

Example 003 (Breakwater with * pontoons Example of program Manual page 60)

Design of a continuous breakwater with 8 pontoons. Each pontoon is 75ft long and has a cross section with width B=16 ft, height H=5 ft, thickness t=4.75 in, draft T=3.55 ft. Mooring cables in the middle of each pontoon with a stiffness 4kps/ft. Wave spectrum of Pierson-Moskowitz type with peak wave period Ts=3 sec, and significant wave height Hs=3 ft. Short crested waves with directional spectrum $S(f,\theta) = S(f) \cos^n(\theta-\theta_0)$.

From Table 4.1, page 37 of the manual we get for n=2 $\alpha=4$, $\beta=2$.

The section properties are shown in pages 62,63 and 63 of the manual.

For the hydrodynamic coefficients we use B=16, T=3.55, and pressing the Generate Values button we get the table according to the table 3.1 page 21 of the manual. (in the values of the added mass the structural mass is added)

We complete the data in the pages of winFLOAT as shown in the next pages. Then we go in the last page Computations and Run Float. The FLOAT computational modulus is running and produces the output file. By pressing Output to NotPad we see the output.

General data

Project File C:\Programfiler\Runet\cgFLOAT\Examples\Exam Get file Save to file		Project title Breakwater of page 60 of manual	
Units <input checked="" type="radio"/> Units in Kps and feet <input type="radio"/> Units in kN and meters		Frequency response analysis (chapter 6, page 48) Lowest spectral period (sec) <input type="text" value="1.00"/> Highest spectral period (sec) <input type="text" value="5.00"/> Number of periods for frequency response computations (max 48) <input type="text" value="48"/>	
Direction of motion <input checked="" type="checkbox"/> Sway <input checked="" type="checkbox"/> Heave <input checked="" type="checkbox"/> Roll		Load simulation (chapter 5, page 44) Number of simulated random loadings (max 48) <input type="text" value="16"/>	
Run Mode <input checked="" type="checkbox"/> Eigenvalue solution <input checked="" type="checkbox"/> Frequency response <input checked="" type="checkbox"/> Time domain analysis <input type="checkbox"/> Boat Wake response		Time series analysis (chapter 7, page 52) Time interval for computations dt (sec) <input type="text" value="0.20"/> Total time of time series To (sec) <input type="text" value="100.00"/> Time interval for random shifts Tsh (sec) <input type="text" value="10.00"/> Wilsons integration theta (default=1.4) <input type="text" value="1.40"/>	
Eigenvalue solution Number of eigenvectors to be plotted <input type="text" value="8"/> Number of eigenvectors to be pinted <input type="text" value="8"/> Maximum iterations in eigenvalue solution <input type="text" value="30"/> Convergrnce tolerance in eigenvalue computation (specify the negative exponent) <input type="text" value="-6"/>		Participating modes Sway <input type="text" value="16"/> Heave <input type="text" value="16"/> Roll <input type="text" value="16"/>	
		Boat wake response (chapter 8, page 54) Significant wave height (ft or m) Hs= <input type="text" value="3.00"/> Significant wave period (sec) Ts= <input type="text" value="3.00"/> Modulation wave period (sec) Tss= <input type="text" value="12.00"/> Boat speed (ft/sec or m/sec) V= <input type="text" value="18.00"/>	

Load correlation [§ 4, p 35-43]

S.C.F. (spatial correlation factor) <input type="radio"/> Constant S.C.F. (0.60xwave length) <input type="radio"/> Frequency dependent, linear pressure <input type="radio"/> Frequency dependent, quadratic pressure decrease <input checked="" type="radio"/> Frequency dependent, exponentially decayed coherence (best choice)		<div style="border: 1px solid black; padding: 5px;"> <p>Linear pressure decrease</p> $scf = \frac{0.6}{(d/\lambda)} \left(1 - \frac{0.2}{d/\lambda}\right)$ <p>Quadratic pressure decrease</p> $scf = \frac{0.8}{(d/\lambda)} \left(1 - \frac{0.225}{d/\lambda}\right) \text{ for } \frac{d}{\lambda} \geq 0.50$ <p>Exponentially decayed wave coherence</p> $y_w \left(\frac{\Delta z}{\lambda}\right) = \exp\left(-\alpha \left(\frac{\Delta z}{\lambda}\right)^\beta\right)$ </div>
Nodal Load Correlation <input type="radio"/> Uncorrelated loads <input checked="" type="radio"/> Exponentially decayed coherence (best choice)		
Factor alpha for exponentially decayed coherence $\alpha =$ <input type="text" value="8.00"/> Factor beta for exponentially decayed coherence $\beta =$ <input type="text" value="1.00"/> Number for random number generation (any number) $n =$ <input type="text" value="34"/>		

Pontoon properties [§ 2, p. 3-6]

Number of Pontoons:

Pontoon similarity:
 All pontoons are the same
 Pontoons are different

Modulus of Elasticity (kps/ft² or kN/m²): $E = 417000.00$

Poissons Ratio: $\nu = 0.220$

n	L (length)	B (width)	I _{yy}	I _{xx}	J	m _{xy}	mt	Kc1	Kc2	Kc3	s.c.f	exp
	75,000	16,000	473,270	74,690	202,280	0,113	3,500	4,000		4,000	1,000	

Connector properties [§ 2, p. 3-6]

Rigid or flexible connections between pontoons:
 Rigid connections between pontoons
 Flexible connections between pontoons

