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LAMPIRAN

Lampiran 1. Kode Program

```
% Program Model Skripsi
clc;clear;close all

%INPUT PARAMETER MODEL
%n=nodes
%MODEL 1-------------------------------------------------------------
n=3;
Radius=5;
Height=7.5;

R = [Radius,Radius,0];
Z = [0,-Height,-Height];

%MODEL 2-------------------------------------------------------------
%n=4;
%Radius1=5;
%Radius2=2.5;
%Height1=5;
%Height2=7.5;

%R = [Radius1,Radius1,Radius2,0];
%Z = [0,-Height1,-Height2,-Height2];

%MODEL 3-------------------------------------------------------------
%n=8;
%Radius1=5;
%Radius2=3;
%Radius3=2.5;
%Height1=1;
%Height2=3;
%Height3=5;
%Height4=7.5;

%R = [Radius1,Radius1,Radius2,Radius2,Radius1,Radius1,Radius3,0];
%Z = [0,-Height1,-Height1,-Height2,-Height2,-Height3,-Height4,-Height4,-
Height4];

%MODEL 4-------------------------------------------------------------
%n=3;
%Radius=5;
%Height1=3.5;
%Height2=7.5;

%R = [Radius,Radius,0];
%Z = [0,-Height1,-Height2];

%MODEL 5-------------------------------------------------------------
%n=7;
%Radius1=5;
%Radius2=3;
%Height1=3.5;
```

```
us1,Radius2,Radius2,Radius1,Radius1,0];
Height1,-Height2,-Height2,-Height3,-Height3,-Height3];

B,YB,ZB]=axiMesh(R,Z,n);
```

```
arah=0;
dalam=0;
%Model 1
w=linspace(0.101,4.901,30);
%Model 2
w=linspace(0.101,4.769,30);
%Model 3
w=linspace(0.101,4.511,30);
%Model 4
w=linspace(0.101,5.121,30);
%Model 5
w=linspace(0.101,4.549,30);
[A,B,Fe]=Nemoh(w, arah, dalam);

%% plot

%Added Mass
A33(1,:)=A(3,3,:);

%Radiation Damping
B33(1,:)=B(3,3,:);

%Excitation Forces
Fe3(1,:)=Fe(:,3);

%Inertia
M=Inertia;
M33=M(3,3);

%Hydrostatic Stiffness
KH3=KH(3,3);

%Viscous Damping
Bi3=(2.*(sqrt((M33+A33)*KH3)))*0.1;
Bi33=max(Bo3);

%Natural Frequency
Wn=(KH)/(M33+(max(A33)));
Wn1=Wn(3,3);

figure
T = w;

subplot(2,2,1);
plot(T,A33);
title('Added Mass');
grid on

subplot(2,2,2);
plot(T,B33);
title('Damping');
grid on
```

```
);


us damping
2.*(M33+A33(1,:))-(i*w.*B33(1,:))+KH3);
```

```
%RAO with viscous damping
RAO3 = Fe3./(-w.^2.*(M33+A33(1,:))-(i*w.*(B33(1,:)+Bi33))+KH3);

figure
plot(T,abs(RAO3));
title('RAO Heave');
grid on

%Export to CSV file(ubah angka dinama file sesuai nomor model)
csvwrite('RAO-Heave-1.csv', abs(transpose(RAO3)));
csvwrite('Added-Mass-1.csv', abs(transpose(A33)));
csvwrite('Excitation-1.csv', abs(transpose(Fe3)));
csvwrite('Rad-Damping-1.csv', abs(transpose(B33)));
```

Lampiran 2. Data Respon Struktur Output ANSYS AQWA

Freq(rad/s)	Rao 1	Freq(rad/s)	Rao 2	Freq(rad/s)	Rao 3	Freq(rad/s)	Rao 4	Freq(rad/s)	Rao 5
0.101	1.002	0.101	1.001	0.101	1.001	0.101	1.001	0.101	1.002
0.267	1.017	0.262	1.010	0.253	1.009	0.274	1.009	0.254	1.015
0.432	1.056	0.423	1.031	0.405	1.026	0.447	1.026	0.408	1.046
0.598	1.150	0.584	1.076	0.557	1.063	0.620	1.062	0.561	1.115
0.763	1.440	0.745	1.188	0.709	1.143	0.793	1.141	0.715	1.291
0.929	3.352	0.906	1.543	0.861	1.351	0.967	1.346	0.868	1.960
1.094	1.022	1.067	2.961	1.013	2.061	1.140	2.018	1.021	3.030
1.260	0.256	1.228	0.833	1.165	1.746	1.313	1.689	1.175	0.559
1.425	0.091	1.389	0.264	1.318	0.521	1.486	0.518	1.328	0.193
1.591	0.036	1.550	0.107	1.470	0.217	1.659	0.216	1.481	0.082
1.756	0.015	1.711	0.048	1.622	0.107	1.832	0.106	1.635	0.038
1.922	0.006	1.872	0.023	1.774	0.058	2.005	0.058	1.788	0.019
2.087	0.003	2.033	0.011	1.926	0.034	2.178	0.034	1.942	0.010
2.253	0.001	2.194	0.009	2.078	0.022	2.351	0.022	2.095	0.007
2.418	0.000	2.355	0.003	2.230	0.015	2.524	0.015	2.248	0.000
2.584	0.000	2.515	0.001	2.382	0.011	2.698	0.011	2.402	0.001
2.749	0.000	2.676	0.001	2.534	0.012	2.871	0.012	2.555	0.001
2.915	0.000	2.837	0.000	2.686	0.004	3.044	0.004	2.708	0.000
3.080	0.000	2.998	0.000	2.838	0.003	3.217	0.003	2.862	0.000
3.246	0.000	3.159	0.000	2.990	0.003	3.390	0.003	3.015	0.000
3.411	0.000	3.320	0.000	3.142	0.002	3.563	0.002	3.169	0.000
3.577	0.000	3.481	0.000	3.294	0.002	3.736	0.002	3.322	0.000
3.742	0.000	3.642	0.000	3.447	0.002	3.909	0.002	3.475	0.000
3.908	0.000	3.803	0.000	3.599	0.002	4.082	0.002	3.629	0.000
4.073	0.000	3.964	0.000	3.751	0.001	4.255	0.001	3.782	0.000
4.239	0.000	4.125	0.002	3.903	0.000	4.429	0.000	3.935	0.000
4.404	0.000	4.286	0.000	4.055	0.000	4.602	0.000	4.089	0.000
4.570	0.000	4.447	0.000	4.207	0.001	4.775	0.001	4.242	0.000
4.735	0.000	4.608	0.000	4.359	0.000	4.948	0.000	4.396	0.000
4.901	0.000	4.769	0.000	4.511	0.000	5.121	0.000	4.549	0.000

