

MBARI - DAVID PACKARD Seakeeping Analysis

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Revision History

Section	Rev	Description	Date	Approved
All	-	Initial release	8/18/25	WLM
Appendices	A	Corrected labels for Appendix A and B. Appendix C is also added for RAOs.	8/28/25	WLM

References

- Glostén, Document No. 18110.01-079-00, "50m Research Vessel Design Seakeeping Analysis," Rev. -, 15 November 2019.
- Freire Construcciones Navales, Document No. B731-152.011.01.02, "50m Research Vessel Design Stability Booklet," 18 June 2024.
- Glostén hull surface model, "MNV 07-05-2019 Trimmed.3dm."
- Glostén Dwg No. 18110.01-070-01, "50m Research Vessel Design – Lines Plan," Rev -.
- Freire Construcciones Navales, Dwg No. B731-102.020.01.02, "Lines Plan," Rev. 02, 7 July 2021.
- Freire Construcciones Navales, Dwg No. B731-264.010.01.04, "Bilge Keel Arrangement," Rev. 04, 27 May 2021.
- VisualSMP [software], Alion Science and Technology, Version 3.0, 2010.
- Meyers, W.; Baitis, A.; "SMP84: Improvements to Capability and Prediction Accuracy of the Standard Ship Motion Program SMP81," David W. Taylor Naval Ship Research and Development Center, 1985.
- Naval Sea Systems Command, Ship Performance Department, Document # DTNSRDC/SPD-0936-03, *Validation of the Standard Ship Motion Program SMP: Ship Motion Transfer Function Prediction*, July 1981 (<https://apps.dtic.mil/sti/citations/ADA106195>).
- Naval Sea Systems Command, Ship Performance Department, Document # DTNSRDC/SPD-0936-02, *Validation of the Standard Ship Motion Program SMP: Improved Roll Damping Prediction*, June 1981 (<https://apps.dtic.mil/sti/citations/ADA106196>).

Executive Summary

This report builds upon the seakeeping analysis initially performed for the *David Packard* research vessel before construction in Reference 1. As built, the bilge keel was shifted up and lengthened. This modification was included in the updated model used for this analysis in SMP, a linear potential flow theory seakeeping analysis software. Point motions for two positions of the vessel's ROV sheave were determined for the "Normal Science, Mid-Voyage" Load Condition in Sea States 3, 4, and 5 at zero vessel speed. The root mean square (RMS) values for global vertical motions, velocities, and accelerations were calculated and reported. The vessel's active roll stabilizers were considered inactive in this condition.

Modeling

The US Navy Ship Motion Program (SMP, Reference 7) was used to analyze the vessel. SMP calculates a vessel's seakeeping responses in the frequency domain using linear strip theory. The program was first validated in the early 1980's with a focus on Ship Motion Transfer Function Prediction (Reference 9) and Improved Roll Damping Prediction (Reference 10) followed by regular program improvements through 1995. Glosten applies the program to ship design on a regular basis and has observed good correlation between predicted ship motions and model test results. The vessel is treated as a three-dimensional rigid body with freedom to translate and rotate about its three axes. The position, velocity, and acceleration of any point on the vessel can be calculated from this information.

Sea States Definition

The particulars of the sea states and sea spectra considered in this analysis are discussed in Reference 1 and reproduced in Table 1. Waves were assumed to be long-crested (single-directional) in this analysis for conservative estimates of vessel motions.

Table 1 Climatology for seakeeping analysis

	Sea State 3	Sea State 4	Sea State 5
Wave significant height (H_S , ft)	2.9	6.2	10.7
Wave peak period (T_P , s)	7.5	8.8	9.7

Vessel Particulars

Vessel particulars and load condition used in this analysis are defined in Table 2. These conditions correspond to the "LC02 Normal Science Load, Mid-Voyage" condition (Reference 2).

Table 2 Vessel particulars and load conditions for seakeeping analysis

Parameter	Values
Displacement, LT	1,238.4
Length overall, ft	164
Length between perpendiculars, ft	162.4
Draft, ft	11.88
Vertical center of gravity ¹ , ft	17.09
Transverse metacentric height ² , ft	5.00
Free-surface correction, ft	0.17
Roll gyradius ³ as a fraction of beam, nondimensional	0.38
Pitch gyradius ³ as a fraction of length ⁴ , nondimensional	0.22
Yaw gyradius ³ as a fraction of length ⁴ , nondimensional	0.22

1. Vertical location of the center of gravity above baseline (without free-surface correction).

2. Including free-surface correction.

3. Gyradius is calculated about the center of gravity for roll and yaw and about a point on the waterplane directly below the center of gravity for pitch.

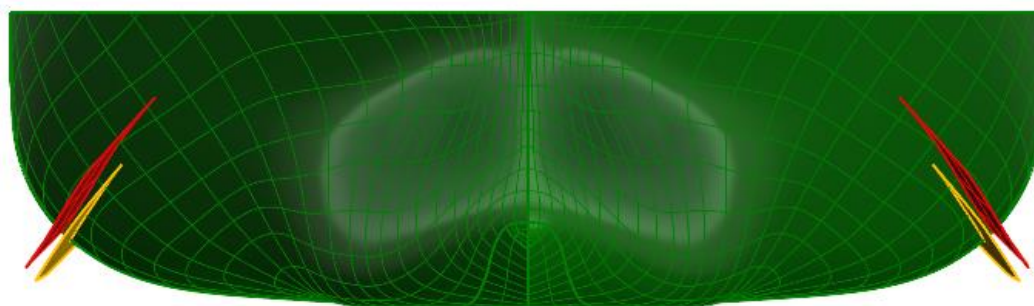
4. Length between perpendiculars is used for this calculation.

The vessel's as-built Lines Plan (Reference 5) indicates no change in the hullform compared to the hullform (References 3, 4) utilized for the original seakeeping analysis (Reference 1).

However, the as-built Bilge Keel Arrangement (Reference 6) indicates a vertical shift in the bilge keel placement and an increase in length from these lines plans. Figure 1 and Figure 2 illustrate these modifications, with the as-built bilge keel shown in red and the original shown in yellow.

Table 3 Bilge keel particulars

Bilge Keel Version	Frames on Hull Surface	Frames at Leading Edge	Length along Hull Surface (ft)	Nominal depth (ft)	Area as modeled (ft ²)
Original	30 to 53	33 to 50	45	2.3	88.5
As Built	24 to 57	30 to 52	65	2.1	116.4

**Figure 1 Body view of vessel highlighting bilge keel changes, looking aft**

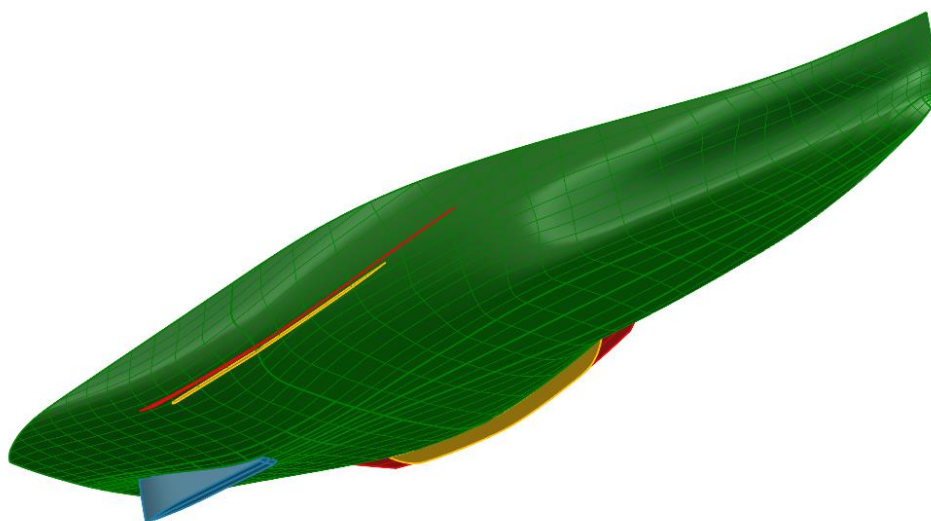


Figure 2 Isometric view of vessel highlighting bilge keel changes, looking up and aft

Motion Points for Seakeeping Analysis

Seakeeping response was calculated for two points on the vessel representing the two positions of the ROV launch sheave. The first point is the ROV sheave position during deployment and recovery operations, when the outer boom of the overhead crane is fully telescoped out and rotated 23 degrees down from horizontal. It has a maximum rotation of 35 degrees below horizontal. The second point is the ROV sheave location when cast during dives which the outer boom is fully raised and telescoped in. This position is a post-construction refinement from the estimate used for the “ROV Launch Sheave” position in the original seakeeping analysis (Reference 1) and therefore exhibits similar global motions.

Table 4 Motion points for seakeeping analysis

Motion Point	L, ft fwd Fr0 [AP]	T, ft stbd	V, ft ABL
ROV Sheave - Deployment	67.04	33.84	23.04
ROV Sheave - Cast	67.04	27.70	32.38

Interpreting Polar Plot of Seakeeping Results

Figure 3 shows an example polar plot. The values on the circumference indicate wave heading, as a direction ‘from’ in degrees. This means, for example, that a wave heading of 45 degrees indicates that the waves are approaching the vessel from the starboard bow. This convention is shown adjacent to the polar diagram.

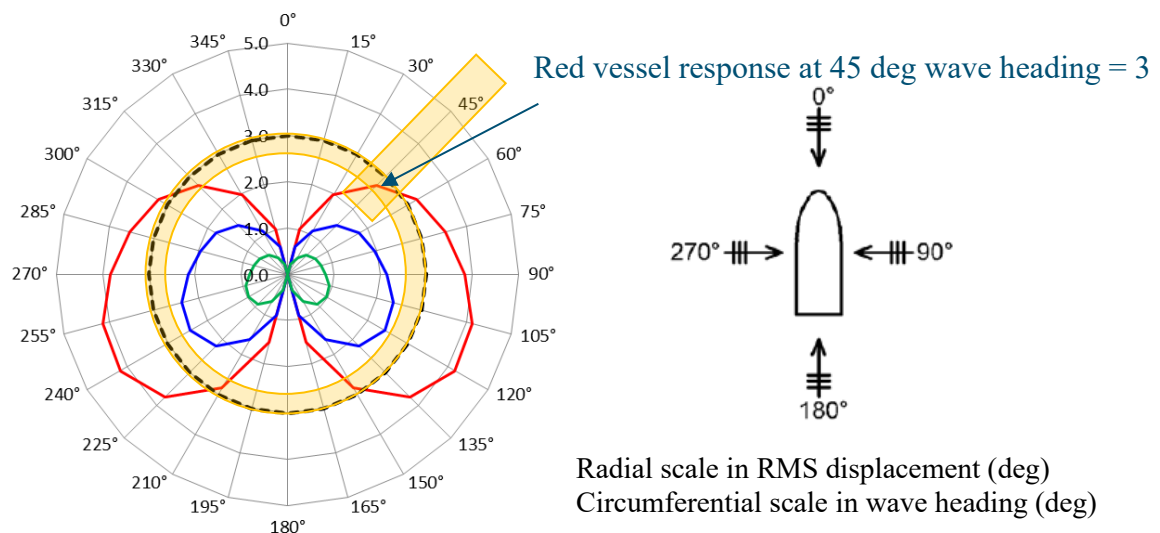


Figure 3 Example polar diagram with wave heading sign convention

Each colored line represents a response of a unique vessel or a unique sea state as a function of wave heading. For example, the red line shows that the response of a vessel in 45 degree waves is three response units. If the motion shown was roll angle, it would be three degrees of roll.

The dashed-black line at a constant response (over all headings) represents a criterion that must be met; in the example, the criterion is 3 response units. In the example plot, the green and blue lines show that the criteria are met in all wave headings, but the red lines show that the criteria are met only for head seas and following seas. Not all polar diagrams have a criterion indicated.

Motions Results

Motions at ROV Sheave – Cast

The polar diagrams showing the absolute RMS vertical displacement, velocity, and acceleration at the ROV sheave in the cast position are shown in Figure 4, Figure 5, and Figure 6, respectively.

