By Tom Irvine Email: tomirvine@aol.com

March 5, 2007



Figure 1. Wave Height Power Spectral Density

The graph in Figure 1 is taken from Reference 1, Figure 10.3. It is essentially a "snapshot" of a certain time and place, as indicated on the graph.

The amplitude unit is  $m^2$  sec which is equivalent to  $m^2/Hz$ . The overall level from the mean curve is approximately 0.5 meters RMS, or 20 inches RMS.

Reference 1, Appendix A shows that the wave period can generally vary from 2.0 to 20 sec. The corresponding frequency domain is from 0.05 to 0.5 Hz.

Further data is given in Appendix A.

## Reference

1. Y. Goda, Random Seas and Design of Maritime Structures, World Scientific, London, 2000.

## APPENDIX A

## Pierson - Moskowitz Sea Spectrum

Values are worst case forecasts for open water in vicinity of referenced point.

Wind Speed (Kts)	Sea State	Significant Wave (ft)	Significant Range of Periods (sec)	Average Period (sec)	Average Length of Waves (ft)
3	0	<.5	<0.5 - 1	0.5	1.5
4	0	<.5	0.5 - 1	1	2
5	1	0.5	1 - 2.5	1.5	9.5
7	1	1	1 - 3.5	2	13
8	1	1	1 - 4	2	16
9	2	1.5	1.5 - 4	2.5	20
10	2	2	1.5 - 5	3	26
11	2.5	2.5	1.5 - 5.5	3	33
13	2.5	3	2 - 6	3.5	39.5
14	3	3.5	2 - 6.5	3.5	46
15	3	4	2 - 7	4	52.5
16	3.5	4.5	2.5 - 7	4	59
17	3.5	5	2.5 - 7.5	4.5	65.5
18	4	6	2.5 - 8.5	5	79
19	4	7	3 - 9	5	92
20	4	7.5	3 - 9.5	5.5	99
21	5	8	3 - 10	5.5	105
22	5	9	3.5 - 10.5	6	118
23	5	10	3.5 - 11	6	131.5
25	5	12	4 - 12	7	157.5
27	6	14	4 - 13	7.5	184
29	6	16	4.5 - 13.5	8	210
31	6	18	4.5 - 14.5	8.5	236.5
33	6	20	5 - 15.5	9	262.5
37	7	25	5.5 - 17	10	328.5

Wind Speed (Kts)	Sea State	Significant Wave (ft)	Significant Range of Periods (sec)	Average Period (sec)	Average Length of Waves (ft)
40	7	30	6 - 19	11	394
43	7	35	6.5 - 21	12	460
46	7	40	7 - 22	12.5	525.5
49	8	45	7.5 - 23	13	591
52	8	50	7.5 - 24	14	655
54	8	55	8 - 25.5	14.5	722.5
57	8	60	8.5 - 26.5	15	788
61	9	70	9 - 28.5	16.5	920
65	9	80	10 - 30.5	17.5	1099
69	9	90	10.5 - 32.5	18.5	1182
73	9	100	11 - 34.5	19.5	1313.5

1 knot = 1.151 miles/hour = 1.852 km/hr

1 ft = 0.3048 meters