Pontoon similarity:
 All connectors are the same
 Connectors are different

Modulus of Elasticity (kps/ft² or kN/m²): $E_c = 1000.00$

Poissons Ratio: $\nu_c = 0.480$

n	Lc (length)	I _{cyy}	I _{cxx}	J _c	A _{cxx}	A _{cyy}
	1.000	236.200	15.600	232.000	6.700	6.700

Hydrodynamic coefficients [§ 3, p. 7-34]

Total number of supplied hydrodynamic coefficients (interpolation between) = 7

Number of middle period (used for eigenvalue and time series analysis):

Cross section width (ft or m) B =

Cross section draft (ft or m) T = B/T =

	T sec	BvS	BvH	BvR	ZvS	ZvH	ZvR	CIS	CIH	CIR
1	2.1	1.065	2.953	1.251	0.180	0.022	0.001	0.300	0.168	0.192
2	2.6	1.167	2.829	1.249	0.237	0.064	0.002	0.361	0.284	0.149
3	3.1	1.343	2.742	1.249	0.243	0.126	0.004	0.388	0.390	0.334
4	3.9	1.619	2.747	1.255	0.183	0.220	0.006	0.367	0.521	0.481
5	4.5	1.722	2.820	1.261	0.132	0.274	0.006	0.321	0.590	0.494
6	5.2	1.739	2.963	1.265	0.082	0.325	0.005	0.253	0.659	0.452
7	6.3	1.678	3.195	1.268	0.044	0.368	0.003	0.179	0.728	0.362

Wave spectrum

Wave spectrum values supplied (periods-amplitude)
 Pierson-Moskowitz wave spectrum
 JONSWAP wave spectrum

Lower spectra period (sec) Significant wave height (ft or m) Hs
 Higher spectra period (sec) Number of spectra frequencies (max 128)
 Peak wave period Ts

JONSWAP spectra coefficients $\gamma =$ $\sigma_1 =$ $\sigma_2 =$

Simulation of wave time series from wave spectrum

Time series simulated from spectrum at equal frequency intervals
 Time series simulated from spectrum at equal spectra areas

Pierson-Moskowitz

$$S(f) = \alpha g^{-2} (2\pi)^{-4} f^{-5} \exp\left\{-\frac{5}{4}\left(\frac{f}{f_p}\right)^{-4}\right\}$$

JONSWAP

$$S(f) = \alpha g^{-2} (2\pi)^{-4} f^{-5} \exp\left\{-\frac{5}{4}\left(\frac{f}{f_p}\right)^{-4}\right\} \gamma \exp\left\{-\frac{(f-f_p)^2}{2\sigma^2 f_p^2}\right\}$$

$\sigma_1=0.07$ for $f < f_p$, $\sigma_2=0.09$ for $f > f_p$

Make Input File
Print Input
Run FLOAT
Get Output File
Output to NotePad
Output to Word
Print Output

Example (manual pg. 60) Breakwater

800104013102	7	3	8
75.00	16.00	473	75 202 0.
417000	0.220		
1.000	236.000	15.600	2
10000	0.450		
2.100	1.065	2.953	1.251 0.180 0.0
2.600	1.167	2.829	1.249 0.237 0.0
3.100	1.343	2.742	1.249 0.243 0.1
3.900	1.619	2.747	1.255 0.183 0.2
4.500	1.722	2.820	1.261 0.132 0.2
5.200	1.739	2.963	1.265 0.082 0.3
6.300	1.678	3.195	1.268 0.044 0.3
1.00	5.00		
1.00	5.00	3.00	3.00 3.30 0.07 0.0
	0.20	100.00	10.00

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*****
PROGRAM CGFLOAT VERS.5 1985 BY C.GEORGIADIS copyright RUNET
*****
Example (manual pg. 60) Breakwater with flexible connectors:
*****
NUMBER OF PONTONS ..... 8
FLAG FOR DIRECTION ..... 0
0 SHAY + HE AVE + ROLL
1 SHAY
2 HEAVE
3 ROLL
4 SHAY + HEAVE
FLAG FOR SAME PONTONS ..... 0
0 SAME
1 DIFFERENT
FLAG FOR RIGID CONNECTORS... 1
0 RIGID
1 FLEXIBLE
FLAG FOR SAME CONNECTORS... 0
0 SAME
1 DIFFERENT
FLAG FOR RUN MODE ..... 4
0 EIGENVALUE SOLUTION
1 EIGENVALUE + FREQUENC RE SP
2 FREQUENCY RESPONSE
3 EIGENVAL + TIME SERIES
4 ALL THE ABOVE
FLAG FOR UNITS ..... 0
0 FEET-KIPS
1 METERS-KILOTONS
FLAG FOR TIME SERIES INPUT... 1
0 SIMULATED FROM SPECTRUM
AT EQUAL FREQUENCY INTERVALS
1 SIMULATED FROM SPECTRUM AT
EQUAL SPECTRA AREAS
2 INPUT TIME SERIES
3 READED FROM TAPE 11
FLAG FOR S.C.F. .... 2
0 INPUT VALUES
1 LINEAR PRESSURE DECREASE
2 QUADRATIC PRESSURE DECREASE
3 MORE ACCURATE
FLAG FOR LOAD CORRELATION... 1
0 UNCORRELATED
1 EXPONENT CORRELATION
0 REGULAR ANALYSIS
1 BOAT WAKE ANALYSIS
    
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