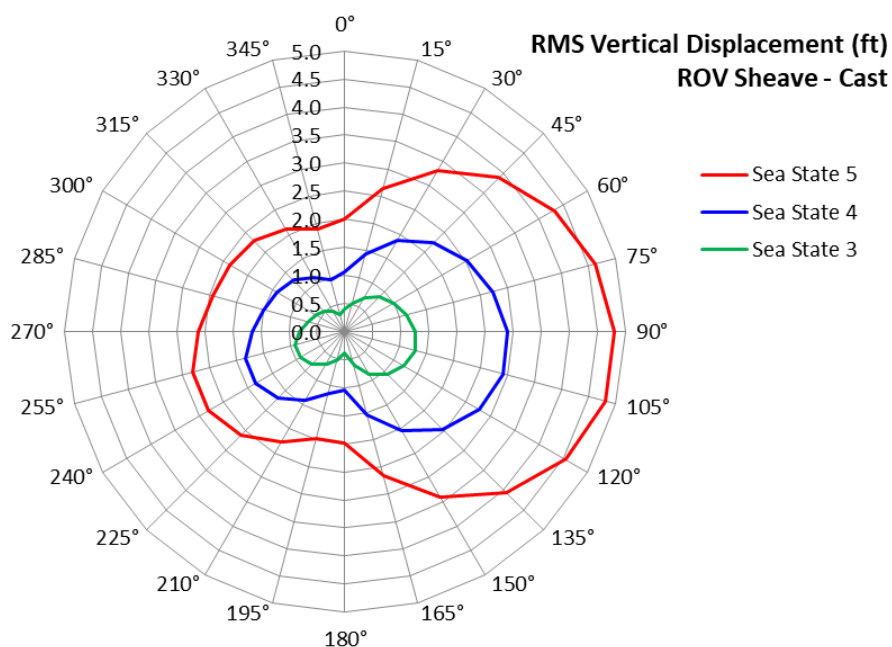


Figure 4 RMS global vertical displacement at ROV sheave in cast position in Sea States 3 through 5 without active roll stabilizers operating

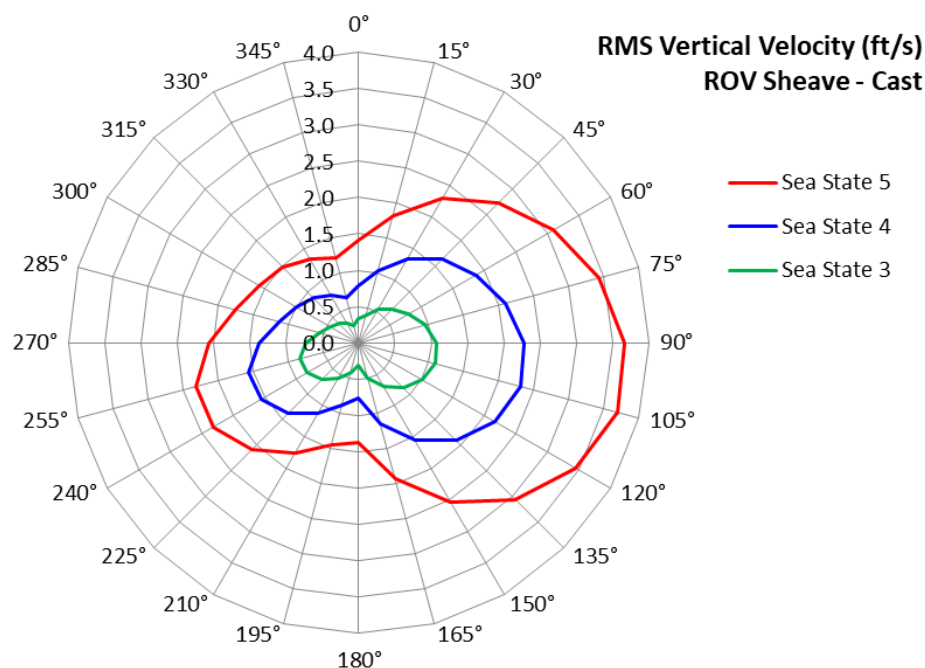


Figure 5 RMS global vertical velocity at ROV sheave in cast position in Sea States 3 through 5 without active roll stabilizers operating

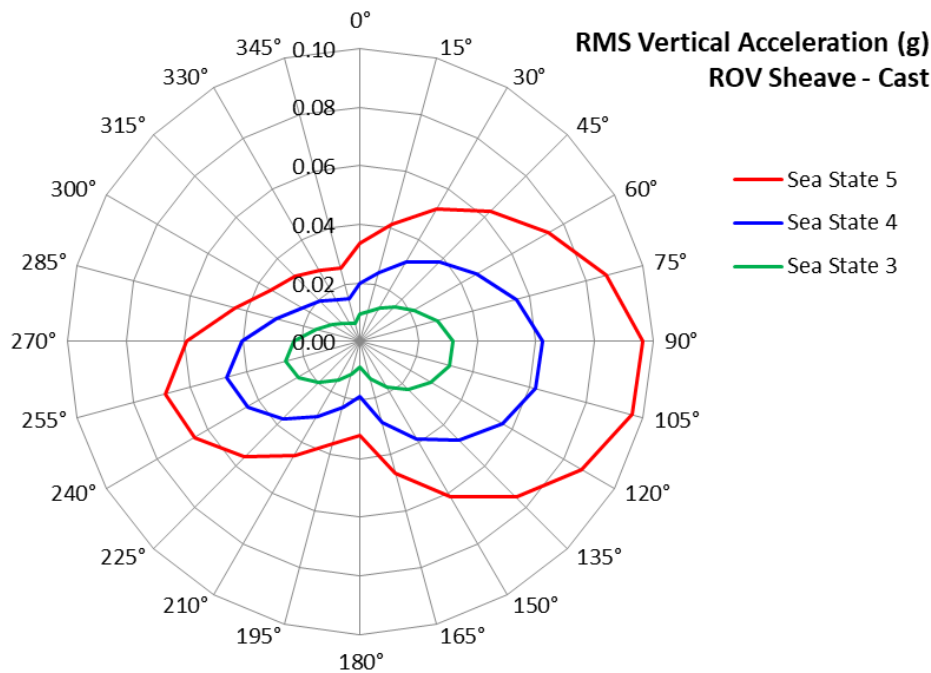


Figure 6 RMS global vertical acceleration at ROV sheave in cast position in Sea States 3 through 5 without active roll stabilizers operating

The beam-on condition on the starboard side (90°) shows higher response than the port side. The motions are not symmetric as the sheave position is off center. Waves from port have a different phase relationship with the sheave than waves from starboard. The results do not include any shielding effect from the body of the vessel from the waves. The plots for the absolute and relative responses are included in Appendix A.

Motions at ROV Sheave – Deployment

The polar diagrams showing the relative RMS vertical displacement and velocity at the ROV sheave in the deployment position are shown in Figure 7 and Figure 8, respectively.

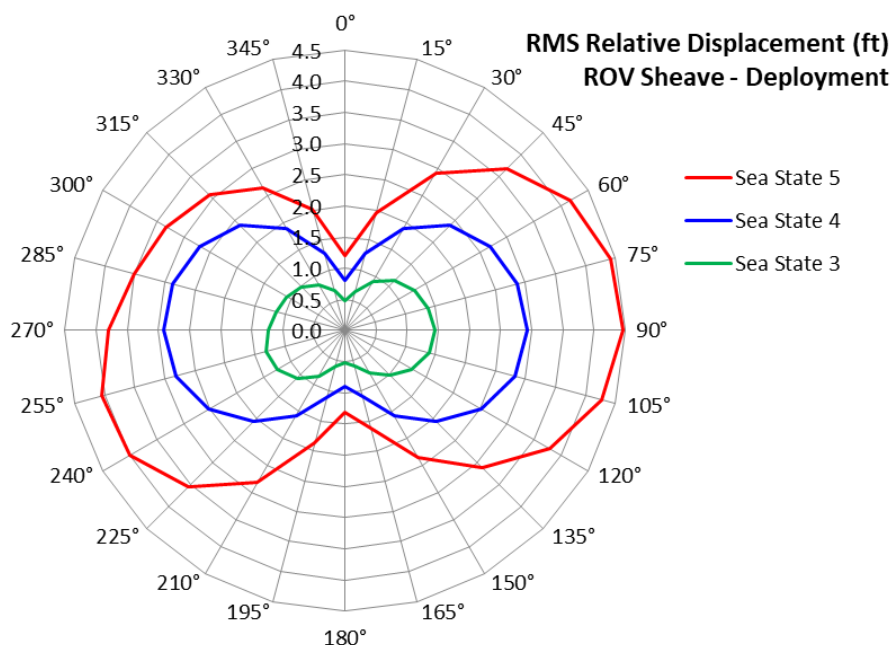


Figure 7 RMS displacement relative to water surface at ROV sheave in deployment position in Sea States 3 through 5 without active roll stabilizers operating

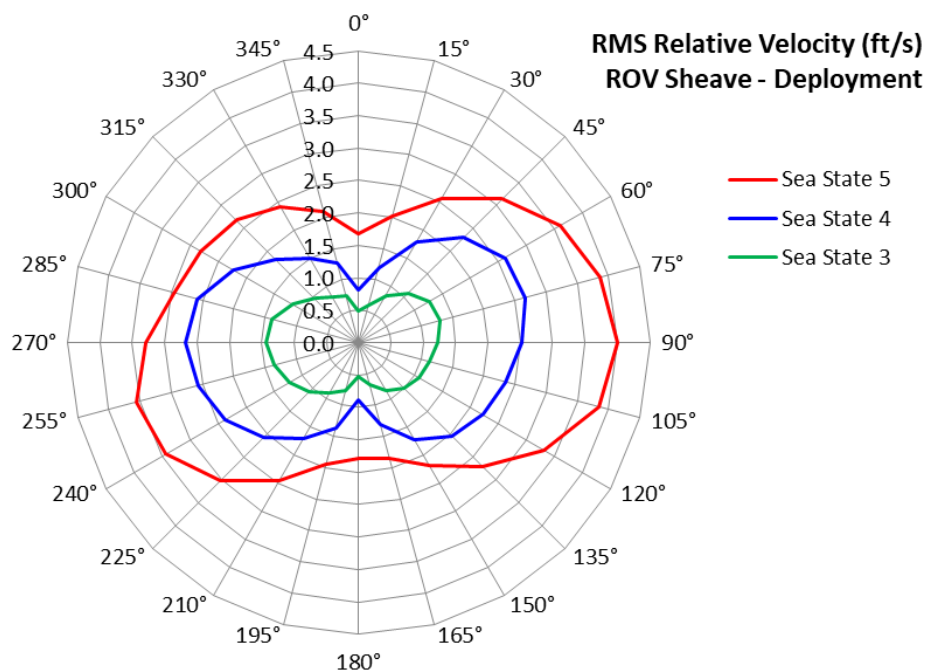


Figure 8 RMS velocity relative to water surface at ROV sheave in deployment position in Sea States 3 through 5 without active roll stabilizers operating

The responses for the ROV in deployment position are shown relative to the water surface. The plots for the absolute and relative responses are included in Appendix B.

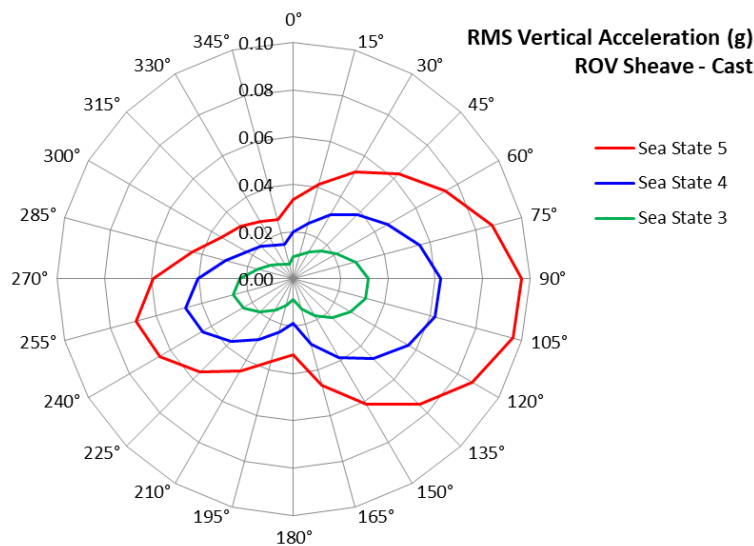
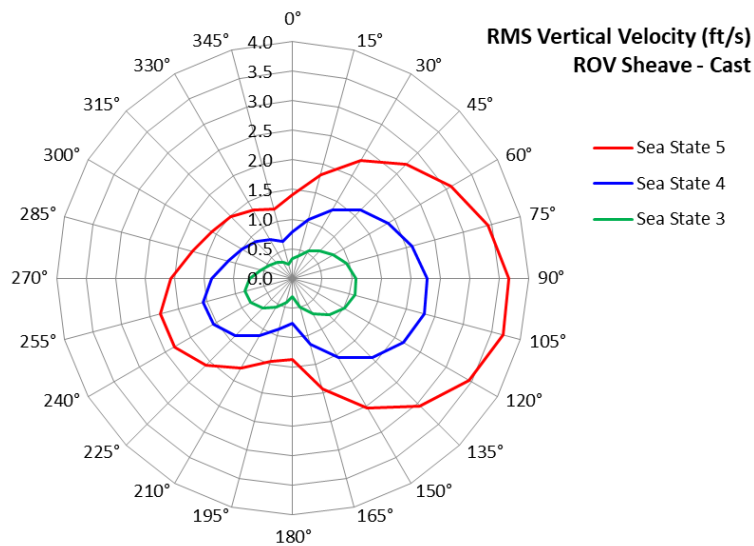
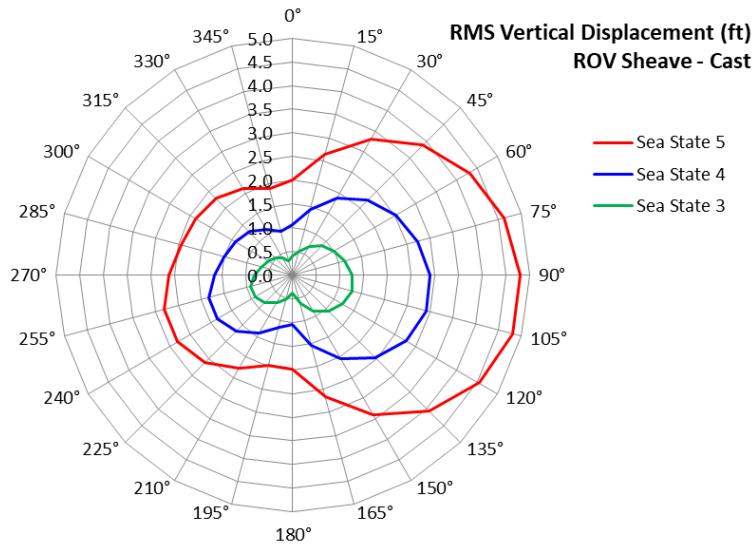
Extreme Motions

