

1. Given: A hurricane in the northern Gulf of Mexico with:

- $\Delta p = 60$ mm
- $R = 18$ Nmiles
- $V_F = 11$ mph
- $\alpha = 1.2$
- Reference depth 45 ft.
- Latitude 29 degrees

from Fig C-6.

$$\frac{d}{gT^2} = \frac{45'}{32.2(12)^2} = 0.009$$

Circle the closest answer:

Determine:

a) H_{os} is: [<20 , 30, 35, 38, >40] ft

b) T_{os} is: [<12 , 13, 14.5, 15, >15] sec

c) If $CR=2$ and $Cf=0.0027$, the surge height is approximately:

[<1 , 2, 4, 6, 8, >10] ft

0.5 / 1

Show your calculations here!

$$a) H_{os} = \Delta p = 60 \text{ mm} \div 25.4 = 2.36 \text{ in}$$

$$R = 18 \text{ Nmiles}$$

$$f = 2 \times 2\pi / 24 \times \sin 29^\circ = 0.253 \text{ rad/hr}$$

$$V_F = 11 \text{ mph} \times \frac{5280}{6082} = 9.55 \text{ knots}$$

$$f =$$

$$\text{Latitude} = 29^\circ$$

$$\alpha = 1.2$$

$$U_{max} = A \{ b \Delta p^{1/2} - CRf \}$$

$$= 0.868 \{ (73) \sqrt{2.36} - (0.57)(18)(0.253) \}$$

$$= 95.1 \text{ knots}$$

$$95.1 \times \frac{6082}{5280} = 109.5 \text{ mph}$$

$$U_R = 0.865 U_{max} + 0.5 V_F$$

$$= 87.03 \text{ kt}$$

$$H_{os} = A_0 \left\{ 1 + \frac{B_0 \alpha V_F}{U_R} \right\} e^{\frac{R \Delta p}{e_0}} = 16.5 \left\{ 1 + \frac{(0.208)(1.2)(9.55)}{187.03} \right\} e^{\frac{(18)(2.36)}{100}}$$

$$= 16.5 (1.255) (1.5) = 30.9 \text{ ft}$$

$$T_{OS} = A \left\{ 1 + \frac{B \alpha V F}{\sqrt{UR}} \right\} e^{\frac{R_{AP}}{c}}$$

$$T_{OS} = 8.6 \left\{ 1 + \frac{(0.104)(1.2)(9.55)}{\sqrt{87.03}} \right\} e^{\frac{(18)(2.36)}{200}}$$

$$T_{OS} = 8.6 \left\{ 1.13 \right\} (1.24)$$

$$T_{OS} = 12.1 \text{ sec}$$

From pg. 74

$$h_{SS} \approx k_s k_r \left[\Delta P + \frac{C_r C_f R U_r^2}{2g d r e f} \frac{P_a}{P_w} \right]$$

units feet

$$h_{SS} \approx 0.65 \left[2.36 + \frac{(2)(0.0027)(18)(87.03)^2}{2(32.2)(45)} \frac{1}{800} \right]$$

$$h_{SS} \approx 0.65 [2.3603]$$

$$h_{SS} \approx 1.53 \text{ ft}$$

2. Given: A lake that is 52 miles long and 40 ft deep. The overwater wind speed at 7-m above the surface is 76 mph. Assume: The air and water temperatures are nearly the same. $T_d = 1.75$ hours.

Circle the closest answer:

Determine:

a) $H_s = [\leq 8, 11, 12, \textcircled{13}, 15, \geq 20]$ ft 3

b) $T_s = [\leq 3, 4, 5, 7, \textcircled{8}, \geq 10]$ sec 3

c) Using a friction coefficient of 0.0025, the wind setup is: 1
 $[\leq 1.5, 2.5, 3.5, 4.5, \textcircled{5}, 6, \geq 7]$ ft

d) The waves are: ~~Fetch Limited~~, Duration Limited 0

e) $H_{rms} = [\leq 5, \textcircled{7}, 9, 11, 13, \leq 15]$ ft 0

Show your calculations here!