Added Mass (kg)									
Freq(Hz)	Model 1	Freq(Hz)	Model 2	Freq(Hz)	Model 3	Freq(Hz)	Model 4	Freq(Hz)	Model 5
0.016	356117.81	0.016	294018.97	0.016	375284.34	0.016	295789.75	0.016	434697
0.042	304390.56	0.042	243321.25	0.04	326289.06	0.043	243756.59	0.04	385266.69
0.069	276160.94	0.067	215826.09	0.064	299585.81	0.071	216550.27	0.065	357919.88
0.095	255306.44	0.093	195155.28	0.089	279654.94	0.099	195791.48	0.089	337623.78
0.121	238873.88	0.118	177576.86	0.113	262650.03	0.126	176900.78	0.114	321122.84
0.148	227508.2	0.144	162720.67	0.137	247626.91	0.154	159157.92	0.138	308216.22
0.174	223005.38	0.17	152436.09	0.161	235583.61	0.181	145135.53	0.162	300299.13
0.2	224735.72	0.195	148405.58	0.185	228320.52	0.209	137685.47	0.187	298234.81
0.227	229331.17	0.221	149571.17	0.21	226105.64	0.236	136430.58	0.211	300478.88
0.253	234035.78	0.247	153342.33	0.234	227352.27	0.264	138989.55	0.236	304445.75
0.279	237791.8	0.272	157682.94	0.258	230214.03	0.291	143108	0.26	308434.94
0.306	240515.13	0.289	161565.55	0.282	233469.45	0.319	147330.72	0.284	311790.66
0.332	242430.92	0.323	164651.67	0.307	236520.23	0.346	148859.47	0.309	314434.22
0.359	243793.48	0.349	167472.94	0.331	239169.05	0.374	154381.81	0.333	316610.5
0.385	244790.64	0.375	168882.53	0.355	241456.86	0.401	156650.33	0.358	316451.94
0.411	245545.11	0.4	170183.3	0.379	243658.03	0.429	158428	0.382	318553.34
0.438	246134.16	0.426	171184.5	0.403	250270.41	0.457	159797.75	0.407	319520.78
0.464	246606	0.451	171966.53	0.428	242832.03	0.484	160863.7	0.431	320247.06
0.49	246990.59	0.477	172591.72	0.452	245165.3	0.512	161701.78	0.455	320824.31
0.517	247310.42	0.503	173101.17	0.476	246360.78	0.539	162392.09	0.48	321292.47
0.543	247579.95	0.528	173524.67	0.5	247304.33	0.567	161215.67	0.504	321679.59
0.569	240751.97	0.554	173878.48	0.524	248278.95	0.594	161229.97	0.529	322003.38
0.596	240946.06	0.58	169907.8	0.549	251232.56	0.622	161401.36	0.553	322279.72
0.622	241101.52	0.605	170138	0.573	252669.94	0.649	161641.64	0.577	316390.16
0.648	241220.41	0.631	170336.05	0.597	246323.36	0.677	161882.28	0.602	316421.34
0.675	241325.05	0.656	170529.52	0.621	245177.84	0.704	162104.06	0.626	316411.28
0.701	241414.92	0.682	170667.53	0.646	244102.47	0.732	162304.58	0.651	316495.44
0.728	241494.83	0.708	170804.52	0.67	250160.03	0.76	162486.19	0.675	316562.53
0.754	241564.64	0.733	170922.63	0.694	245864.42	0.787	162647.59	0.699	316623.25
0.78	241628.39	0.759	171026.84	0.718	245431.23	0.815	162791.7	0.724	316689.84

Radiation Damping (Ns/m)									
Freq(Hz)	Model 1	Freq(Hz)	Model 2	Freq(Hz)	Model 3	Freq(Hz)	Model 4	Freq(Hz)	Model 5
0.016	7806.5215	0.016	7943.5688	0.016	8021.4907	0.016	7938.5249	0.016	7891.8423
0.042	20088.936	0.042	20359.713	0.04	19946.777	0.043	21530.898	0.04	19489.596
0.069	30749.838	0.067	31922.906	0.064	31287.707	0.071	34912.484	0.065	29893.813
0.095	38571.441	0.093	41947.422	0.089	41612.477	0.099	47774.012	0.089	38265.078
0.121	41755.348	0.118	49090.453	0.113	50024.379	0.126	58787.379	0.114	43331.227
0.148	38468.152	0.144	51163.387	0.137	54887.734	0.154	64840.645	0.138	43460.266
0.174	29250.004	0.17	46439.727	0.161	54320.715	0.181	62577.93	0.162	37860.004
0.2	18382.234	0.195	36377.125	0.185	48164.77	0.209	52660.773	0.187	28454.109
0.227	9886.1523	0.221	25033.883	0.21	38919.879	0.236	39425.957	0.211	18917.248
0.253	4690.3877	0.247	15498.948	0.234	29572.924	0.264	26811.051	0.236	11547.839
0.279	1990.4629	0.272	8768.2002	0.258	21777.801	0.291	16775.502	0.26	6672.8701
0.306	756.28931	0.289	4559.6016	0.282	15952.435	0.319	9635.5928	0.284	3742.6599
0.332	243.3472	0.323	2132.575	0.307	11888.127	0.346	1514.5238	0.309	2098.1941
0.359	100.53586	0.349	2105.9341	0.331	9188.7529	0.374	3207.5469	0.333	1270.5691
0.385	26.701466	0.375	516.03656	0.355	7503.1128	0.401	1566.7969	0.358	-32.85006
0.411	6.8455758	0.4	205.0667	0.379	6937.2646	0.429	747.29242	0.382	242.85501
0.438	1.5460823	0.426	78.808342	0.403	13400.217	0.457	341.00833	0.407	149.13754
0.464	0.2512672	0.451	28.600328	0.428	2477.073	0.484	146.09113	0.431	86.561516
0.49	-0.023603	0.477	9.5147829	0.452	3096.1282	0.512	48.317982	0.455	49.047836
0.517	-0.070405	0.503	2.3393295	0.476	2924.4465	0.539	33.9081	0.48	27.469534
0.543	-0.05344	0.528	3.5494721	0.5	2678.4795	0.567	77.235497	0.504	15.298318
0.569	12.695597	0.554	0.4609456	0.524	2627.5544	0.594	14.21516	0.529	2.8762262
0.596	-0.1816934	0.58	12.017963	0.549	4187.002	0.622	-15.868027	0.553	2.6292164
0.622	2.1809182	0.605	-4.1833553	0.573	973.1875	0.649	-102.14575	0.577	6.8657188
0.648	7.9515786	0.631	-8.3373222	0.597	587.9502	0.677	20.954124	0.602	-0.5319329
0.675	-1.8080266	0.656	43.294788	0.621	328.88898	0.704	2.4591928	0.626	2.3116813
0.701	-0.1978774	0.682	-0.1827693	0.646	35.431133	0.732	-3.5813725	0.651	8.5715885
0.728	0.2865905	0.708	-0.1082332	0.67	-6424.4595	0.76	-16.157404	0.675	-0.2467854
0.754	1.1928906	0.733	0.7832831	0.694	92.457603	0.787	1.0995263	0.699	0.8218504
0.78	-0.6832915	0.759	3.7324028	0.718	307.0686	0.815	0.024469	0.724	-0.3787119

