INVENTOCEAN TECHNOLOGIES PVT. LTD.

Project:

TECHNICAL SUPPORT

Client:

BENTLEY SYSTEMS

Document Title:

FAQ - &DATA CURVES P_SPECTRUM

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1. USER QUESTION

A user asks -

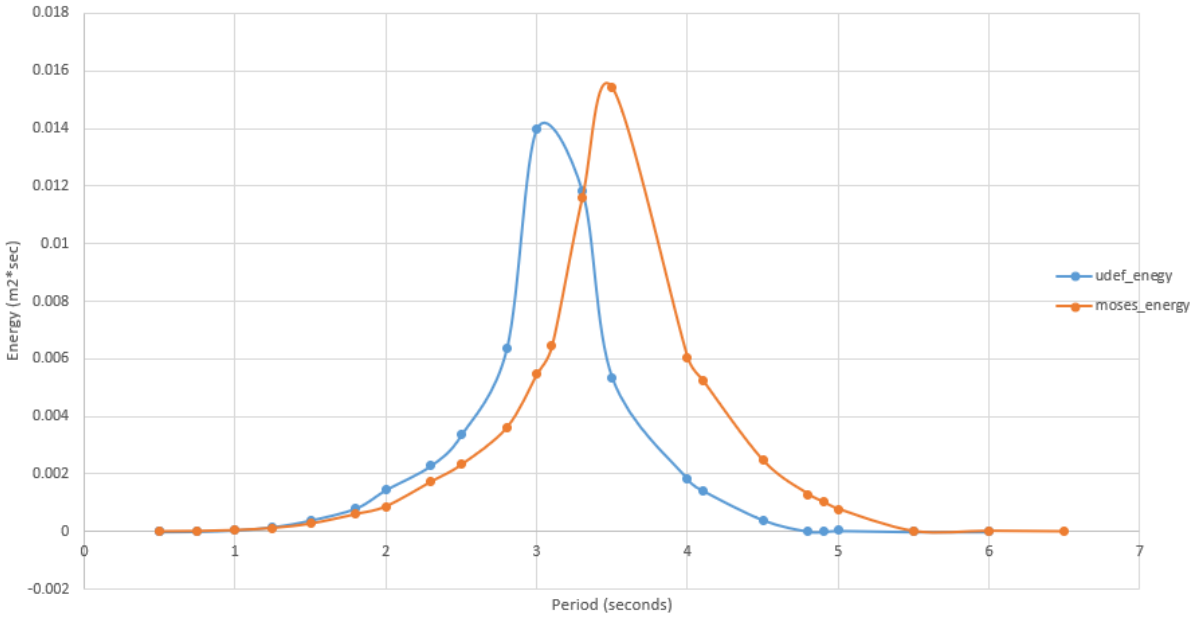
I have defined my spectrum (u_def) using the "**&data curves p_spectrum**" command in MOSES as shown below:

```
&data curves p_spectrum u_def  \
             6.0      0.000000  \
             5.5      0.000001  \
             5.0      0.000037  \
             4.9      0.0000065 \
             4.8      0.0000118 \
             4.5      0.000405  \
             4.1      0.001433  \
             4.0      0.001823  \
             3.5      0.005336  \
             3.3      0.011832  \
             3.0      0.013991  \
             2.8      0.000630  \
             2.5      0.003366  \
             2.3      0.002305  \
             2.0      0.001457  \
             1.8      0.000817  \
             1.5      0.000401  \
             1.25     0.000167  \
             1.0      0.000056  \
             0.75     0.000013  \
             0.5      0.000002
```

Now I use the above spectrum with **&ENV** command to define my environment with Hs = 0.4 m and Tp = 3.1 seconds as shown below:

```
&env peak_diff -sea u_def 0 0.4 3.1 -sp_type peak
&status sea_spectrum -plot
        vlist
        plot 2 3 -no
        set_variable freql -column 1
        set_variable perl  -column 2
        set_variable specl -column 3
&type env_different_peak frequency values (rad/sec) : %freql%
&type env_different_peak period values (seconds) : %perl%
&type env_different_peak spectrum values (m2*sec) : %specl%
end
```

When I plot the u_def (user-defined) spectrum and MOSES defined spectrum (obtained from **&status sea_spectrum** command) in the same graph in excel, I find the peak values to be different in both the spectrums as shown below. Shouldn't the peak values be at the same period since it is the same spectrum?


0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
-0.002
Energy (m2*sec)
0
1
2
3
4
5
6
7
Period (seconds)
udef_enegy
moses_energy

2. RESPONSE TO USER QUESTION

The reason for different peak values is because the spectrum curve that you have defined (u_def) peaks at the period of 3 seconds. However, you have instructed MOSES to define the environment with the u_def curve but with a different peak period of 3.1 seconds.