Given: Lake 52 mi = F Assume AIR & WATER TEMP ARE SAME

$D = 40'$

wind speed U_m

$T_d = 1.75$ hours

Surface = 76 mph = U_A

$L_u = 3600$ s 2.5

$52 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mi}} = 274,560 \text{ ft}$

$0.75 \text{ h} = 60 \text{ min} \times 15 \text{ s}$

$0.75 \text{ h} \times \frac{60 \text{ min}}{1 \text{ h}} \times \frac{60 \text{ s}}{1 \text{ min}} =$

$U_{ow} = 76 \text{ mph} = 111.5 \text{ ft/s}$

2700 sec

Fig. 6.6
 Assuming $R_L = 1.0$ & $R_T = 1.15$

$1.75 \text{ h} = 6300 \text{ sec}$

$U_A = 0.539 (U_{ow} \times R_L R_T)^{1.23}$

$U_A = 0.539 (111.5 \text{ ft/s} \times 1.15)^{1.23} = 211.1 \text{ ft/s}$

Now, $\frac{g d}{U_A^2} = \frac{(32.2)(40)}{(211.1)^2} = 0.0289$ / $\frac{g F}{U_A^2} = \frac{(32.2)(274,560)}{(211.1)^2} = 198.4$

From Fig 3-21

$$\frac{gH_s}{U_A^2} = 0.01$$

$$H_s = \frac{(0.01)(U_A^2)}{g} = \frac{(0.01)(211.1)^2}{32.2} = 13.8 \text{ ft}$$

From Fig 3-22

$$\frac{gT_s}{U_A} = 1.2$$

$$T_s = \frac{(1.2)(U_A)}{g} = \frac{(1.2)(211.1)}{32.2} = 7.867 \text{ sec.}$$

~ 8 sec

either
for 8

Assuming Shallow water

$$\frac{gT_s}{U_A} = \left\{ \frac{gT_s}{U_A} \right\}^{3/4} = \left(\frac{(132.2)(6300)}{(211.1)(537)} \right)^{3/4} = 1.28$$

$$= \frac{1.283(U_A)}{g} = \frac{1.283(211.1)}{32.2} = 8.41$$

Formula (1)

$$Z_{sc \text{ top}} = \frac{F(\text{miles} \cdot U_{ow}^2(\text{mph}))}{1400 d(\text{ft})}$$

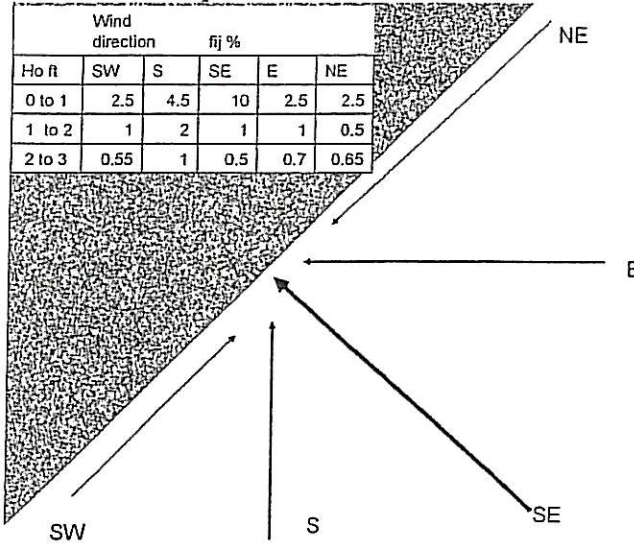
$$= \frac{(52) \times 76^2}{1400 \times 110 \text{ ft}} = 5.36$$

$$Z_{sup} = \frac{F'(Pa(\text{ft} \cdot U_{ow}^2))}{2g\rho_w d}$$

$$Z_{sup} = \frac{274,560 \text{ ft} \cdot (800 \text{ Pa})(0.0025)(111.5)^2}{2(32.2) 600 \text{ Pa} \cdot 40'}$$

$$Z_{sup} =$$

3. Given: Given: the wave frequency table below. The beach slope is 1.5%.
Assume SW → NE is positive



Assuming SW → NE
(+)
[MOVING TO THE RIGHT]

Circle the closest answer:

Estimate:

a) the net longshore transport is:
[≤6000, 8000, 10000, 15000, 30000, ≥36000] yd³/yr

b) the gross longshore transport is:
[≤7000, 8000, 10000, 15000, 36000, ≥50000] yd³/yr

c) the maximum breaker induced current is (use 3 ft wave):
[≤0.5, 1, 1.25, 1.5, 1.75, 2, ≥4] ft/sec

Show your calculations here and in table above!