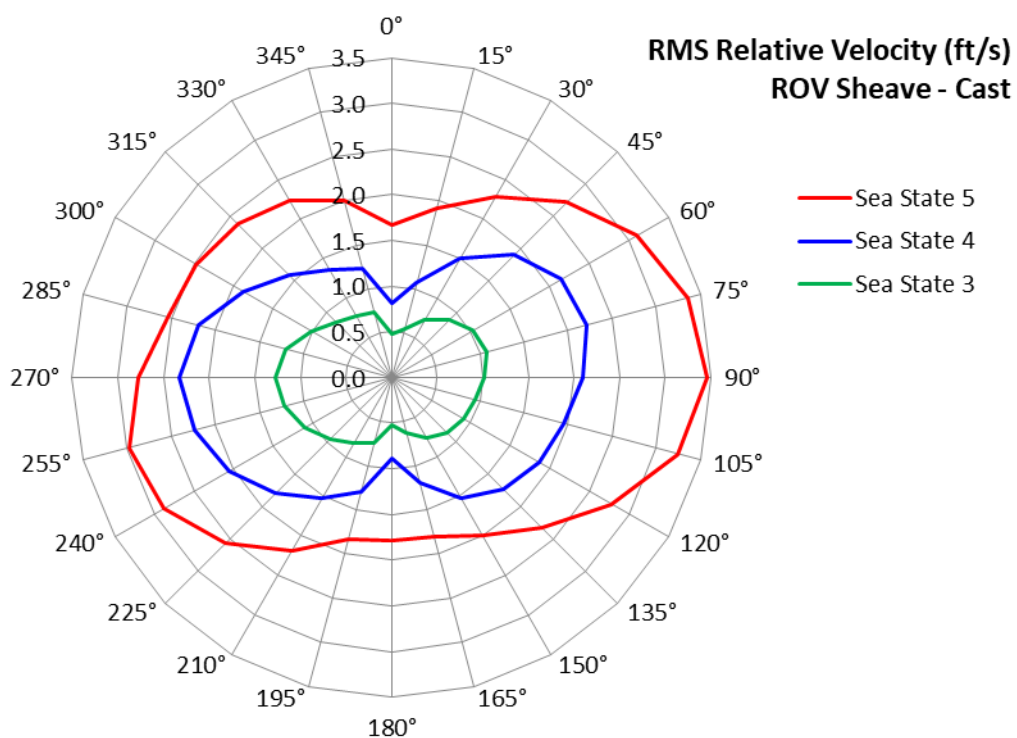
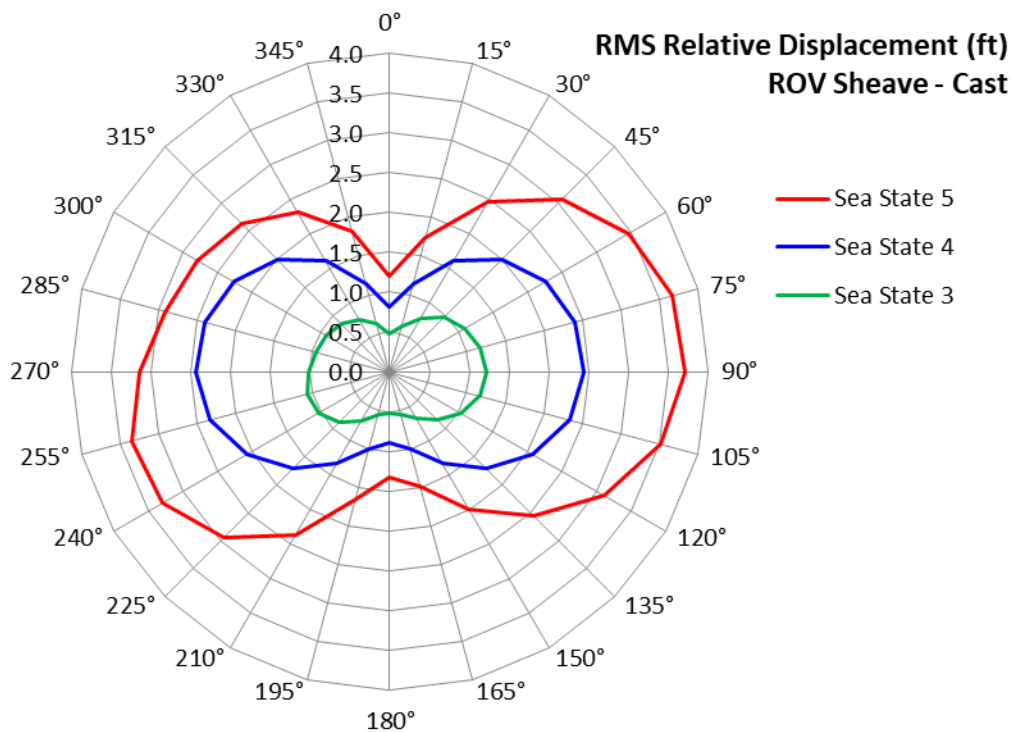
The extreme motion can be estimated by multiplying the Rayleigh factor of 4.29 by the RMS value for the corresponding sheave position, response quantity (displacement, velocity, or acceleration). The Rayleigh factor of 4.29 corresponds to the maximum response amplitude with a 10% probability of exceedance over 1,000 load cycles. For example, an RMS relative velocity of 4.0 ft/s at the ROV sheave in the deployment position (Figure 8) in Sea State 5 with a 90° wave heading gives an extreme relative velocity of $4.0 \times 4.29 = 17.16$ ft/s.

Vessel RAOs

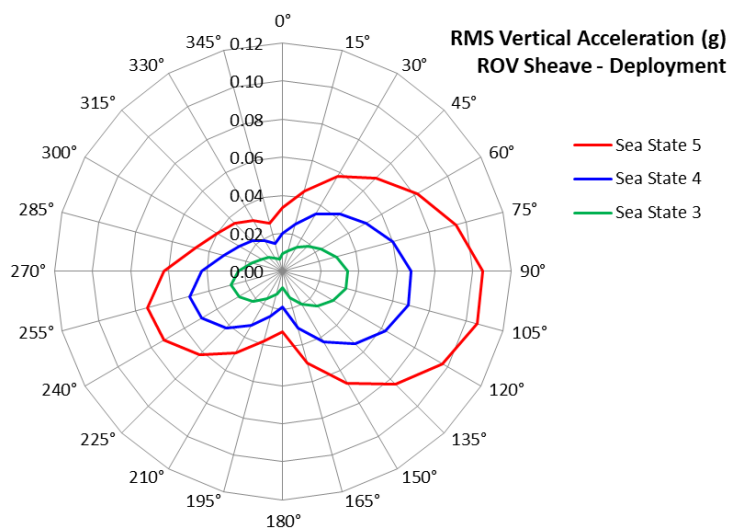
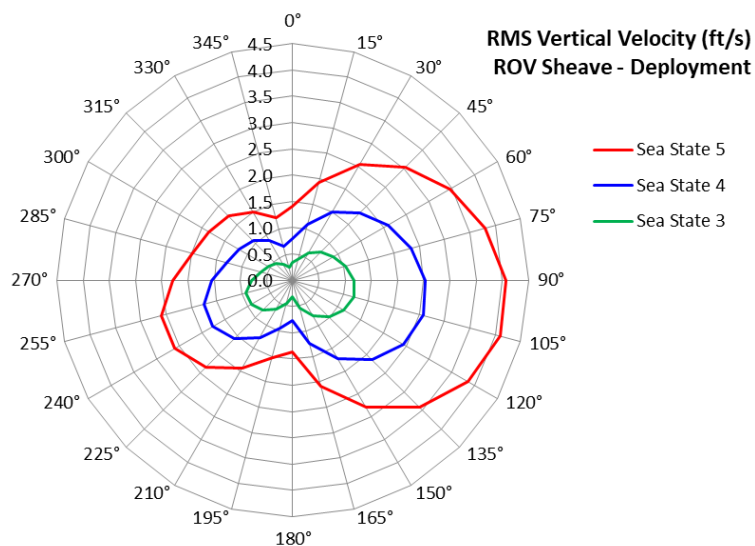
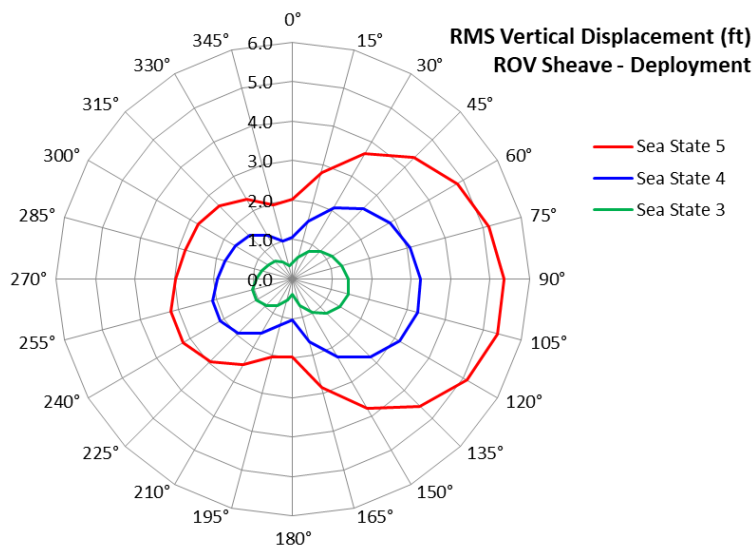
The motion RAOs are included in Appendix C.

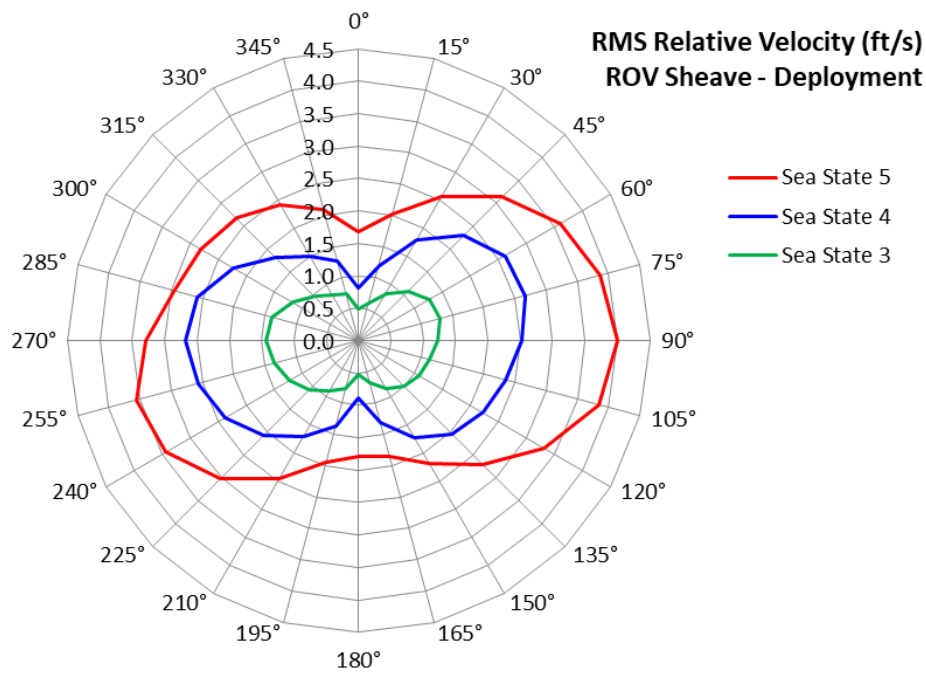
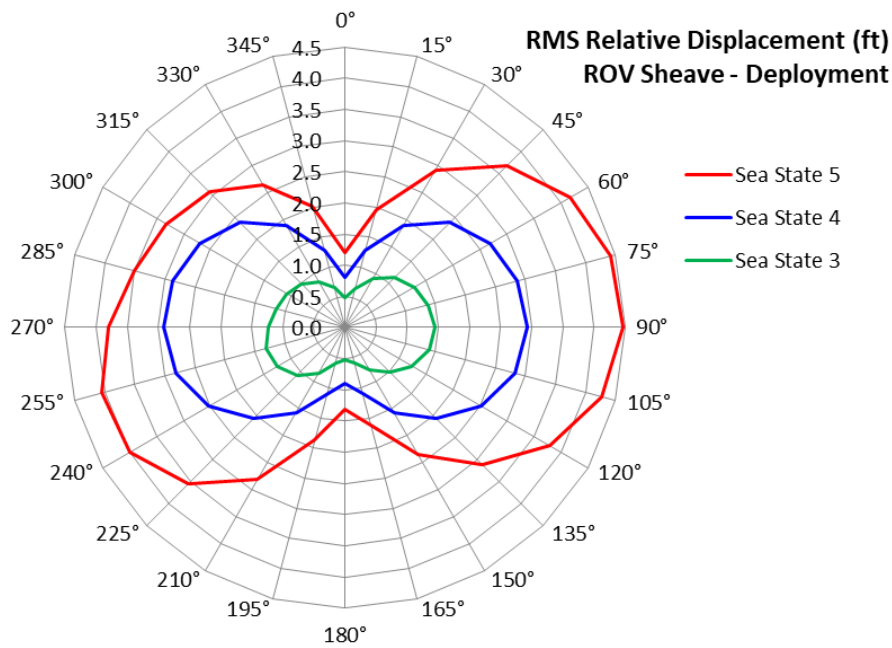
Appendix A Motions for ROV Sheave – Cast





Appendix B Motions for ROV Sheave – Deployment





Appendix C David Packard - Motion Response
Amplitude Operators (RAOs) – As-built
with Roll Stabilizers Turned Off

