Table 1 Similitude ratios of physical quantities for the dynamic test.

Physical quantity	Scale factor	Value
Length	S_l	20
Area	$S_A = S_l^2$	400
Velocity of flow	$S_u = S_l^{0.5}$	4.47
Quantity of flow	$S_Q = S_l^{2.5}$	1788.8
Elastic modulus	S_E	20
Stiffness	$S_k = S_E S_l$	400
Density	$S_\rho = S_E / S_l$	1
Mass	$S_m = S_\rho S_l^3$	8000
Force	$S_F = S_l^3$	8000
Pressure	$S_P = S_l$	20
Strain	S_ε	1
Stress	$S_\sigma = S_\varepsilon S_E$	20
Displacement	$S_x = S_l$	20
Acceleration	$S_a = S_x / S_t^2$	1
Time	$S_t = (S_m / S_k)^{0.5} = S_l^{0.5}$	4.47
Frequency	$S_f = 1/S_t$	1/4.47

Table 2 Present study's test variables.

Water depth (m)		Current speed (m/sec)		Wave properties (m, m, sec)		Earthquake amplitude (g)		Structure Orientation (θ)	
H1	0.60	C	0.10	W	0.02, 0.1, 2	E	0.10g	$\theta 1$	0°
H2	0.675							$\theta 2$	45°
H3	0.75							$\theta 3$	90°

Table 3 Type, number, and symbol of measuring instruments used in the tests.

Test measures	Instruments	Numbers	Symbol
Displacement	LVDT transducers	8	U
Acceleration	Accelerometer sensor	18	A
Wave properties	Wave gauge	4	-
Flow velocity	current meter	2	-

Table 4 Peak relative displacement and peak acceleration.

Action	H3		H4		H5	
	Disp.	Acc.	Disp.	Acc.	Disp.	Acc.
0°	3.558	0.209	5.475	0.263	4.653	0.234
45°	4.372	0.250	7.232	0.333	6.037	0.291
90°	5.525	0.303	8.500	0.379	7.225	0.400

Table 5 Peak relative displacement and peak acceleration.

Action	H3		H4		H5	
	Disp.	Acc.	Disp.	Acc.	Disp.	Acc.
15°	3.893	0.237	6.296	0.302	5.351	0.269
30°	4.092	0.240	6.576	0.320	5.519	0.280
60°	4.781	0.273	7.821	0.349	6.604	0.312
75°	5.083	0.279	7.911	0.364	6.647	0.319