3 2/2
2/2
1/2

Ho ft	Wind direction				
	SW	S	SE	E	NE
0 to 1	2.5	4.5	10	2.5	2.5
1 to 2	1	2	1	1	0.5
2 to 3	0.55	1	0.5	0.7	0.65

0 to 1/2	1.3744	0.7854	0	-0.7854	-1.3744
1 to 2/2	1.9436	-1.5266	0	1.5266	-1.9436
1 to 2/2	-13.568	-10.65	0	13.568	10.436
0 to 1/2	-23.972	-17.442	0	23.972	17.442
			0		
			0		

4.5

Given $\frac{Q}{H}$	α_0 , ft	SW	S	SE	E	NR
0 - 1	78.75	45	10	-45	-78.75	
1 - 2	1.25	4.5	1	2.5	+1.25	
2 - 3	2.75	1	0.5	0.7	0.325	
3 - 5	0	0	0	0	0	
5 - 6	0	0	0	0	0	

Sol

$$Q_{15} = K_y = 137000 \text{ gal}^3/\text{yr}$$

Avg	$\frac{L}{2}$, ft	α_0 (radians SW)	SW	S	SE	E	NE
$0 + \frac{1}{2} = \frac{1}{2}$		α_0 (rad)	1.37411	0.7854	0	-0.7854	-1.37411
$L + \frac{2}{2} = 2$			-23972	-17442	0	17442	+23972
$\frac{2+3}{2} = 2.5$			-19436	-15266	0	15266	+19436
			-13568	-1065	0	13568	1065
$\Sigma =$			-23987.5	-17454	0	17457	23984

$$A_1 = 137000 \times (0.5)^{5/2} (\cos(-450)^{1/4}) \sin 2(-45) \times (2/100)$$

$$A_2 = 13700 \times (2)^{5/2} (\cos(-450)^{1/4}) \sin 2(-45) \times (1/100)$$

$$A_3 = 13700 \times (2.5)^{5/2} (\cos(-450)^{1/4}) \sin 2(-45) \times (1/100)$$

$$A_1 = 24218.4 \times 0.707^{1/4} \times (-1)/100 =$$

$$W - E =$$

$$E - W =$$

4. Given: A beach with a $D_{50} = 0.475$ mm. Assume water temperature approximately 10 degrees C.

Circle the closest answer:

a) The fall velocity is: [<0.03 , 0.05 , 0.06 , 0.07 , 0.08 , >0.1] ft/sec

b) The stable beach slope is: [$<1\%$, 1.5% , 2% , 3% , $>4\%$]
Assume 'exposed'.

c) For a deep water wave $H_0 = 5$ ft and $T = 9.9$ sec, the beach profile tends to: [Berm; Offshore bar(s), Neither] State method _____

d) The closure depth for the wave in (b) is:
[<50 , 80 , 100 , 120 , 130 , >150] ft

Show your calculations here!

Given: $H_0 = 5$ ft ; $T = 9.9$ sec. Also from Fig. 8-8 p. 103

$\omega = 7$ m/sec from fig. 11-31 p. 82

$$\frac{7 \text{ m}}{1 \text{ sec}} \times \frac{3.280839 \text{ ft}}{100 \text{ m}} = \frac{22.965 \text{ ft}}{100} / \text{sec} = 0.22965 \text{ ft/sec}$$

$$L_0 = \frac{gT^2}{2\pi} = \frac{32.2(9.9)^2}{2(\pi)} = 502.28 \text{ ft}$$

$$\frac{H_0}{L_0} = \frac{5 \text{ ft}}{502.28 \text{ ft}} = 0.00995$$

$$\frac{\pi \omega}{gT} = \frac{\pi \times 0.22965 \text{ ft/sec}}{32.2(9.9)} = 0.00226$$