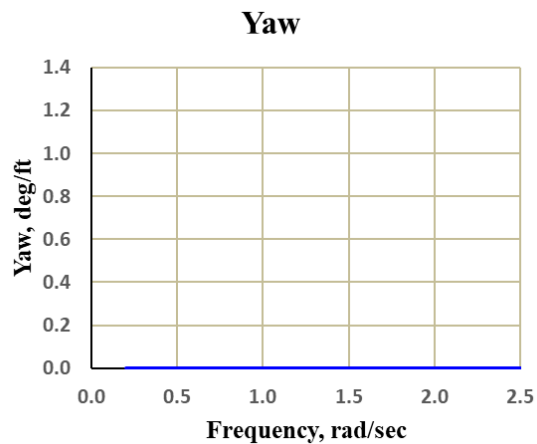
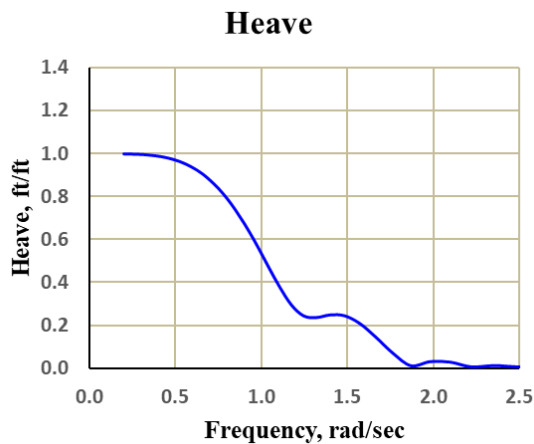
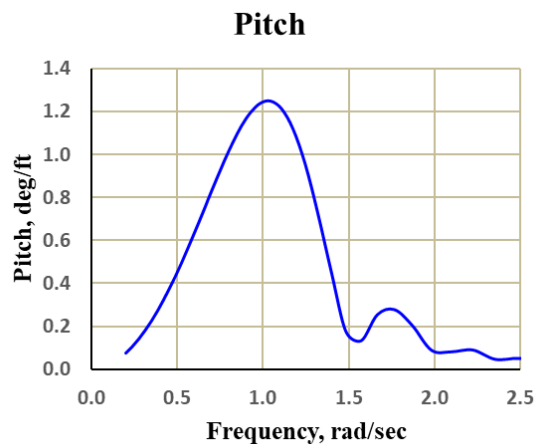
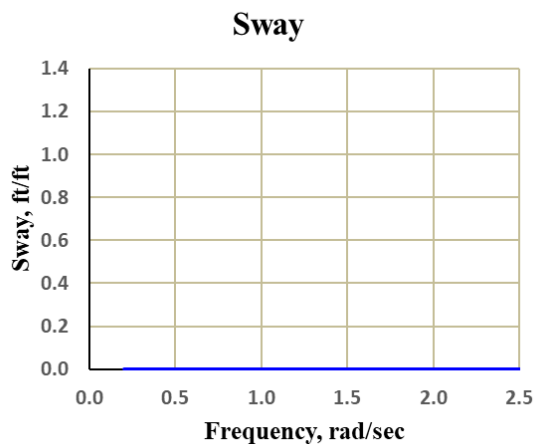
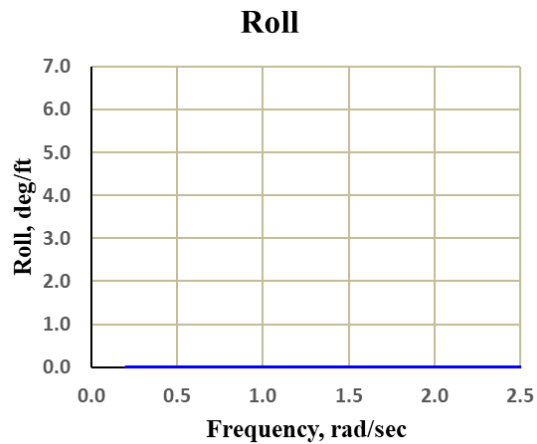
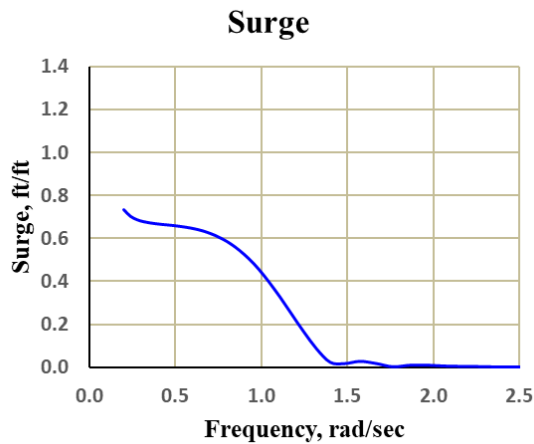
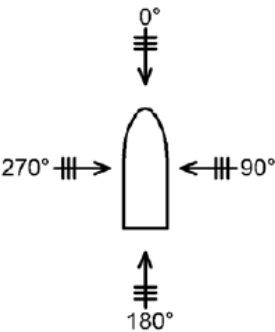
Translational RAOs at Heading 0°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.732	66.0	0.000	0.0	0.999	0.0
0.238	0.702	72.2	0.000	0.0	0.999	0.0
0.276	0.686	76.8	0.000	0.0	0.998	0.0
0.313	0.677	80.5	0.000	0.0	0.996	-0.1
0.350	0.671	83.5	0.000	0.0	0.994	-0.1
0.386	0.667	86.2	0.000	0.0	0.991	-0.2
0.421	0.664	88.5	0.000	0.0	0.986	-0.3
0.456	0.661	90.5	0.000	0.0	0.980	-0.4
0.491	0.658	92.4	0.000	0.0	0.973	-0.6
0.525	0.655	94.1	0.000	0.0	0.964	-0.8
0.558	0.651	95.7	0.000	0.0	0.953	-0.9
0.591	0.647	97.1	0.000	0.0	0.940	-1.2
0.624	0.641	98.4	0.000	0.0	0.924	-1.4
0.656	0.634	99.6	0.000	0.0	0.907	-1.6
0.687	0.626	100.7	0.000	0.0	0.886	-1.9
0.730	0.613	102.0	0.000	0.0	0.855	-2.3
0.775	0.595	103.2	0.000	0.0	0.815	-2.6
0.823	0.572	104.2	0.000	0.0	0.767	-2.9
0.873	0.542	105.1	0.000	0.0	0.708	-3.1
0.927	0.504	105.7	0.000	0.0	0.638	-3.1
0.984	0.455	105.9	0.000	0.0	0.558	-2.3
1.043	0.396	105.7	0.000	0.0	0.468	-0.3
1.107	0.326	104.9	0.000	0.0	0.376	4.5
1.174	0.248	103.5	0.000	0.0	0.294	14.4
1.245	0.165	101.2	0.000	0.0	0.244	31.0
1.319	0.086	98.0	0.000	0.0	0.236	48.5
1.399	0.022	93.1	0.000	0.0	0.248	57.9
1.482	0.016	-85.9	0.000	0.0	0.244	58.9
1.571	0.027	-90.4	0.000	0.0	0.208	55.0
1.665	0.017	-93.7	0.000	0.0	0.144	49.2
1.764	0.002	-147.7	0.000	0.0	0.069	45.4
1.869	0.009	106.9	0.000	0.0	0.011	91.5
1.980	0.008	120.1	0.000	0.0	0.030	-177.0
2.097	0.004	174.2	0.000	0.0	0.028	176.5
2.221	0.003	-111.0	0.000	0.0	0.006	130.5
2.352	0.001	-19.9	0.000	0.0	0.012	-0.9
2.491	0.001	70.6	0.000	0.0	0.006	-41.0
2.637	0.000	-93.3	0.000	0.0	0.006	172.2
2.792	0.001	-32.5	0.000	0.0	0.003	87.7
2.956	0.000	138.0	0.000	0.0	0.003	-50.3
3.130	0.000	137.9	0.000	0.0	0.001	166.1
3.313	0.000	-131.5	0.000	0.0	0.001	-56.4
3.507	0.001	26.3	0.000	0.0	0.003	120.7
3.713	0.000	-179.7	0.000	0.0	0.003	-76.2
3.930	0.000	-4.7	0.000	0.0	0.002	69.1
4.159	0.000	101.4	0.000	0.0	0.002	-162.2
4.402	0.001	-113.5	0.000	0.0	0.001	-57.2
4.659	0.000	37.6	0.000	0.0	0.001	-65.2
4.931	0.000	-39.9	0.000	0.0	0.000	-92.3
5.218	0.000	-124.0	0.000	0.0	0.000	-149.0

Rotational RAOs at Heading 0°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.000	0.0	0.074	-90.6	0.000	0.0
0.238	0.000	0.0	0.105	-91.0	0.000	0.0
0.276	0.000	0.0	0.141	-91.6	0.000	0.0
0.313	0.000	0.0	0.181	-92.1	0.000	0.0
0.350	0.000	0.0	0.225	-92.7	0.000	0.0
0.386	0.000	0.0	0.273	-93.4	0.000	0.0
0.421	0.000	0.0	0.325	-94.2	0.000	0.0
0.456	0.000	0.0	0.380	-95.0	0.000	0.0
0.491	0.000	0.0	0.437	-95.8	0.000	0.0
0.525	0.000	0.0	0.496	-96.8	0.000	0.0
0.558	0.000	0.0	0.557	-97.8	0.000	0.0
0.591	0.000	0.0	0.620	-98.9	0.000	0.0
0.624	0.000	0.0	0.682	-100.1	0.000	0.0
0.656	0.000	0.0	0.745	-101.3	0.000	0.0
0.687	0.000	0.0	0.807	-102.7	0.000	0.0
0.730	0.000	0.0	0.890	-104.6	0.000	0.0
0.775	0.000	0.0	0.974	-107.0	0.000	0.0
0.823	0.000	0.0	1.057	-109.7	0.000	0.0
0.873	0.000	0.0	1.134	-113.0	0.000	0.0
0.927	0.000	0.0	1.198	-116.9	0.000	0.0
0.984	0.000	0.0	1.241	-121.7	0.000	0.0
1.043	0.000	0.0	1.251	-127.5	0.000	0.0
1.107	0.000	0.0	1.215	-134.5	0.000	0.0
1.174	0.000	0.0	1.120	-143.2	0.000	0.0
1.245	0.000	0.0	0.956	-154.1	0.000	0.0
1.319	0.000	0.0	0.724	-167.8	0.000	0.0
1.399	0.000	0.0	0.446	173.7	0.000	0.0
1.482	0.000	0.0	0.175	137.5	0.000	0.0
1.571	0.000	0.0	0.132	18.2	0.000	0.0
1.665	0.000	0.0	0.253	-24.7	0.000	0.0
1.764	0.000	0.0	0.277	-49.2	0.000	0.0
1.869	0.000	0.0	0.203	-74.8	0.000	0.0
1.980	0.000	0.0	0.088	-123.5	0.000	0.0
2.097	0.000	0.0	0.080	131.4	0.000	0.0
2.221	0.000	0.0	0.089	82.0	0.000	0.0
2.352	0.000	0.0	0.045	6.6	0.000	0.0
2.491	0.000	0.0	0.050	-91.8	0.000	0.0
2.637	0.000	0.0	0.031	177.3	0.000	0.0
2.792	0.000	0.0	0.028	62.5	0.000	0.0
2.956	0.000	0.0	0.018	-67.5	0.000	0.0
3.130	0.000	0.0	0.012	131.1	0.000	0.0
3.313	0.000	0.0	0.014	-65.3	0.000	0.0
3.507	0.000	0.0	0.017	110.6	0.000	0.0
3.713	0.000	0.0	0.015	-79.7	0.000	0.0
3.930	0.000	0.0	0.012	64.8	0.000	0.0
4.159	0.000	0.0	0.009	176.9	0.000	0.0
4.402	0.000	0.0	0.009	-95.9	0.000	0.0
4.659	0.000	0.0	0.005	-42.5	0.000	0.0
4.931	0.000	0.0	0.004	-64.3	0.000	0.0
5.218	0.000	0.0	0.004	-139.6	0.000	0.0