Excitation Forces Model 1 (N/Unit amplitude)								
Freq(Hz)	-180	-135	-90	-45	0	45	90	135	180
0.016	780999.81	781000.19	781000.19	781000.63	781000.06	781000.56	781000.44	781000.63	780999.81
0.042	737451.06	737451.19	737452.13	737451.5	737451.63	737452	737452.69	737451.5	737451.06
0.069	660553.63	660553.44	660553.94	660554.19	660554.63	660554.81	660555.06	660554.25	660553.63
0.095	556985	556985.31	556984.88	556985.38	556986.06	556987.06	556986.06	556985.69	556985
0.121	437263.38	437262.75	437262.22	437263.66	437263.69	437264.09	437263.88	437264.44	437263.38
0.148	316925.41	316925.09	316925.81	316926.78	316926.59	316927.41	316927.78	316927.41	316925.47
0.174	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05
0.2	1.35E+05	1.35E+05	1.35E+05	1.35E+05	1.35E+05	1.35E+05	1.35E+05	1.35E+05	1.35E+05
0.227	8.20E+04	8.20E+04	8.20E+04	8.20E+04	8.20E+04	8.20E+04	8.20E+04	8.20E+04	8.20E+04
0.253	4.78E+04	4.78E+04	4.78E+04	4.78E+04	4.78E+04	4.78E+04	4.78E+04	4.78E+04	4.78E+04
0.279	2.70E+04	2.70E+04	2.70E+04	2.70E+04	2.70E+04	2.70E+04	2.70E+04	2.70E+04	2.70E+04
0.306	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04
0.332	7.68E+03	7.68E+03	7.68E+03	7.68E+03	7.68E+03	7.69E+03	7.68E+03	7.68E+03	7.68E+03
0.359	3.95E+03	3.94E+03	3.95E+03	3.95E+03	3.95E+03	3.95E+03	3.95E+03	3.95E+03	3.95E+03
0.385	1.91E+03	1.91E+03	1.91E+03	1.91E+03	1.91E+03	1.91E+03	1.91E+03	1.91E+03	1.91E+03
0.411	8.85E+02	8.84E+02	8.85E+02	8.85E+02	8.86E+02	8.85E+02	8.84E+02	8.84E+02	8.85E+02
0.438	3.80E+02	3.78E+02	3.83E+02	3.91E+02	3.98E+02	3.96E+02	3.91E+02	3.85E+02	3.80E+02
0.464	1.48E+02	1.48E+02	1.48E+02	1.49E+02	1.51E+02	1.48E+02	1.48E+02	1.49E+02	1.48E+02
0.49	1.73E+01	1.67E+01	1.46E+01	1.71E+01	2.10E+01	1.59E+01	1.50E+01	1.72E+01	1.73E+01
0.517	2.68E+02	2.64E+02	2.63E+02	2.66E+02	2.65E+02	2.65E+02	2.63E+02	2.65E+02	2.68E+02
		3.36385	117.82308	116.6045	116.57675	117.86231	118.29176	116.91845	117.0266
		2.96991	354.22461	339.52954	365.47971	344.9957	346.67477	356.49976	332.17419
		110325	61.968914	83.588188	77.892899	80.342987	60.950146	49.404972	44.095337
		1.97949	353.9278	338.10513	346.49512	337.75876	353.78055	332.02084	341.53879
		591.736	1555.2882	1606.9152	1653.4015	1589.2456	1553.6483	1611.2787	1651.6152
		5.94958	452.65982	453.55997	456.06131	452.59949	456.68372	455.23169	450.86298
		535507	64.716225	61.476784	99.731712	64.399353	62.226616	74.418327	34.732826
		518318	95.663773	105.9447	98.41243	107.5956	98.870667	98.181786	93.209213
		1.44327	480.21255	475.73401	479.57617	477.92856	478.14844	470.51971	475.49097
		1.64969	296.08197	299.82416	306.40402	291.68109	309.46259	302.16312	296.36255

