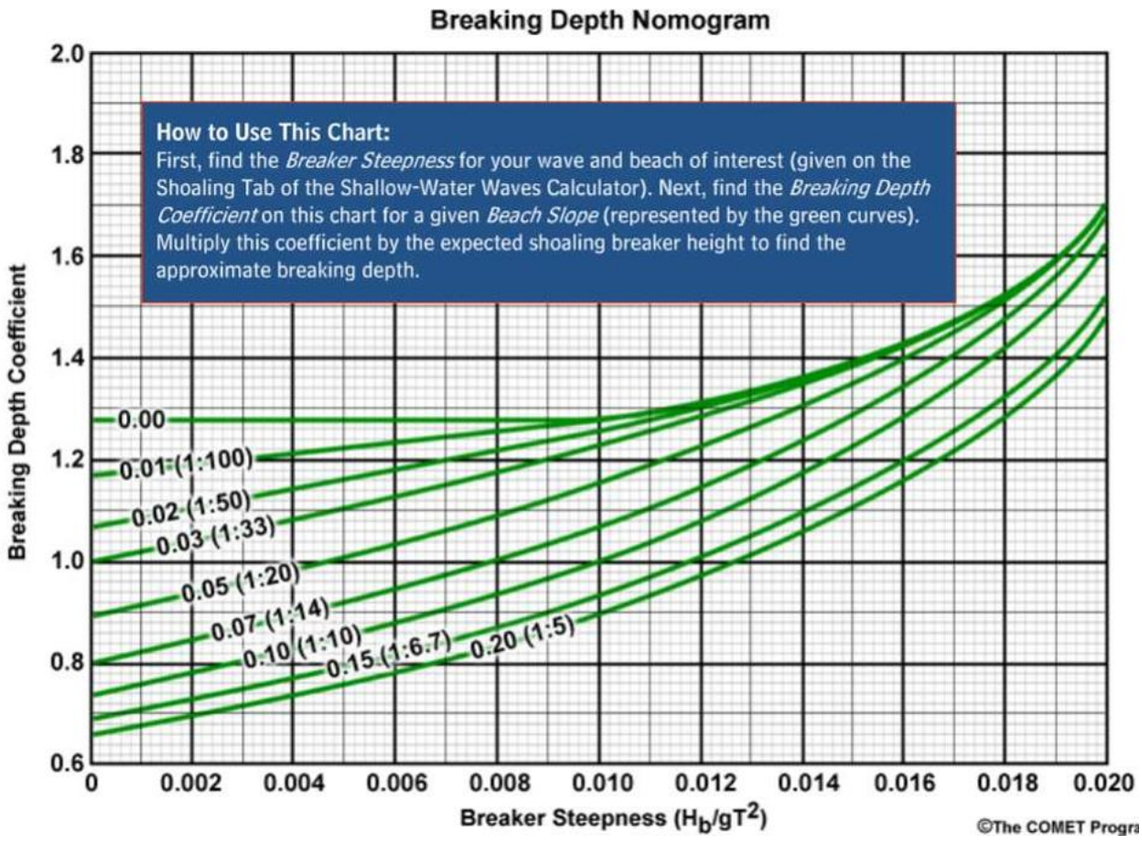


Figure 5: Breaking Depth Nomogram (Figure for Question 3(b))

Figure for Question 5(c)

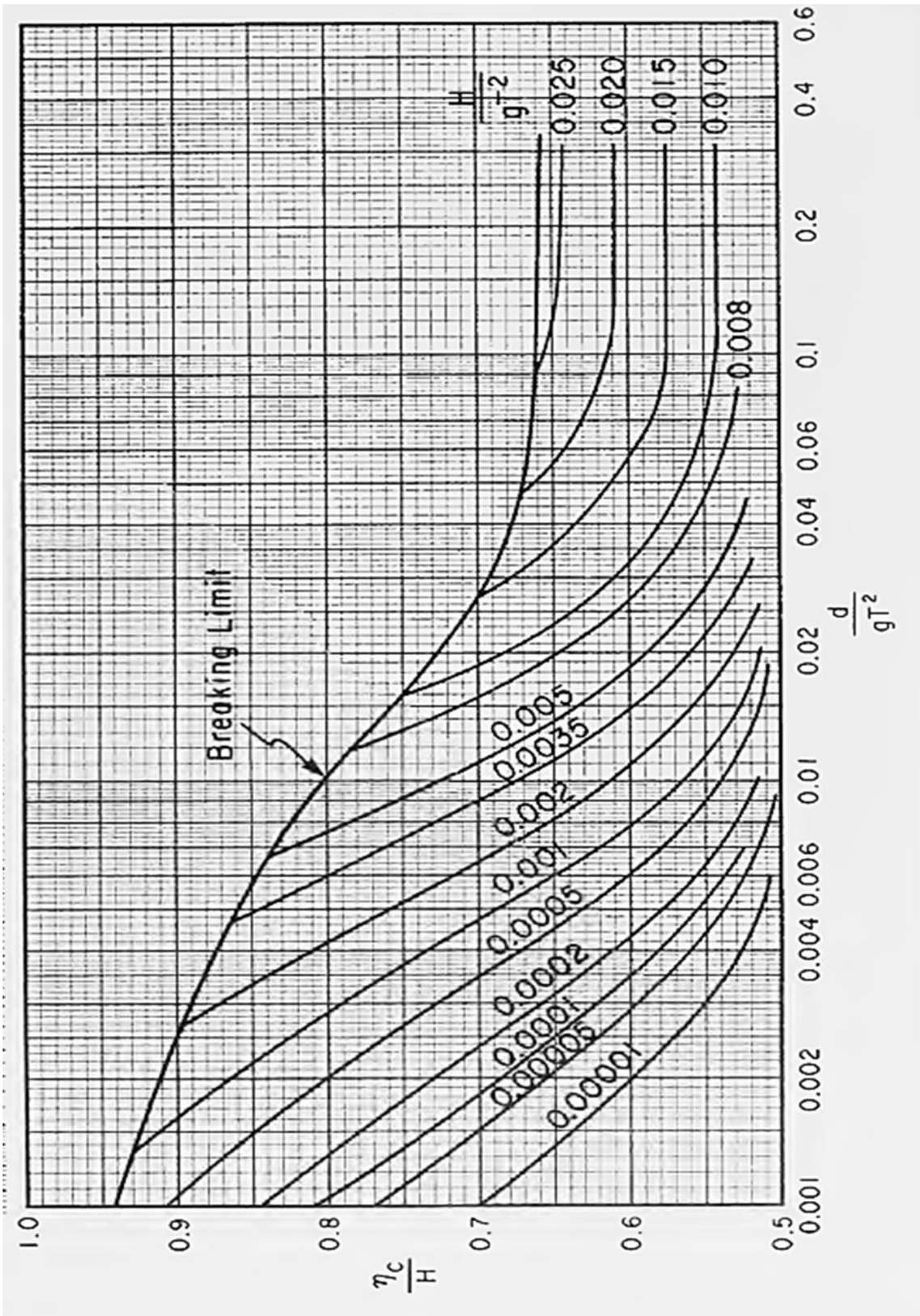


Figure 6: Ratio of crest elevation above still-water level to wave height