Plotted RAOs at Heading 0°



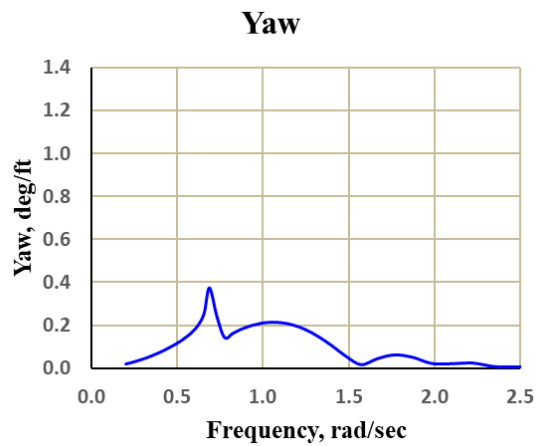
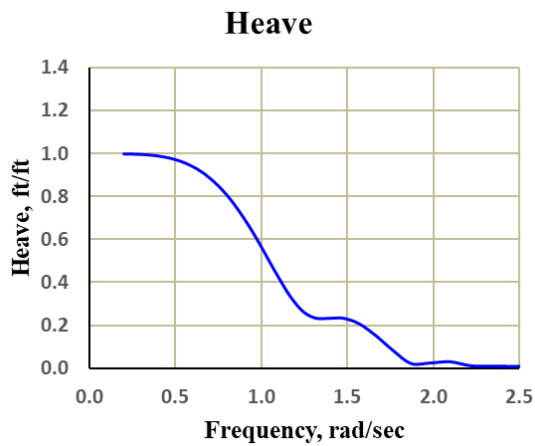
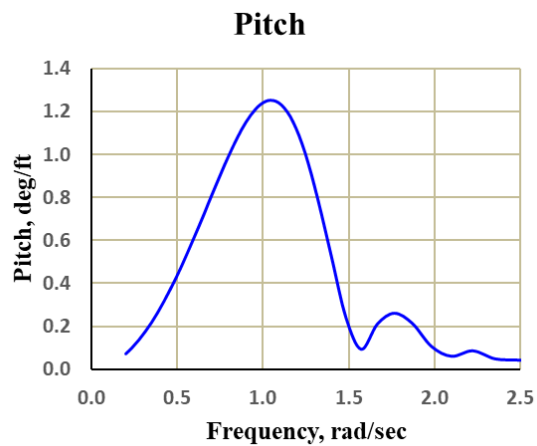
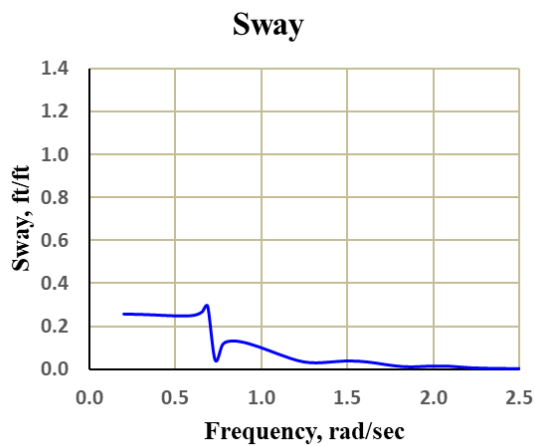
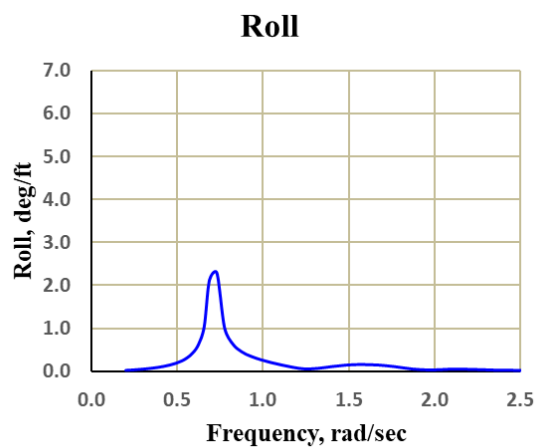
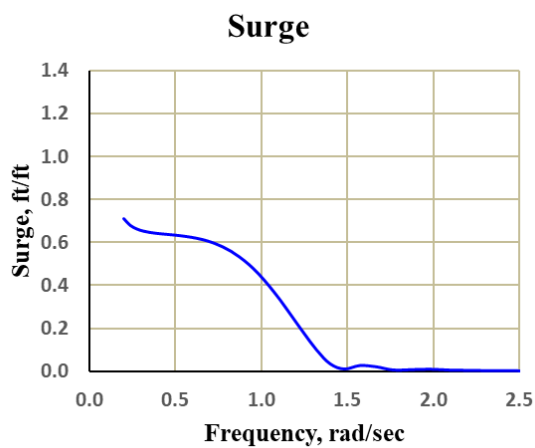
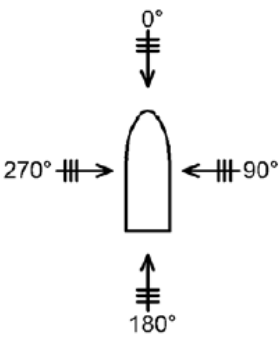
Translational RAOs at Heading 15°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.710	64.9	0.258	-90.1	0.999	0.0
0.238	0.678	71.2	0.257	-90.1	0.999	0.0
0.276	0.662	75.9	0.256	-90.2	0.998	0.0
0.313	0.652	79.7	0.255	-90.3	0.997	-0.1
0.350	0.646	82.9	0.254	-90.4	0.994	-0.1
0.386	0.642	85.6	0.253	-90.6	0.991	-0.2
0.421	0.639	87.9	0.252	-90.9	0.987	-0.3
0.456	0.636	90.0	0.250	-91.3	0.982	-0.4
0.491	0.634	92.0	0.249	-91.9	0.975	-0.5
0.525	0.631	93.7	0.248	-92.8	0.966	-0.7
0.558	0.628	95.3	0.248	-94.2	0.956	-0.9
0.591	0.624	96.8	0.250	-96.4	0.944	-1.1
0.624	0.619	98.1	0.255	-100.5	0.930	-1.3
0.656	0.613	99.3	0.268	-108.9	0.913	-1.5
0.687	0.606	100.4	0.295	-134.2	0.895	-1.8
0.730	0.594	101.8	0.044	49.3	0.865	-2.1
0.775	0.579	103.1	0.116	-58.2	0.829	-2.5
0.823	0.558	104.2	0.132	-68.9	0.783	-2.8
0.873	0.531	105.1	0.129	-73.2	0.728	-3.0
0.927	0.496	105.8	0.119	-75.7	0.663	-3.0
0.984	0.452	106.1	0.105	-78.0	0.587	-2.5
1.043	0.398	106.0	0.087	-80.9	0.502	-1.0
1.107	0.333	105.5	0.068	-85.8	0.412	2.5
1.174	0.258	104.3	0.049	-95.7	0.326	9.7
1.245	0.178	102.5	0.034	-116.5	0.261	22.7
1.319	0.100	100.3	0.029	-149.6	0.232	39.6
1.399	0.034	99.1	0.034	-174.5	0.233	52.6
1.482	0.010	-95.1	0.038	175.7	0.232	57.2
1.571	0.026	-90.8	0.037	175.1	0.205	55.7
1.665	0.020	-90.0	0.029	-177.8	0.151	51.5
1.764	0.005	-85.2	0.017	-155.3	0.082	48.1
1.869	0.006	95.6	0.011	-89.9	0.021	63.6
1.980	0.009	110.1	0.014	-43.7	0.024	-178.6
2.097	0.005	149.5	0.013	-28.8	0.029	-176.4
2.221	0.003	-128.8	0.007	-34.2	0.010	168.9
2.352	0.002	-63.1	0.003	-102.0	0.009	6.6
2.491	0.001	51.8	0.002	-112.6	0.008	-17.9
2.637	0.000	116.7	0.002	-56.5	0.004	-175.0
2.792	0.001	-40.0	0.002	-69.2	0.004	125.0
2.956	0.000	7.4	0.002	-60.8	0.003	-21.1
3.130	0.000	-178.2	0.001	156.2	0.002	-150.0
3.313	0.000	-30.5	0.003	-114.8	0.002	36.3
3.507	0.000	-71.3	0.003	-73.8	0.002	-158.2
3.713	0.000	74.8	0.004	2.1	0.001	12.1
3.930	0.000	-141.4	0.004	98.7	0.001	160.5
4.159	0.000	-40.8	0.002	-94.7	0.000	-104.9
4.402	0.000	174.5	0.002	148.7	0.000	-82.8
4.659	0.000	-8.6	0.002	-35.8	0.001	-44.0
4.931	0.000	75.2	0.001	175.9	0.000	-0.9
5.218	0.000	-31.2	0.001	81.1	0.000	158.4

Rotational RAOs at Heading 15°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.019	-94.3	0.071	-90.5	0.019	4.5
0.238	0.028	-96.1	0.101	-91.0	0.026	4.9
0.276	0.039	-98.2	0.136	-91.5	0.035	5.3
0.313	0.052	-100.6	0.175	-92.0	0.045	5.8
0.350	0.069	-103.3	0.218	-92.6	0.057	6.3
0.386	0.088	-106.3	0.264	-93.3	0.069	7.0
0.421	0.113	-109.5	0.314	-94.0	0.082	7.8
0.456	0.144	-113.1	0.367	-94.8	0.096	8.7
0.491	0.184	-117.0	0.423	-95.7	0.112	9.7
0.525	0.238	-121.2	0.480	-96.6	0.129	10.8
0.558	0.315	-125.9	0.540	-97.6	0.148	12.0
0.591	0.432	-131.4	0.600	-98.6	0.171	13.3
0.624	0.630	-138.3	0.662	-99.8	0.203	14.4
0.656	1.034	-149.0	0.723	-101.0	0.255	14.1
0.687	2.130	-174.3	0.784	-102.3	0.373	4.6
0.730	2.296	85.2	0.866	-104.2	0.241	-50.3
0.775	1.011	54.5	0.950	-106.4	0.142	-15.2
0.823	0.634	43.0	1.034	-109.1	0.161	3.2
0.873	0.457	35.2	1.113	-112.3	0.181	11.5
0.927	0.349	28.4	1.182	-116.0	0.197	17.3
0.984	0.270	22.0	1.231	-120.6	0.208	22.4
1.043	0.204	15.1	1.251	-126.2	0.213	27.5
1.107	0.144	6.3	1.229	-133.0	0.211	32.7
1.174	0.089	-9.6	1.150	-141.4	0.200	38.3
1.245	0.051	-52.0	1.004	-151.7	0.180	44.4
1.319	0.066	-111.1	0.788	-164.6	0.147	51.4
1.399	0.107	-133.0	0.519	178.6	0.105	60.0
1.482	0.141	-141.0	0.241	151.7	0.055	74.4
1.571	0.156	-144.2	0.093	50.7	0.016	151.4
1.665	0.145	-144.7	0.210	-15.8	0.044	-128.7
1.764	0.106	-142.2	0.260	-41.3	0.061	-111.7
1.869	0.050	-128.4	0.213	-64.5	0.051	-96.6
1.980	0.026	-39.5	0.106	-99.7	0.022	-60.6
2.097	0.047	-10.8	0.060	156.0	0.020	44.7
2.221	0.040	-23.6	0.085	97.9	0.023	75.8
2.352	0.024	-72.9	0.048	42.7	0.006	105.9
2.491	0.017	-124.8	0.042	-68.7	0.006	-104.7
2.637	0.002	-19.2	0.031	-145.5	0.001	136.8
2.792	0.016	-28.9	0.027	91.1	0.001	116.9
2.956	0.009	-93.6	0.018	-26.4	0.002	-77.6
3.130	0.005	51.7	0.014	-172.4	0.004	126.2
3.313	0.010	-60.1	0.011	18.9	0.006	-117.1
3.507	0.012	119.0	0.010	-149.6	0.002	-50.9
3.713	0.007	-44.8	0.009	25.8	0.009	-0.8
3.930	0.004	-110.1	0.006	173.8	0.003	134.2
4.159	0.011	103.6	0.003	-76.8	0.005	130.2
4.402	0.010	-113.5	0.002	-66.1	0.003	-93.0
4.659	0.002	-70.5	0.003	-19.8	0.001	-33.5
4.931	0.003	-87.8	0.002	-4.1	0.002	-144.4
5.218	0.002	-125.9	0.000	-9.1	0.001	155.9