Excitation Forces Model 2 (N/Unit amplitude)									
Freq(Hz)	-180	-135	-90	-45	0	45	90	135	180
0.016	781883.06	781884.06	781884.19	781884.63	781883.94	781884.56	781884.06	781883.88	781883.06
0.042	744490.19	744489.88	744491.63	744492.13	744492.63	744491.19	744491.19	744490.06	744490.19
0.067	678834.63	678835.63	678837.13	678838.25	678838.38	678837.69	678836.25	678835	678834.56
0.093	589849.5	589849.75	589851.63	589854.44	589854.81	589852.81	589850.69	589850.06	589849.5
0.118	485179.75	485179.13	485182.28	485183.78	485185.25	485182.13	485181.25	485178.91	485179.75
0.144	376354.44	376353.69	376357.22	376360.53	376360.94	376357.88	376356.06	376354.88	376354.44
0.17	276826.16	276826.22	276830.84	276834.5	276834.66	276832.34	276829.5	276827.28	276826.16
0.195	195560.45	195561.88	195566.88	195570.38	195569.63	195569.19	195565.84	195562.7	195560.47
0.221	133891.58	133892.13	133897.72	133901.06	133899.63	133899.94	133896.52	133893.73	133891.55
0.247	8.90E+04	8.90E+04	8.90E+04	8.90E+04	8.90E+04	8.90E+04	8.90E+04	8.90E+04	8.90E+04
0.272	5.76E+04	5.76E+04	5.76E+04	5.76E+04	5.76E+04	5.76E+04	5.76E+04	5.76E+04	5.76E+04
0.289	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04
0.323	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04
0.349	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.28E+04	2.28E+04
0.375	8.90E+03	8.89E+03	8.89E+03	8.90E+03	8.89E+03	8.90E+03	8.89E+03	8.90E+03	8.90E+03
0.4	5.01E+03	5.01E+03	5.01E+03	5.00E+03	5.01E+03	5.01E+03	5.01E+03	5.01E+03	5.01E+03
0.426	2.82E+03	2.81E+03	2.80E+03	2.79E+03	2.78E+03	2.79E+03	2.80E+03	2.82E+03	2.82E+03
0.451	1.52E+03	1.52E+03	1.53E+03	1.53E+03	1.53E+03	1.53E+03	1.52E+03	1.52E+03	1.52E+03
0.477	7.83E+02	7.84E+02	7.85E+02	7.88E+02	7.88E+02	7.87E+02	7.85E+02	7.83E+02	7.83E+02
0.503	3.12E+02	3.03E+02	2.98E+02	3.08E+02	3.14E+02	3.05E+02	2.98E+02	3.06E+02	3.12E+02
0.528	8.95E+02	8.95E+02	8.96E+02	8.96E+02	8.95E+02	8.96E+02	8.96E+02	8.94E+02	8.95E+02
0.554	2.06E+02	2.04E+02	2.07E+02	2.07E+02	2.05E+02	2.08E+02	2.06E+02	2.04E+02	2.06E+02
0.58	3.37E+02	3.54E+02	3.73E+02	3.97E+02	3.96E+02	3.89E+02	3.61E+02	3.45E+02	3.37E+02
0.605	2.90E+02	2.74E+02	3.22E+02	3.02E+02	3.24E+02	2.95E+02	3.12E+02	2.69E+02	2.90E+02
0.631	9.38E+02	9.66E+02	9.65E+02	9.73E+02	9.49E+02	9.71E+02	9.60E+02	9.62E+02	9.38E+02
0.656	2.10E+04	2.10E+04	2.10E+04	2.10E+04	2.10E+04	2.10E+04	2.10E+04	2.10E+04	2.10E+04
0.682	4.81E+02	4.92E+02	5.00E+02	4.98E+02	5.04E+02	5.00E+02	4.95E+02	4.94E+02	4.81E+02
0.708	1.58E+02	1.22E+02	2.52E+01	5.01E+01	7.86E+01	5.46E+01	3.01E+01	1.32E+02	1.58E+02
0.733	2.31E+02	2.08E+02	2.24E+02	2.00E+02	2.19E+02	2.00E+02	2.21E+02	2.07E+02	2.31E+02
0.759	1.22E+03	1.24E+03	1.25E+03	1.24E+03	1.23E+03	1.24E+03	1.25E+03	1.24E+03	1.22E+03

Excitation Forces Model 3 (N/Unit amplitude)									
Freq(Hz)	-180	-135	-90	-45	0	45	90	135	180
0.016	781979.88	781979.75	781981.06	781981.69	781982.56	781982.06	781981.81	781980.38	781979.94
0.04	748451.19	748450.56	748453.69	748456.19	748457.88	748456.69	748455.56	748452.81	748451.19
0.064	690278.13	690279.13	690282.13	690287.19	690289.25	690288.94	690284.81	690281.06	690278.19
0.089	611354.63	611354.88	611360.13	611366.38	611370.69	611368.56	611363.63	611357.69	611354.75
0.113	517511.47	517513.16	517519.75	517527.28	517532.44	517530.47	517523.5	517514.91	517511.47
0.137	417652.16	417653.69	417662.13	417673	417678.34	417674.94	417665.34	417656.53	417652.16
0.161	323001.81	323003.56	323012.91	323024.47	323029.72	323025.59	323015.34	323005.44	323001.91
0.185	2.43E+05	2.43E+05	2.43E+05	2.43E+05	2.43E+05	2.43E+05	2.43E+05	2.43E+05	2.43E+05
0.21	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05
0.234	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05
0.258	9.79E+04	9.78E+04	9.78E+04	9.78E+04	9.78E+04	9.78E+04	9.78E+04	9.78E+04	9.79E+04
0.282	7.33E+04	7.33E+04	7.32E+04	7.32E+04	7.32E+04	7.32E+04	7.32E+04	7.33E+04	7.33E+04
0.307	5.60E+04	5.60E+04	5.60E+04	5.60E+04	5.60E+04	5.60E+04	5.60E+04	5.60E+04	5.60E+04
0.331	4.41E+04	4.41E+04	4.41E+04	4.41E+04	4.41E+04	4.41E+04	4.41E+04	4.41E+04	4.41E+04
0.355	3.61E+04	3.61E+04	3.61E+04	3.61E+04	3.61E+04	3.61E+04	3.61E+04	3.61E+04	3.61E+04
0.379	3.15E+04	3.15E+04	3.15E+04	3.15E+04	3.15E+04	3.15E+04	3.15E+04	3.15E+04	3.15E+04
0.403	4.18E+04	4.18E+04	4.18E+04	4.18E+04	4.18E+04	4.18E+04	4.18E+04	4.18E+04	4.18E+04
0.428	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.44E+04
0.452	1.49E+04	1.49E+04	1.48E+04	1.48E+04	1.48E+04	1.48E+04	1.49E+04	1.49E+04	1.49E+04
0.476	1.35E+04	1.35E+04	1.35E+04	1.35E+04	1.35E+04	1.35E+04	1.35E+04	1.35E+04	1.35E+04
0.5	12072.549	12087.414	12151.964	12225.818	12258.456	12260.708	12216.091	12125.564	12072.546
0.524	11498.22	11521.166	11545.366	11552.255	11537.593	11543.727	11552.895	11516.325	11498.188
0.549	13322.104	13455.784	13607.437	13494.989	13347.187	13465.201	13610.945	13467.167	13322.085
0.573	14163.417	14122.352	14100.146	14170.554	14200.905	14143.139	14089.378	14112.312	14163.429
0.597	5764.2065	5745.1587	5728.585	5817.0708	5779.2495	5782.4844	5798.0313	5705.6987	5764.2148
0.621	3360.9377	3369.2729	3367.8113	3360.2175	3377.3347	3351.3982	3363.2402	3364.532	3360.9292
0.646	502.95154	507.8327	512.58881	495.40277	510.75723	502.34885	502.95374	497.64795	502.93079
0.67	15425.168	15343.277	15393.641	15385.576	15377.568	15407.174	15353.158	15383.471	15425.196
0.694	4025.6882	4024.7324	4042.8357	4052.9553	4092.5381	4053.4167	4045.7366	4053.582	4025.6838
		17.4224	2266.4749	2131.4036	2132.1245	2186.5532	2293.3843	2413.3252	2512.5552