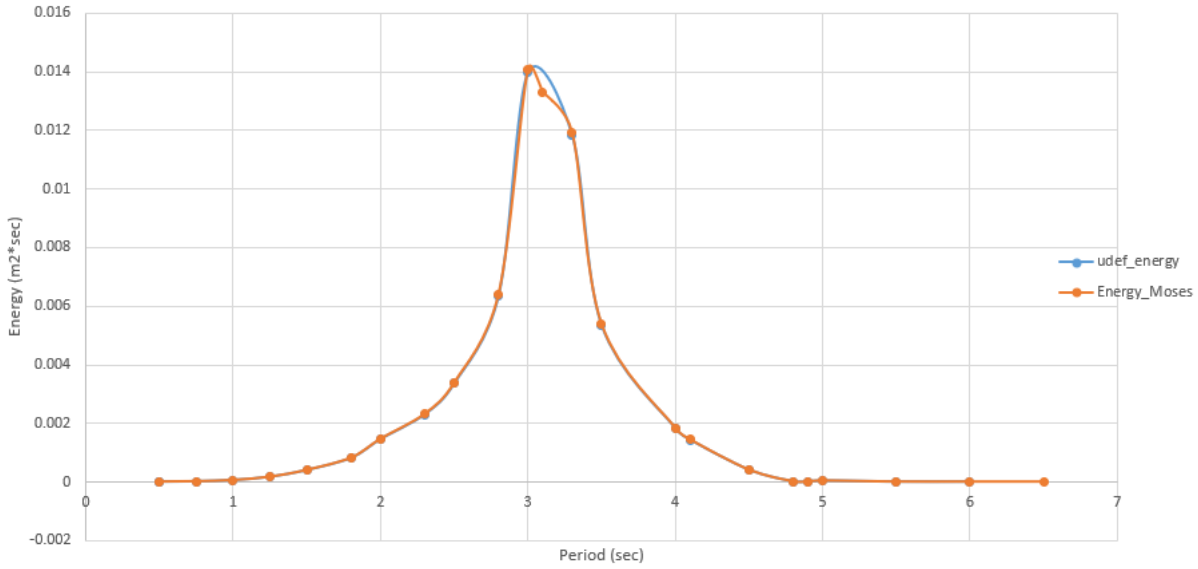
When you first input the P_SPECTRUM curve MOSES will automatically find the peak period of the curve data (3 seconds in this case). If this peak value differs from the defined peak period on **&ENV -SEA** then MOSES will move the peak of the spectrum to the right (when plotted against period) and therefore you have different peaks in your excel graph.

To ensure the input curve matches the spectrum produced by MOSES it is best to enter the curve P_SPECTRUM at the same periods as defined in &DEFAULT -PERIOD. In addition to that, the peak period of &ENV command should be the same as the peak period of the user-defined (u_def) curve.

You can cross-check this by inputting the same peak period (3.0 seconds) in the &ENV command as shown below :

```
&env peak_same -sea u_def 0 0.4 3.0 -sp_type peak
&status sea_spectrum -plot
        vlist
        plot 2 3 -no
        set_variable freq2 -column 1
        set_variable per2  -column 2
        set_variable spec2 -column 3
&type env_same_peak frequency values (rad/sec) : %freq2%
&type env_same_peak period values (seconds) : %per2%
&type env_same_peak spectrum values (m2*sec) : %spec2%
```

Now when you plot the above two spectrum curves (u_def and MOSES_def) into the same excel graph you will see they match quite well.



When defining spectrum using &data curves command following things should be kept in mind for best results:

- Make sure the peak of the spectrum is clearly defined with the data point in the P_SPECTRUM curve input.
- Make sure the peak period of the curve and the peak period defined on &ENV -SEA are the same.
- Define extra periods on &DEFAULT -PERIOD, particularly around and including the peak period.

3. MOSES INPUT FILES

Rows	test.cif File
1	&device -pri device -oec no -mecho no -limerror 1000
2	&titl Project: User_Defined Spectrum Test
3	&dime -dimen meters m-tons
4	&default -period 25. 20. 19. 18. 17. 16. 15. 14.5 \
6	14. 13.5 13. 12.5 12. 11.5 11. 10.5 \
7	10. 9.5 9. 8.5 8. 7.5 7. 6.5 \
8	6.0 5.5 5.0 4.9 4.8 4.5 4.1 4.0 3.5 3.3 3.1 \
9	3.0 2.8 2.5 2.3 2.0 1.8 1.5 1.25 1.0 0.75 0.5
10	inmodel
11	&data curves p_spectrum u_def \
12	6.0 0.000000 \
13	5.5 0.000001 \
14	5.0 0.000037 \
15	4.9 0.0000065 \
16	4.8 0.0000118 \
17	4.5 0.000405 \
18	4.1 0.001433 \
19	4.0 0.001823 \
20	3.5 0.005336 \
21	3.3 0.011832 \
22	3.0 0.013991 \
23	2.8 0.006360 \
24	2.5 0.003366 \
25	2.3 0.002305 \
26	2.0 0.001457 \
27	1.8 0.000817 \
28	1.5 0.000401 \
29	1.25 0.000167 \
30	1.0 0.000056 \
31	0.75 0.000013 \
32	0.5 0.000002
33	&env peak_diff -sea u_def 0 0.4 3.1 -sp_type peak
34	&status sea_spectrum -plot
35	vlist
36	plot 2 3 -no
37	set_variable freq1 -column 1
38	set_variable per1 -column 2
39	set_variable spec1 -column 3
40	&type env_different_peak frequency values (rad/sec) : %freq1%
41	&type env_different_peak period values (seconds) : %per1%
42	&type env_different_peak spectrum values (m2*sec) : %spec1%
43	end
44	&env peak_same -sea u_def 0 0.4 3.0 -sp_type peak
45	&status sea_spectrum -plot
46	vlist
47	plot 2 3 -no
48	set_variable freq2 -column 1
49	set_variable per2 -column 2
50	set_variable spec2 -column 3
51	&type env_same_peak frequency values (rad/sec) : %freq2%
52	&type env_same_peak period values (seconds) : %per2%
53	&type env_same_peak spectrum values (m2*sec) : %spec2%
54	end
55	&eofile

Rows	test.dat File
1	&dimen -dimen meters m-tons
2	&describe body dummy
3	*dummy 0 0 0
4	&eofile