Plotted RAOs at Heading 15°



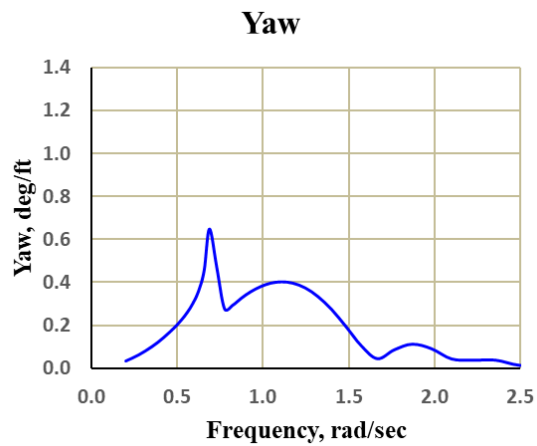
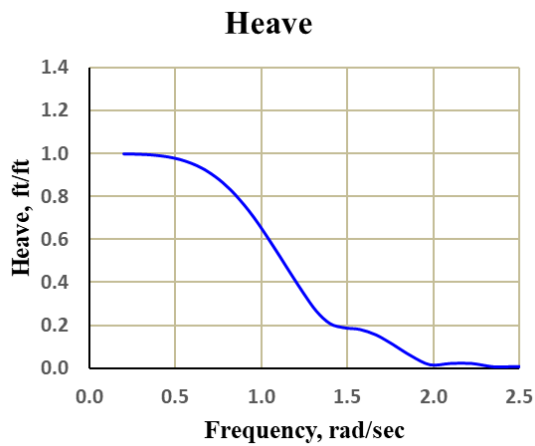
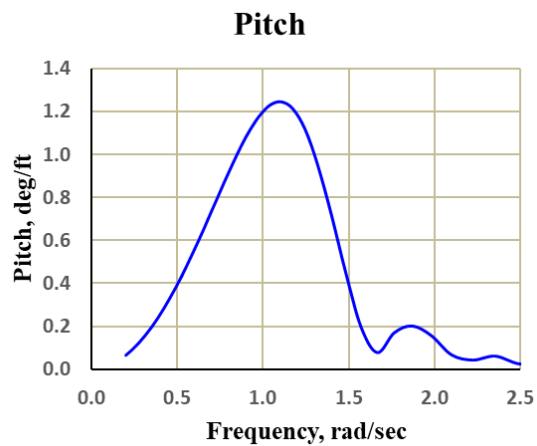
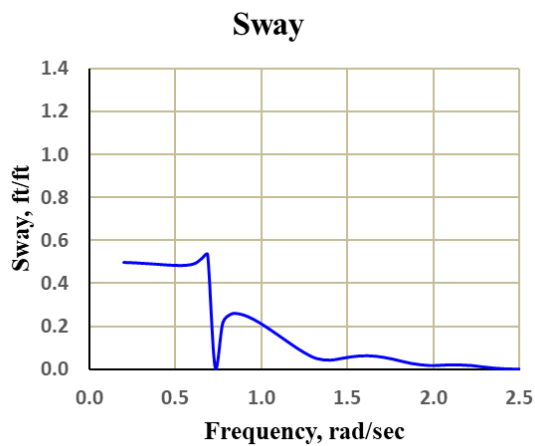
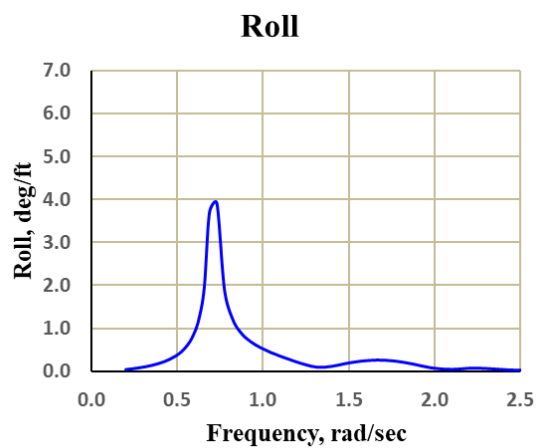
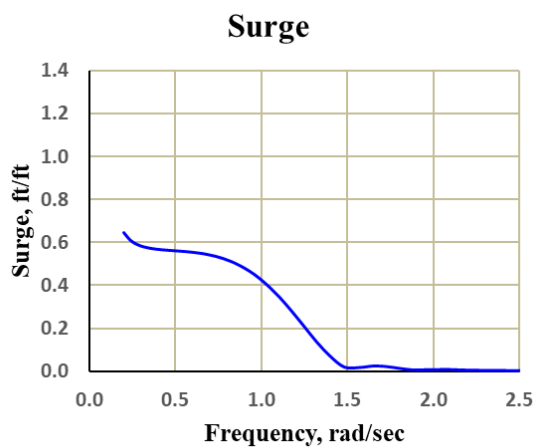
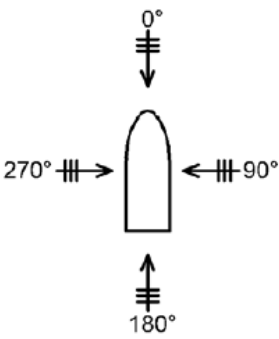
Translational RAOs at Heading 30°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.646	61.3	0.498	-90.1	1.000	0.0
0.238	0.610	67.9	0.497	-90.1	0.999	0.0
0.276	0.591	73.0	0.495	-90.2	0.998	0.0
0.313	0.580	77.1	0.494	-90.2	0.997	0.0
0.350	0.573	80.6	0.492	-90.4	0.996	-0.1
0.386	0.569	83.5	0.490	-90.6	0.993	-0.1
0.421	0.566	86.1	0.488	-90.8	0.990	-0.2
0.456	0.564	88.3	0.486	-91.2	0.986	-0.3
0.491	0.562	90.4	0.484	-91.8	0.980	-0.4
0.525	0.560	92.3	0.483	-92.6	0.974	-0.5
0.558	0.558	94.0	0.484	-93.9	0.966	-0.7
0.591	0.555	95.6	0.488	-96.1	0.956	-0.8
0.624	0.552	97.1	0.497	-99.9	0.945	-1.0
0.656	0.548	98.4	0.518	-108.1	0.932	-1.2
0.687	0.544	99.6	0.534	-131.7	0.918	-1.4
0.730	0.536	101.1	0.014	155.7	0.894	-1.7
0.775	0.526	102.6	0.218	-63.7	0.865	-2.0
0.823	0.512	103.9	0.258	-70.9	0.830	-2.3
0.873	0.493	105.0	0.259	-74.0	0.786	-2.6
0.927	0.468	105.9	0.244	-75.6	0.733	-2.9
0.984	0.435	106.5	0.220	-76.8	0.671	-2.9
1.043	0.394	106.8	0.190	-78.0	0.600	-2.6
1.107	0.342	106.7	0.155	-79.9	0.521	-1.7
1.174	0.281	106.1	0.117	-83.9	0.436	0.3
1.245	0.211	105.2	0.081	-93.0	0.348	4.2
1.319	0.138	104.7	0.052	-115.2	0.266	12.3
1.399	0.070	106.6	0.045	-154.2	0.207	27.7
1.482	0.018	127.1	0.055	180.0	0.188	44.8
1.571	0.017	-110.2	0.064	172.2	0.180	53.7
1.665	0.024	-92.7	0.063	173.9	0.155	55.9
1.764	0.017	-79.5	0.049	-176.3	0.110	55.8
1.869	0.006	-37.4	0.030	-151.3	0.057	58.9
1.980	0.007	62.5	0.019	-91.3	0.015	98.2
2.097	0.007	98.3	0.023	-42.9	0.022	-171.5
2.221	0.004	148.9	0.019	-20.0	0.022	-160.8
2.352	0.003	-127.3	0.007	-3.6	0.006	-144.7
2.491	0.002	-70.4	0.002	177.5	0.007	-0.5
2.637	0.001	39.4	0.003	-165.8	0.004	4.2
2.792	0.001	135.4	0.001	-137.0	0.004	168.2
2.956	0.000	-116.3	0.001	-97.9	0.001	125.9
3.130	0.000	134.4	0.002	100.2	0.003	-18.3
3.313	0.000	-118.8	0.004	148.3	0.002	172.8
3.507	0.001	56.4	0.003	-125.6	0.001	81.2
3.713	0.001	-151.7	0.001	-7.9	0.002	-63.3
3.930	0.000	-105.2	0.001	89.7	0.001	101.2
4.159	0.000	34.3	0.005	-94.2	0.001	-102.7
4.402	0.000	-165.3	0.003	105.9	0.000	38.9
4.659	0.000	10.2	0.002	-21.1	0.000	-176.8
4.931	0.000	-151.5	0.001	-89.4	0.000	63.3
5.218	0.000	43.0	0.001	110.7	0.000	-144.3

Rotational RAOs at Heading 30°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.038	-94.0	0.064	-90.4	0.032	4.9
0.238	0.055	-95.7	0.091	-90.8	0.046	5.2
0.276	0.076	-97.7	0.122	-91.3	0.061	5.6
0.313	0.101	-99.9	0.157	-91.8	0.079	6.1
0.350	0.132	-102.4	0.195	-92.4	0.098	6.6
0.386	0.170	-105.2	0.237	-93.0	0.120	7.3
0.421	0.217	-108.3	0.282	-93.7	0.143	8.0
0.456	0.276	-111.7	0.330	-94.4	0.168	8.9
0.491	0.352	-115.4	0.381	-95.2	0.195	9.9
0.525	0.455	-119.6	0.433	-96.0	0.225	11.0
0.558	0.600	-124.3	0.487	-96.9	0.260	12.2
0.591	0.819	-130.0	0.543	-97.9	0.303	13.4
0.624	1.189	-137.5	0.600	-98.9	0.361	14.4
0.656	1.920	-149.4	0.657	-100.0	0.457	13.6
0.687	3.688	-176.7	0.714	-101.2	0.651	2.7
0.730	3.907	94.8	0.792	-102.9	0.468	-44.1
0.775	1.877	62.0	0.874	-104.9	0.276	-20.2
0.823	1.199	49.4	0.959	-107.3	0.294	-1.8
0.873	0.878	41.0	1.042	-110.2	0.327	7.4
0.927	0.685	34.1	1.120	-113.6	0.357	13.5
0.984	0.547	27.8	1.186	-117.7	0.380	18.8
1.043	0.436	21.7	1.232	-122.7	0.397	23.8
1.107	0.336	15.1	1.246	-128.9	0.403	29.0
1.174	0.241	6.4	1.212	-136.4	0.397	34.5
1.245	0.151	-9.2	1.116	-145.7	0.375	40.4
1.319	0.088	-50.2	0.948	-156.9	0.334	47.0
1.399	0.110	-108.2	0.714	-170.2	0.273	54.6
1.482	0.177	-130.3	0.447	173.4	0.194	64.7
1.571	0.233	-138.2	0.194	147.2	0.104	83.0
1.665	0.257	-141.1	0.077	43.2	0.043	156.0
1.764	0.235	-141.2	0.170	-15.9	0.085	-134.9
1.869	0.168	-138.1	0.201	-37.8	0.111	-114.2
1.980	0.075	-122.9	0.155	-57.4	0.090	-95.7
2.097	0.040	-25.7	0.066	-89.6	0.042	-55.7
2.221	0.070	3.3	0.042	150.7	0.036	36.9
2.352	0.048	-4.1	0.060	107.2	0.036	75.9
2.491	0.018	-86.8	0.024	56.1	0.012	133.6
2.637	0.024	-154.8	0.027	-72.9	0.011	-129.8
2.792	0.006	84.4	0.015	-145.4	0.001	101.4
2.956	0.014	-17.1	0.017	83.9	0.001	36.2
3.130	0.007	-153.7	0.011	-42.0	0.000	141.0
3.313	0.007	71.6	0.013	-155.7	0.008	149.4
3.507	0.007	-51.1	0.013	62.1	0.008	-99.8
3.713	0.006	127.4	0.008	-94.1	0.001	59.6
3.930	0.007	-114.6	0.003	118.7	0.005	-113.8
4.159	0.017	93.3	0.003	2.4	0.010	119.9
4.402	0.022	-77.8	0.003	149.3	0.014	-51.8
4.659	0.011	57.9	0.000	-101.9	0.004	97.9
4.931	0.007	69.5	0.002	-164.3	0.002	82.5
5.218	0.000	35.6	0.000	-71.8	0.002	-93.1

Plotted RAOs at Heading 30°



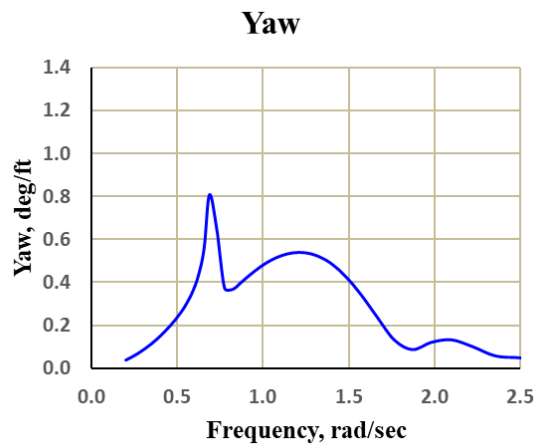
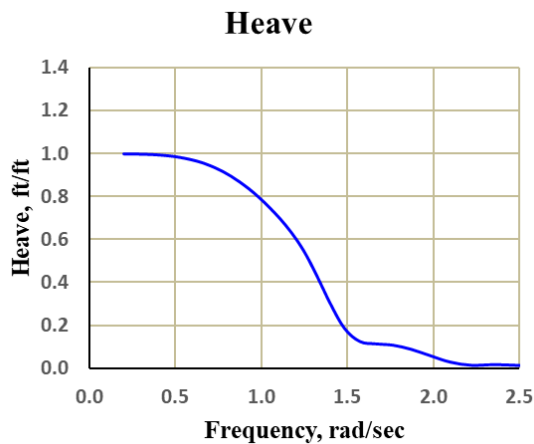
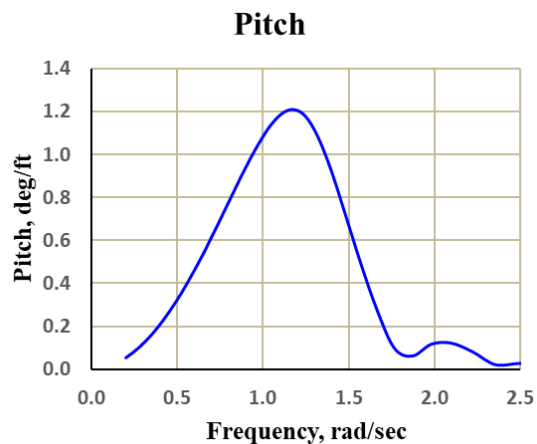
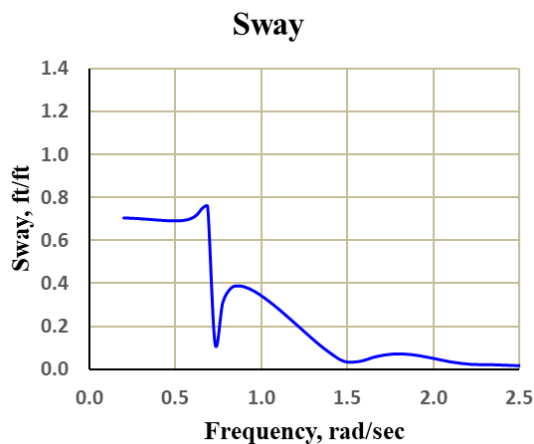
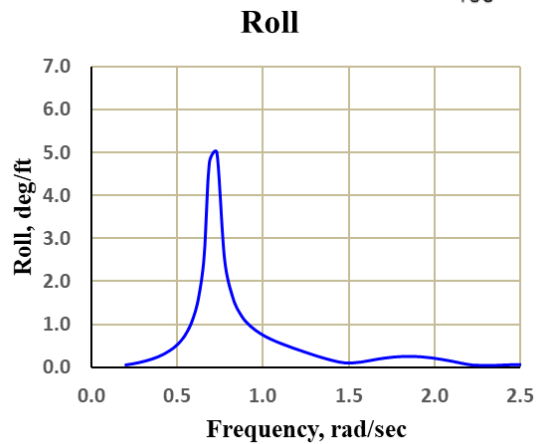
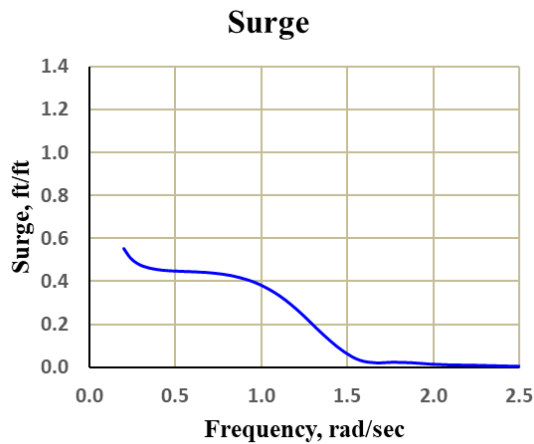
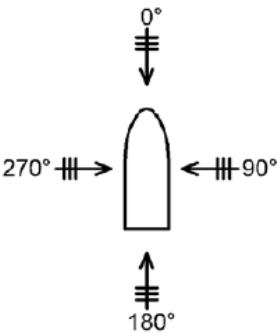
Translational RAOs at Heading 45°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.551	53.7	0.704	-90.0	1.000	0.0
0.238	0.507	60.9	0.702	-90.1	0.999	0.0
0.276	0.483	66.7	0.701	-90.1	0.999	0.0
0.313	0.469	71.4	0.699	-90.2	0.998	0.0
0.350	0.460	75.4	0.697	-90.3	0.997	0.0
0.386	0.454	78.8	0.695	-90.5	0.996	-0.1
0.421	0.451	81.8	0.693	-90.7	0.994	-0.1
0.456	0.448	84.5	0.691	-91.0	0.991	-0.2
0.491	0.447	86.9	0.690	-91.5	0.988	-0.2
0.525	0.446	89.0	0.690	-92.2	0.984	-0.3
0.558	0.445	91.0	0.694	-93.4	0.979	-0.4
0.591	0.444	92.9	0.701	-95.2	0.973	-0.5
0.624	0.442	94.6	0.718	-98.7	0.966	-0.7
0.656	0.441	96.1	0.749	-106.1	0.958	-0.8
0.687	0.439	97.5	0.757	-127.2	0.949	-0.9
0.730	0.436	99.3	0.120	-142.8	0.935	-1.2
0.775	0.432	101.0	0.311	-71.4	0.917	-1.4
0.823	0.426	102.6	0.378	-74.3	0.896	-1.7
0.873	0.416	104.0	0.388	-75.9	0.869	-2.1
0.927	0.404	105.3	0.375	-76.4	0.836	-2.5
0.984	0.386	106.3	0.350	-76.4	0.798	-3.1
1.043	0.362	106.9	0.316	-76.1	0.752	-3.9
1.107	0.330	107.3	0.275	-75.6	0.698	-5.0
1.174	0.289	107.3	0.228	-75.1	0.632	-6.9
1.245	0.239	107.3	0.178	-75.1	0.548	-10.0
1.319	0.181	108.1	0.126	-76.6	0.435	-13.7
1.399	0.122	111.2	0.076	-83.1	0.302	-14.6
1.482	0.070	119.8	0.037	-112.0	0.185	-5.2
1.571	0.032	145.8	0.037	-175.6	0.124	20.6
1.665	0.020	-150.7	0.059	165.5	0.113	46.8
1.764	0.023	-108.2	0.071	165.9	0.107	60.5
1.869	0.020	-81.8	0.069	174.2	0.088	68.3
1.980	0.014	-47.8	0.054	-169.7	0.058	76.7
2.097	0.010	4.8	0.035	-140.1	0.028	96.1
2.221	0.009	54.6	0.023	-87.2	0.013	164.7
2.352	0.006	99.3	0.021	-32.2	0.016	-140.2
2.491	0.004	167.9	0.017	14.5	0.012	-111.1
2.637	0.003	-117.6	0.012	72.6	0.006	-45.9
2.792	0.002	-26.5	0.008	132.9	0.007	14.2
2.956	0.002	43.4	0.004	-160.9	0.002	25.2
3.130	0.002	151.4	0.001	-26.8	0.003	-121.4
3.313	0.001	-174.3	0.002	69.7	0.002	-9.9
3.507	0.001	-74.5	0.003	-86.2	0.002	71.1
3.713	0.001	9.1	0.006	-28.8	0.001	-172.6
3.930	0.000	144.3	0.005	30.9	0.002	-101.5
4.159	0.000	26.5	0.002	37.5	0.001	52.5
4.402	0.000	-153.4	0.007	-131.5	0.000	11.5
4.659	0.000	10.5	0.005	64.5	0.001	161.4
4.931	0.000	179.0	0.003	94.9	0.000	-27.9
5.218	0.000	-89.9	0.002	-75.8	0.000	111.3