Excitation Forces Model 4 (N/Unit amplitude)									
Freq(Hz)	-180	-135	-90	-45	0	45	90	135	180
0.016	782691.69	782692.19	782692.56	782691.69	782691.06	782691.69	782692.56	782692.19	782691.69
0.043	746211.19	746210.69	746210.88	746208.81	746209.19	746209.25	746210.69	746210.06	746211.25
0.071	681257.13	681257.94	681256.63	681255.63	681253.44	681255	681256.19	681257.94	681257.13
0.099	592927.75	592928.5	592927.19	592925.13	592923	592925.06	592927.19	592928.31	592927.81
0.126	489566.72	489567.25	489564.69	489562.66	489559.81	489562.31	489564.78	489567.72	489566.72
0.154	384037.47	384036.13	384033.19	384028.16	384027.19	384028.91	384033.91	384036.09	384037.53
0.181	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05
0.209	2.12E+05	2.12E+05	2.12E+05	2.12E+05	2.12E+05	2.12E+05	2.12E+05	2.12E+05	2.12E+05
0.236	1.52E+05	1.52E+05	1.52E+05	1.52E+05	1.52E+05	1.52E+05	1.52E+05	1.52E+05	1.52E+05
0.264	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05
0.291	7.22E+04	7.22E+04	7.22E+04	7.22E+04	7.22E+04	7.22E+04	7.22E+04	7.22E+04	7.22E+04
0.319	4.76E+04	4.76E+04	4.76E+04	4.76E+04	4.76E+04	4.76E+04	4.76E+04	4.76E+04	4.76E+04
0.346	1.34E+04	1.34E+04	1.34E+04	1.34E+04	1.34E+04	1.34E+04	1.34E+04	1.34E+04	1.34E+04
0.374	2.19E+04	2.19E+04	2.19E+04	2.19E+04	2.19E+04	2.19E+04	2.19E+04	2.19E+04	2.19E+04
0.401	1.36E+04	1.36E+04	1.36E+04	1.36E+04	1.37E+04	1.36E+04	1.36E+04	1.36E+04	1.36E+04
0.429	8.43E+03	8.43E+03	8.45E+03	8.47E+03	8.50E+03	8.50E+03	8.48E+03	8.45E+03	8.43E+03
0.457	5.17E+03	5.17E+03	5.16E+03	5.15E+03	5.14E+03	5.14E+03	5.14E+03	5.15E+03	5.17E+03
0.484	3.03E+03	3.02E+03	3.01E+03	3.01E+03	3.02E+03	3.02E+03	3.00E+03	3.01E+03	3.03E+03
0.512	1.34E+03	1.35E+03	1.40E+03	1.38E+03	1.33E+03	1.35E+03	1.40E+03	1.38E+03	1.34E+03
0.539	1.48E+03	1.49E+03	1.49E+03	1.49E+03	1.48E+03	1.49E+03	1.50E+03	1.49E+03	1.48E+03
0.567	1424.118	1368.2759	1422.1251	1406.2216	1382.4047	1441.41	1391.3784	1405.4606	1424.1154
0.594	301.75705	312.06311	309.49326	277.83176	246.89488	236.30792	237.85957	268.44168	301.75653
0.622	368.85184	365.41589	380.57535	376.02209	377.25583	378.12793	393.01022	376.04211	368.85159
0.649	2974.3997	2946.5828	2846.4968	2869.4175	2982.0703	2946.2063	2847.9875	2876.4617	2974.3994
0.677	770.31482	765.13678	771.427	783.10773	769.91565	775.40295	781.08569	768.4314	770.31451
0.704	88.763748	108.87664	107.13908	93.816696	166.35933	162.33261	120.59103	108.4842	88.764771
0.732	263.74207	277.48364	258.71799	278.95337	253.27855	277.29315	268.34589	282.33493	263.74136
0.76	2129.3181	2117.2083	2142.4487	2135.9236	2136.9922	2113.9954	2145.7573	2139.8474	2129.3179
0.787	470.53021	454.97482	454.38501	465.98254	440.9516	460.74469	463.26422	455.63049	470.53137
0.815	61.504086	10.266485	39.899715	38.778667	70.005173	12.646641	55.248177	55.272465	61.505062

Excitation Forces Model 5 (N/Unit amplitude)									
Freq(Hz)	-180	-135	-90	-45	0	45	90	135	180
0.016	781072.75	781071.63	781073.06	781075.13	781075.81	781076.56	781076.81	781075.88	781072.75
0.04	742931.56	742928.94	742933.25	742934.19	742939	742940.94	742942.63	742935.5	742931.56
0.065	676583.56	676579.81	676582.63	676588.31	676595.56	676598.88	676597.44	676590.31	676583.56
0.089	586918.81	586912.81	586918.81	586925.81	586934.94	586938.63	586938.5	586928.19	586918.81
0.114	481324.59	481320.16	481325.31	481332.25	481343.75	481350.09	481348.25	481334.72	481324.56
0.138	370834.75	370832.44	370834.75	370843.78	370852.47	370862.72	370858.66	370847.59	370834.63
0.162	2.69E+05	2.69E+05	2.69E+05	2.69E+05	2.69E+05	2.69E+05	2.69E+05	2.69E+05	2.69E+05
0.187	1.86E+05	1.86E+05	1.86E+05	1.86E+05	1.86E+05	1.86E+05	1.86E+05	1.86E+05	1.86E+05
0.211	1.25E+05	1.25E+05	1.25E+05	1.25E+05	1.25E+05	1.25E+05	1.25E+05	1.25E+05	1.25E+05
0.236	8.31E+04	8.31E+04	8.31E+04	8.31E+04	8.31E+04	8.31E+04	8.31E+04	8.31E+04	8.31E+04
0.26	5.46E+04	5.46E+04	5.46E+04	5.46E+04	5.46E+04	5.46E+04	5.46E+04	5.46E+04	5.46E+04
0.284	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04	3.62E+04
0.309	2.46E+04	2.46E+04	2.46E+04	2.46E+04	2.46E+04	2.46E+04	2.46E+04	2.46E+04	2.46E+04
0.333	1.88E+04	1.88E+04	1.88E+04	1.88E+04	1.88E+04	1.88E+04	1.88E+04	1.88E+04	1.88E+04
0.358	6.58E+02	6.52E+02	6.64E+02	6.83E+02	6.95E+02	6.99E+02	6.96E+02	6.73E+02	6.58E+02
0.382	4.89E+03	4.91E+03	4.89E+03	4.87E+03	4.85E+03	4.85E+03	4.85E+03	4.88E+03	4.89E+03
0.407	3.70E+03	3.72E+03	3.70E+03	3.67E+03	3.64E+03	3.63E+03	3.64E+03	3.67E+03	3.70E+03
0.431	2.70E+03	2.76E+03	2.71E+03	2.61E+03	2.50E+03	2.46E+03	2.49E+03	2.59E+03	2.70E+03
0.455	1.78E+03	1.77E+03	1.78E+03	1.81E+03	1.84E+03	1.87E+03	1.85E+03	1.81E+03	1.78E+03
0.48	1.24E+03	1.24E+03	1.24E+03	1.24E+03	1.25E+03	1.28E+03	1.26E+03	1.24E+03	1.24E+03
0.504	7.84E+02	1.01E+03	9.08E+02	6.86E+02	7.89E+02	1.03E+03	9.19E+02	6.85E+02	7.84E+02
0.529	5.30E+02	5.11E+02	5.21E+02	5.37E+02	5.33E+02	5.25E+02	5.27E+02	5.36E+02	5.30E+02
0.553	3.44E+02	3.35E+02	3.42E+02	3.49E+02	3.50E+02	3.47E+02	3.46E+02	3.50E+02	3.44E+02
0.577	3.10E+02	2.98E+02	3.09E+02	3.25E+02	3.25E+02	3.22E+02	3.19E+02	3.08E+02	3.10E+02
0.602	3.73E+01	2.83E+01	3.50E+01	3.07E+01	3.46E+01	2.51E+01	3.67E+01	3.08E+01	3.73E+01
0.626	1.31E+02	1.28E+02	1.39E+02	1.33E+02	1.39E+02	1.31E+02	1.36E+02	1.27E+02	1.31E+02
0.651	8.41E+02	8.28E+02	8.09E+02	8.18E+02	8.38E+02	8.30E+02	8.06E+02	8.14E+02	8.41E+02
0.675	1.66E+02	1.72E+02	1.73E+02	1.74E+02	1.75E+02	1.71E+02	1.75E+02	1.73E+02	1.66E+02
0.699	4.20E+01	2.92E+01	4.99E+01	5.98E+01	4.96E+01	6.39E+01	3.78E+01	2.99E+01	4.20E+01
		11E+00	1.91E+01	2.89E+01	3.55E+01	2.58E+01	1.81E+01	5.89E+00	4.02E+00

Lampiran 3. Data Respon Struktur output Matlab

Added Mass(kg)									
Freq(rad/s)	Add-mass1	Freq(rad/s)	Add-mass2	Freq(rad/s)	Add-mass3	Freq(rad/s)	Add-mass4	Freq(rad/s)	Add-mass5
0.101	339290	0.101	248250	0.101	314400	0.101	249460	0.101	399250
0.267	343440	0.262	252880	0.253	319680	0.274	255220	0.254	405500
0.432	330980	0.423	245400	0.405	314600	0.447	247510	0.408	397430
0.598	306160	0.584	225560	0.557	299160	0.620	226360	0.561	376700
0.763	279280	0.745	200880	0.709	278750	0.793	199680	0.715	357610
0.929	261440	0.906	179690	0.861	259610	0.967	175840	0.868	335460
1.094	253530	1.067	166000	1.013	246260	1.140	160010	1.021	324650
1.260	253740	1.228	160470	1.165	239690	1.313	151970	1.175	321090
1.425	257870	1.389	160740	1.318	238820	1.486	150100	1.328	323320
1.591	263040	1.550	163770	1.470	241130	1.659	152060	1.481	328670
1.756	267900	1.711	167780	1.622	243510	1.832	154480	1.635	330610
1.922	271650	1.872	171520	1.774	246860	2.005	155490	1.788	334230
2.087	273760	2.033	176100	1.926	249810	2.178	172290	1.942	334540
2.253	276430	2.194	181390	2.078	252200	2.351	178060	2.095	337210
2.418	276290	2.355	182520	2.230	255210	2.524	176610	2.248	339450
2.584	278120	2.515	183200	2.382	269410	2.698	176940	2.402	340600
2.749	277450	2.676	183910	2.534	249240	2.871	177700	2.555	341590
2.915	278080	2.837	184380	2.686	253080	3.044	177740	2.708	341900
3.080	278390	2.998	184350	2.838	253110	3.217	178360	2.862	341990
3.246	276000	3.159	184760	2.990	254490	3.390	178380	3.015	343160
3.411	276670	3.320	185050	3.142	255200	3.563	178710	3.169	343230
3.577	276920	3.481	184670	3.294	256230	3.736	179590	3.322	340850
3.742	277600	3.642	183920	3.447	257740	3.909	179780	3.475	342090
3.908	277900	3.803	184260	3.599	251330	4.082	176420	3.629	343350
4.073	278160	3.964	184590	3.751	252590	4.255	176890	3.782	342480
4.239	278360	4.125	184860	3.903	252020	4.429	177470	3.935	342650
4.404	278570	4.286	185110	4.055	249170	4.602	177840	4.089	342690
4.570	278740	4.447	185330	4.207	243790	4.775	178130	4.242	342750
4.735	279180	4.608	185530	4.359	273240	4.948	178330	4.396	343200
4.901	279300	4.769	185710	4.511	261930	5.121	178580	4.549	343450