Rotational RAOs at Heading 45°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.053	-93.5	0.052	-90.1	0.037	5.8
0.238	0.077	-94.9	0.074	-90.6	0.053	6.0
0.276	0.107	-96.5	0.100	-91.0	0.071	6.4
0.313	0.143	-98.5	0.128	-91.5	0.091	6.8
0.350	0.186	-100.6	0.160	-92.0	0.114	7.4
0.386	0.239	-103.0	0.194	-92.5	0.139	8.0
0.421	0.305	-105.7	0.231	-93.1	0.166	8.8
0.456	0.387	-108.7	0.271	-93.7	0.196	9.7
0.491	0.492	-112.1	0.313	-94.4	0.228	10.7
0.525	0.634	-115.9	0.356	-95.1	0.265	11.9
0.558	0.832	-120.3	0.402	-95.9	0.308	13.2
0.591	1.131	-125.8	0.449	-96.8	0.361	14.5
0.624	1.630	-133.3	0.497	-97.6	0.435	15.6
0.656	2.599	-145.6	0.546	-98.6	0.561	14.8
0.687	4.783	-173.7	0.596	-99.6	0.809	3.3
0.730	5.002	104.6	0.665	-101.1	0.645	-41.8
0.775	2.515	71.0	0.740	-102.8	0.374	-27.7
0.823	1.622	58.0	0.819	-104.8	0.368	-9.8
0.873	1.199	49.4	0.902	-107.3	0.401	0.2
0.927	0.951	42.3	0.985	-110.2	0.438	6.9
0.984	0.783	36.0	1.066	-113.8	0.473	12.3
1.043	0.655	30.3	1.138	-118.1	0.502	17.4
1.107	0.547	24.8	1.191	-123.5	0.525	22.4
1.174	0.446	19.2	1.212	-130.1	0.538	27.6
1.245	0.349	13.0	1.181	-138.1	0.538	33.1
1.319	0.253	4.6	1.083	-147.3	0.523	39.0
1.399	0.160	-11.0	0.920	-157.2	0.486	45.6
1.482	0.097	-51.5	0.713	-167.6	0.426	53.3
1.571	0.121	-105.2	0.486	-179.0	0.341	62.8
1.665	0.186	-126.2	0.271	167.2	0.237	76.7
1.764	0.238	-133.1	0.097	140.0	0.131	104.3
1.869	0.252	-134.8	0.060	24.6	0.087	170.9
1.980	0.217	-133.2	0.116	-10.7	0.121	-138.6
2.097	0.140	-127.1	0.121	-24.6	0.132	-112.3
2.221	0.049	-102.0	0.080	-35.8	0.100	-84.7
2.352	0.042	16.3	0.020	-58.5	0.057	-33.9
2.491	0.061	41.0	0.026	146.2	0.049	35.8
2.637	0.029	64.2	0.027	133.6	0.037	88.4
2.792	0.019	176.9	0.002	-91.3	0.022	165.6
2.956	0.015	-163.9	0.014	-65.5	0.013	-120.5
3.130	0.004	24.0	0.004	-172.9	0.009	-6.2
3.313	0.002	22.1	0.009	126.8	0.001	103.2
3.507	0.007	157.4	0.004	-55.6	0.005	-131.0
3.713	0.008	-177.8	0.007	-8.9	0.008	-33.0
3.930	0.005	92.1	0.006	-171.4	0.011	63.2
4.159	0.015	-168.1	0.003	34.2	0.011	174.2
4.402	0.033	28.9	0.001	178.1	0.023	41.4
4.659	0.017	-116.0	0.001	178.8	0.013	-93.7
4.931	0.005	-162.9	0.001	-159.4	0.004	-131.3
5.218	0.004	62.0	0.001	-97.3	0.002	79.5

Plotted RAOs at Heading 45°



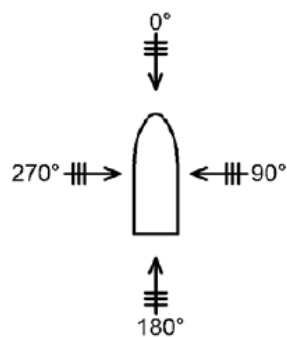
Translational RAOs at Heading 60°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.449	39.4	0.862	-90.0	1.000	0.0
0.238	0.391	46.5	0.861	-90.1	1.000	0.0
0.276	0.357	52.8	0.859	-90.1	0.999	0.0
0.313	0.336	58.4	0.857	-90.1	0.999	0.0
0.350	0.322	63.2	0.855	-90.2	0.999	0.0
0.386	0.313	67.6	0.853	-90.3	0.998	0.0
0.421	0.307	71.4	0.852	-90.5	0.997	0.0
0.456	0.303	74.9	0.851	-90.8	0.996	-0.1
0.491	0.300	78.0	0.852	-91.1	0.995	-0.1
0.525	0.298	80.8	0.855	-91.7	0.994	-0.1
0.558	0.297	83.4	0.862	-92.6	0.992	-0.2
0.591	0.297	85.8	0.875	-94.1	0.990	-0.2
0.624	0.297	88.0	0.901	-96.9	0.987	-0.3
0.656	0.297	90.0	0.947	-103.3	0.985	-0.4
0.687	0.297	91.8	0.971	-121.5	0.982	-0.5
0.730	0.297	94.1	0.286	-136.9	0.977	-0.6
0.775	0.296	96.3	0.400	-81.1	0.971	-0.8
0.823	0.296	98.4	0.484	-79.4	0.965	-1.1
0.873	0.294	100.3	0.505	-79.3	0.957	-1.5
0.927	0.291	101.9	0.500	-78.9	0.948	-2.2
0.984	0.285	103.4	0.481	-78.1	0.938	-3.1
1.043	0.277	104.5	0.452	-76.8	0.925	-4.5
1.107	0.263	105.2	0.416	-75.1	0.908	-6.9
1.174	0.244	105.7	0.374	-73.0	0.881	-10.8
1.245	0.216	106.5	0.328	-70.2	0.827	-16.8
1.319	0.183	108.4	0.277	-66.6	0.725	-24.9
1.399	0.148	112.4	0.224	-62.1	0.571	-33.2
1.482	0.114	118.9	0.170	-56.3	0.401	-38.9
1.571	0.083	128.9	0.117	-48.4	0.251	-39.5
1.665	0.057	145.1	0.067	-35.6	0.140	-32.2
1.764	0.040	170.2	0.027	-2.1	0.071	-8.9
1.869	0.030	-157.3	0.024	96.7	0.047	37.8
1.980	0.025	-123.6	0.044	133.7	0.049	74.7
2.097	0.021	-90.7	0.055	154.4	0.049	95.3
2.221	0.017	-54.4	0.056	175.0	0.042	111.2
2.352	0.013	-11.0	0.048	-160.4	0.029	129.5
2.491	0.012	33.8	0.036	-127.5	0.016	165.5
2.637	0.010	79.1	0.025	-81.0	0.014	-143.4
2.792	0.009	122.7	0.019	-19.6	0.011	-116.0
2.956	0.005	159.4	0.018	43.2	0.003	-48.8
3.130	0.002	-81.0	0.014	98.1	0.005	45.7
3.313	0.003	-11.4	0.011	163.5	0.004	128.8
3.507	0.004	75.1	0.007	-162.0	0.004	164.5
3.713	0.002	149.0	0.001	-149.3	0.004	-28.9
3.930	0.002	-99.9	0.005	80.6	0.001	-19.6
4.159	0.001	43.6	0.003	-42.4	0.001	-159.0
4.402	0.001	163.2	0.001	11.2	0.001	-52.4
4.659	0.001	-59.6	0.009	-46.6	0.001	59.0
4.931	0.000	49.7	0.003	-133.8	0.000	-92.0
5.218	0.000	70.2	0.001	-159.3	0.000	131.1