Excitation Force(N/unit amplitude)									
Freq(rad/s)	Fex1	Freq(rad/s)	Fex2	Freq(rad/s)	Fex3	Freq(rad/s)	Fex4	Freq(rad/s)	Fex5
0.101	761010.000	0.101	762710.000	0.101	763090.000	0.101	764040.000	0.101	761430.000
0.267	706150.000	0.262	719270.000	0.253	724780.000	0.274	723400.000	0.254	714080.000
0.432	611670.000	0.423	642670.000	0.405	657610.000	0.447	649620.000	0.408	632660.000
0.598	495830.000	0.584	544930.000	0.557	570660.000	0.620	554320.000	0.561	530720.000
0.763	377750.000	0.745	440210.000	0.709	475110.000	0.793	451720.000	0.715	421490.000
0.929	269850.000	0.906	339750.000	0.861	380950.000	0.967	353280.000	0.868	320680.000
1.094	179770.000	1.067	250690.000	1.013	295080.000	1.140	265370.000	1.021	232400.000
1.260	108860.000	1.228	176220.000	1.165	221560.000	1.313	191410.000	1.175	161400.000
1.425	54957.000	1.389	116600.000	1.318	162020.000	1.486	131210.000	1.328	107420.000
1.591	13268.000	1.550	69624.000	1.470	116440.000	1.659	82167.000	1.481	68284.000
1.756	20589.000	1.711	30953.000	1.622	84144.000	1.832	40080.000	1.635	42282.000
1.922	45134.000	1.872	5754.600	1.774	61177.000	2.005	10908.000	1.788	24185.000
2.087	47153.000	2.033	47975.000	1.926	46115.000	2.178	116110.000	1.942	11877.000
2.253	33776.000	2.194	59982.000	2.078	38059.000	2.351	60333.000	2.095	3733.200
2.418	19114.000	2.355	35964.000	2.230	37583.000	2.524	32386.000	2.248	13759.000
2.584	7690.700	2.515	19181.000	2.382	127590.000	2.698	15302.000	2.402	7227.600
2.749	610.590	2.676	6935.500	2.534	517.860	2.871	1563.800	2.555	3112.600
2.915	5471.600	2.837	2882.000	2.686	5225.000	3.044	12077.000	2.708	496.800
3.080	6870.100	2.998	10104.000	2.838	5911.400	3.217	21079.000	2.862	3891.700
3.246	5776.800	3.159	12948.000	2.990	4819.000	3.390	17654.000	3.015	6975.600
3.411	3543.100	3.320	11290.000	3.142	4683.400	3.563	8591.100	3.169	9626.100
3.577	1296.200	3.481	6718.000	3.294	3887.400	3.736	100.860	3.322	8852.200
3.742	177.090	3.642	1879.400	3.447	7964.300	3.909	6532.900	3.475	5131.500
3.908	718.710	3.803	1794.400	3.599	290.640	4.082	8666.300	3.629	1591.500
4.073	658.670	3.964	3329.400	3.751	1930.600	4.255	5764.200	3.782	1492.300
4.239	351.360	4.125	3011.700	3.903	4706.000	4.429	1032.900	3.935	3504.800
4.404	71.048	4.286	1508.900	4.055	9213.900	4.602	2590.100	4.089	3896.000
4.570	67.025	4.447	148.050	4.207	22617.000	4.775	3528.800	4.242	2105.500
4.735	80.054	4.608	667.020	4.359	24776.000	4.948	1835.700	4.396	671.820
4.901	42.146	4.769	780.320	4.511	2817.800	5.121	81.993	4.549	558.750

Radiation Damping(Ns/m)									
Freq(rad/s)	Rad-B1	Freq(rad/s)	Rad-B2	Freq(rad/s)	Rad-B3	Freq(rad/s)	Rad-B4	Freq(rad/s)	Rad-B5
0.101	414.790	0.101	354.550	0.101	313.780	0.101	335.890	0.101	360.670
0.267	6591.300	0.262	5509.300	0.253	4440.900	0.274	6021.900	0.254	5085.000
0.432	21250.000	0.423	18559.000	0.405	14924.000	0.447	21114.000	0.408	16548.000
0.598	37422.000	0.584	35273.000	0.557	29008.000	0.620	41130.000	0.561	30659.000
0.763	46100.000	0.745	48115.000	0.709	41012.000	0.793	57369.000	0.715	40626.000
0.929	43588.000	0.906	52109.000	0.861	46517.000	0.967	63999.000	0.868	42659.000
1.094	33105.000	1.067	47032.000	1.013	44578.000	1.140	60190.000	1.021	37048.000
1.260	20288.000	1.228	36426.000	1.165	37231.000	1.313	49256.000	1.175	27207.000
1.425	9326.600	1.389	24706.000	1.318	27916.000	1.486	35352.000	1.328	17625.000
1.591	1649.700	1.550	14024.000	1.470	19484.000	1.659	22161.000	1.481	15284.000
1.756	2138.400	1.711	5813.500	1.622	12446.000	1.832	11241.000	1.635	7799.200
1.922	5170.400	1.872	828.120	1.774	8945.800	2.005	2900.000	1.788	1747.600
2.087	2636.500	2.033	7189.500	1.926	7235.600	2.178	41756.000	1.942	5516.100
2.253	3593.500	2.194	5568.900	2.078	4477.700	2.351	4732.900	2.095	228.370
2.418	1619.100	2.355	2297.000	2.230	6027.000	2.524	866.180	2.248	958.090
2.584	760.980	2.515	1017.100	2.382	70016.000	2.698	779.440	2.402	24.801
2.749	4.232	2.676	550.610	2.534	163.270	2.871	262.890	2.555	91.182
2.915	187.630	2.837	407.100	2.686	1038.900	3.044	651.890	2.708	209.740
3.080	135.840	2.998	590.770	2.838	2438.600	3.217	648.860	2.862	419.130
3.246	231.270	3.159	651.060	2.990	2386.000	3.390	903.130	3.015	254.070
3.411	91.961	3.320	28.299	3.142	330.870	3.563	87.049	3.169	231.320
3.577	58.657	3.481	154.160	3.294	917.300	3.736	404.280	3.322	649.520
3.742	4.849	3.642	65.083	3.447	254.680	3.909	463.860	3.475	339.950
3.908	67.159	3.803	90.043	3.599	279.400	4.082	144.010	3.629	72.866
4.073	19.642	3.964	28.162	3.751	468.630	4.255	14.205	3.782	91.576
4.239	0.520	4.125	8.233	3.903	1410.900	4.429	18.265	3.935	182.730
4.404	2.134	4.286	59.792	4.055	3093.000	4.602	117.980	4.089	209.590
4.570	0.066	4.447	2.283	4.207	31250.000	4.775	3.049	4.242	89.716
4.735	0.000	4.608	12.395	4.359	34616.000	4.948	64.507	4.396	7.565
4.901	0.000	4.769	11.087	4.511	863.830	5.121	6.596	4.549	21.448

Freq(rad/s)	Rao 1	Freq(rad/s)	Rao 2	Freq(rad/s)	Rao 3	Freq(rad/s)	Rao 4	Freq(rad/s)	Rao 5
0.101	0.976	0.101	0.976	0.101	0.976	0.101	0.976	0.101	0.976
0.267	0.977	0.262	0.976	0.253	0.976	0.274	0.976	0.254	0.977
0.432	0.994	0.423	0.984	0.405	0.981	0.447	0.980	0.408	0.988
0.598	1.063	0.584	1.014	0.557	1.003	0.620	0.997	0.561	1.033
0.763	1.344	0.745	1.114	0.709	1.070	0.793	1.056	0.715	1.195
0.929	3.411	0.906	1.473	0.861	1.276	0.967	1.243	0.868	1.954
1.094	0.732	1.067	2.752	1.013	2.081	1.140	1.799	1.021	2.884
1.260	0.190	1.228	0.697	1.165	1.577	1.313	0.988	1.175	0.467
1.425	0.057	1.389	0.220	1.318	0.448	1.486	0.312	1.328	0.162
1.591	0.009	1.550	0.081	1.470	0.182	1.659	0.116	1.481	0.066
1.756	0.011	1.711	0.025	1.622	0.088	1.832	0.038	1.635	0.030
1.922	0.018	1.872	0.003	1.774	0.047	2.005	0.008	1.788	0.013
2.087	0.015	2.033	0.023	1.926	0.027	2.178	0.062	1.942	0.005
2.253	0.009	2.194	0.023	2.078	0.018	2.351	0.026	2.095	0.001
2.418	0.004	2.355	0.012	2.230	0.015	2.524	0.011	2.248	0.004
2.584	0.002	2.515	0.005	2.382	0.041	2.698	0.005	2.402	0.002
2.749	0.000	2.676	0.002	2.534	0.000	2.871	0.000	2.555	0.001
2.915	0.001	2.837	0.001	2.686	0.001	3.044	0.003	2.708	0.000
3.080	0.001	2.998	0.002	2.838	0.001	3.217	0.004	2.862	0.001
3.246	0.001	3.159	0.002	2.990	0.001	3.390	0.003	3.015	0.001
3.411	0.000	3.320	0.002	3.142	0.001	3.563	0.001	3.169	0.001
3.577	0.000	3.481	0.001	3.294	0.001	3.736	0.000	3.322	0.001
3.742	0.000	3.642	0.000	3.447	0.001	3.909	0.001	3.475	0.001
3.908	0.000	3.803	0.000	3.599	0.000	4.082	0.001	3.629	0.000
4.073	0.000	3.964	0.000	3.751	0.000	4.255	0.001	3.782	0.000
4.239	0.000	4.125	0.000	3.903	0.000	4.429	0.000	3.935	0.000
4.404	0.000	4.286	0.000	4.055	0.001	4.602	0.000	4.089	0.000
4.570	0.000	4.447	0.000	4.207	0.002	4.775	0.000	4.242	0.000
4.735	0.000	4.608	0.000	4.359	0.002	4.948	0.000	4.396	0.000
4.901	0.000	4.769	0.000	4.511	0.000	5.121	0.000	4.549	0.000

Lampiran 4. Data Massa, Kekakuan Hidrostatik dan Redaman Viskositas

ANSYS AQWA				
MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
MASSA (Kg)				
603293.3	519506	416389.4	388785.7	500162.9
HYDROSTATIC STIFFNESS (N/m)				
788841.5	788937.2	788840.6	788959	788734.7
VISCOUS DAMPING (m/s)				
173991.2	160227.3	158051.2	146983.3	171738.9

MATLAB				
MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
MASSA (Kg)				
603759.1	519896.61	416802.8	590342.3	500646.5
HYDROSTATIC STIFFNESS (N/m)				
789717.2	789702.2	789603.8	789717.2	789605.1
VISCOUS DAMPING (m/s)				
171990.4	155507	151866.5	162421.8	168146.3

Lampiran 5. *Time Domain Analysis(RAO-Based Structure Response), Power Absorbed(kW) and Efficiency Energy(%)*