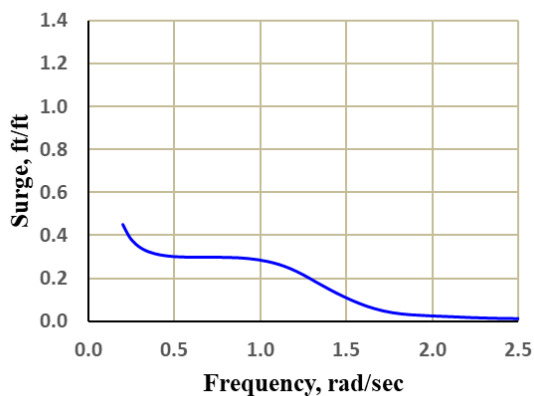
Rotational RAOs at Heading 60°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.065	-92.7	0.037	-89.7	0.033	7.8
0.238	0.095	-93.7	0.053	-90.1	0.046	8.0
0.276	0.131	-95.0	0.071	-90.6	0.062	8.4
0.313	0.175	-96.4	0.091	-91.0	0.080	8.8
0.350	0.228	-98.1	0.114	-91.4	0.100	9.4
0.386	0.292	-100.0	0.138	-91.9	0.122	10.0
0.421	0.371	-102.1	0.164	-92.4	0.146	10.9
0.456	0.470	-104.4	0.193	-93.0	0.172	11.9
0.491	0.596	-107.1	0.223	-93.5	0.202	13.1
0.525	0.764	-110.3	0.254	-94.2	0.236	14.5
0.558	0.998	-114.1	0.287	-94.8	0.277	16.1
0.591	1.349	-119.0	0.321	-95.5	0.330	17.9
0.624	1.929	-126.0	0.357	-96.3	0.408	19.5
0.656	3.041	-137.9	0.393	-97.0	0.545	18.9
0.687	5.451	-165.8	0.431	-97.9	0.825	6.7
0.730	5.621	116.2	0.483	-99.1	0.734	-41.4
0.775	2.860	83.0	0.542	-100.6	0.415	-37.9
0.823	1.834	70.3	0.605	-102.3	0.366	-22.4
0.873	1.345	62.0	0.674	-104.4	0.379	-11.6
0.927	1.062	55.2	0.748	-107.0	0.407	-4.3
0.984	0.878	48.9	0.825	-110.1	0.440	1.5
1.043	0.746	43.0	0.901	-114.0	0.472	6.6
1.107	0.645	37.5	0.969	-118.8	0.501	11.4
1.174	0.562	32.3	1.017	-124.8	0.528	16.1
1.245	0.490	27.4	1.027	-131.8	0.550	21.0
1.319	0.424	22.9	0.984	-138.9	0.565	26.3
1.399	0.360	18.8	0.897	-145.1	0.571	32.0
1.482	0.294	14.9	0.788	-150.4	0.564	38.3
1.571	0.227	10.4	0.664	-155.4	0.540	45.3
1.665	0.159	3.5	0.526	-160.3	0.497	53.3
1.764	0.097	-11.7	0.384	-165.2	0.432	63.0
1.869	0.060	-54.0	0.250	-170.1	0.348	75.7
1.980	0.076	-99.2	0.133	-176.5	0.257	93.8
2.097	0.104	-112.6	0.045	163.9	0.176	121.9
2.221	0.115	-113.0	0.030	52.4	0.127	164.2
2.352	0.102	-107.5	0.055	29.3	0.115	-147.9
2.491	0.067	-96.8	0.052	27.6	0.111	-106.1
2.637	0.025	-67.4	0.030	47.0	0.095	-64.3
2.792	0.018	58.2	0.023	101.0	0.074	-16.2
2.956	0.033	100.7	0.019	129.4	0.052	44.2
3.130	0.026	123.5	0.005	-165.1	0.044	115.4
3.313	0.010	-127.4	0.003	-92.8	0.032	172.5
3.507	0.016	-67.1	0.017	71.5	0.017	-114.5
3.713	0.008	12.2	0.012	24.5	0.004	28.8
3.930	0.011	-169.0	0.009	-109.1	0.011	174.5
4.159	0.017	156.6	0.002	-23.1	0.022	162.3
4.402	0.006	-78.0	0.005	142.2	0.006	-86.7
4.659	0.035	130.0	0.003	-90.4	0.031	127.1
4.931	0.003	-28.1	0.002	8.7	0.006	-38.6
5.218	0.015	34.3	0.002	135.9	0.015	51.7

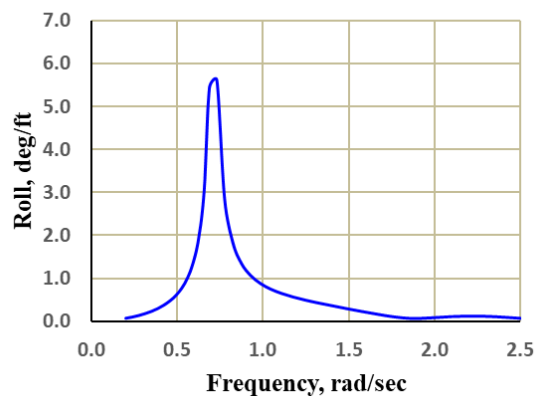
Plotted RAOs at Heading 60°



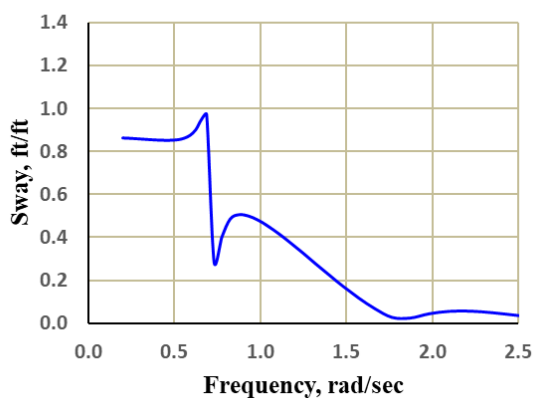
Surge



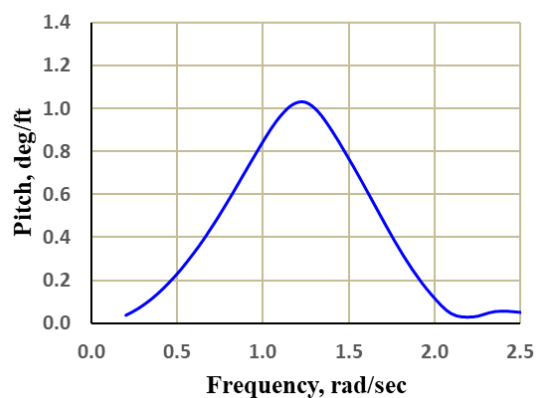
Roll



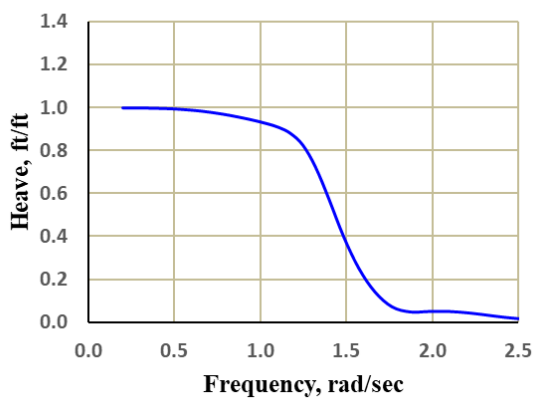
Sway



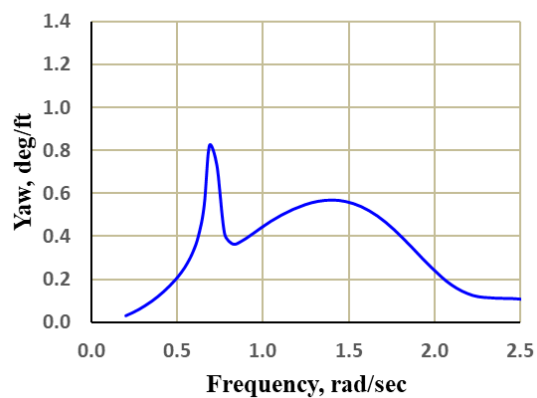
Pitch



Heave



Yaw



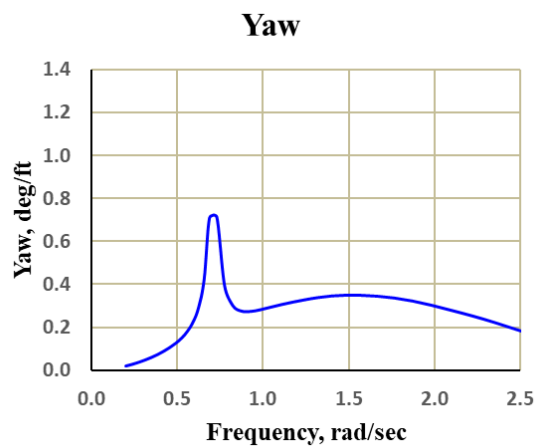
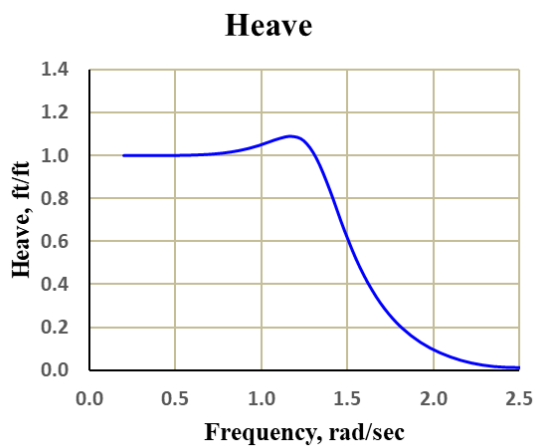
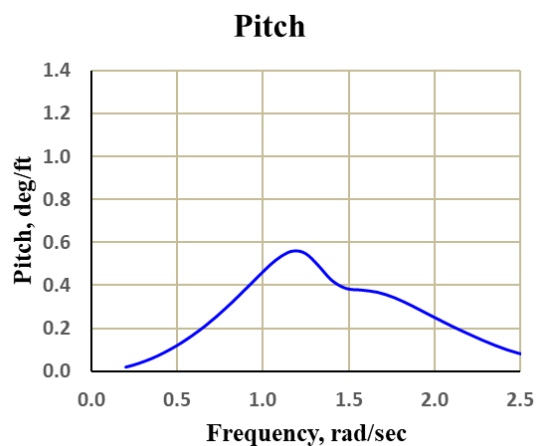
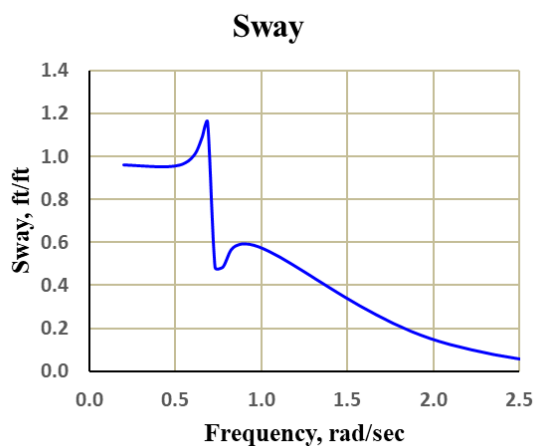
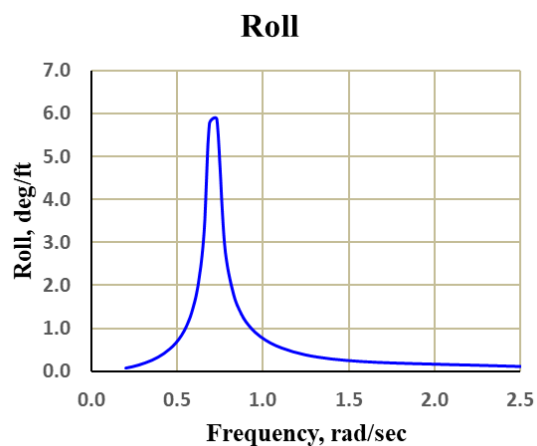
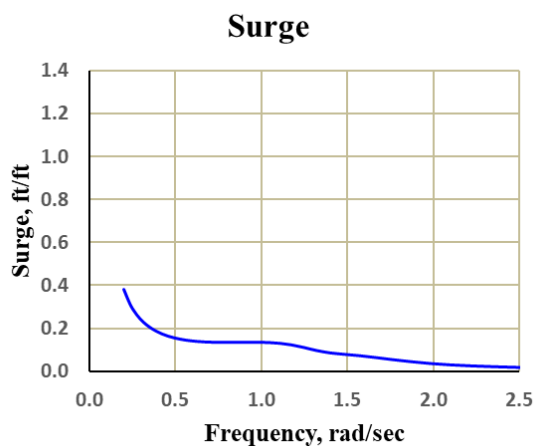
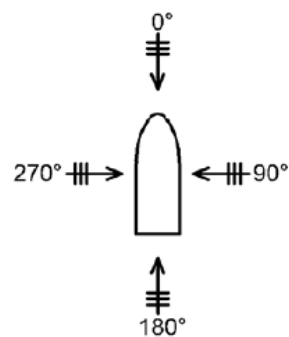
Translational RAOs at Heading 75°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.384	15.0	0.962	-90.0	1.000	0.0
0.238	0.311	18.5	0.960	-90.0	1.000	0.0
0.276	0.263	22.2	0.959	-90.1	1.000	0.0
0.313	0.230	26.1	0.957	-90.1	1.000	0.0
0.350	0.206	30.2	0.955	-90.1	1.000	0.0
0.386	0.189	34.4	0.954	-90.2	1.000	0.0
0.421	0.175	38.6	0.953	-90.3	1.000	0.0
0.456	0.165	42.8	0.954	-90.5	1.000	0.0
0.491	0.157	46.9	0.956	-90.7	1.001	0.0
0.525	0.150	50.9	0.961	-91.1	1.001	0.0
0.558	0.146	54.8	0.972	-91.7	1.001	0.0
0.591	0.142	58.4	0.991	-92.7	1.002	-0.1
0.624	0.140	61.9	1.027	-94.9	1.003	-0.1
0.656	0.138	65.2	1.094	-100.0	1.004	-0.1
0.687	0.137	68.3	1.159	-115.6	1.006	-0.2
0.730	0.136	72.2	0.485	-134.3	1.008	-0.3
0.775	0.135	75.9	0.486	-91.5	1.012	-0.5
0.823	0.135	79.4	0.566	-85.8	1.017	-0.8
0.873	0.136	82.7	0.592	-84.2	1.024	-1.2
0.927	0.136	85.5	0.593	-83.1	1.034	-2.0
0.984	0.136	87.8	0.581	-81.8	1.047	-3.1
1.043	0.134	89.6	0.560	-80.3	1.063	-5.0
1.107	0.131	90.7	0.533	-78.4	1.080	-8.0
1.174	0.123	91.5	0.501	-76.0	1.089	-12.8
1.245	0.112	93.1	0.466	-73.1	1.069	-20.0
1.319	0.097	97.5	0.428	-69.5	0.988	-29.2
1.399	0.086	105.6	0.389	-65.1	0.835	-38.6
1.482	0.079	114.2	0.348	-59.9	0.650	-45.4
1.571	0.072	121.4	0.306	-53.6	0.481	-48.6
1.665	0.064	128.9	0.265	-46.1	0.344	-48.3
1.764	0.054	138.5	0.225	-36.9	0.240	-44.8
1.869	0.044	151.3	0.187	-25.6	0.161	-38.2
1.980	0.036	167.6	0.154	-11.6	0.103	-27.9
2.097	0.030	-172.7	0.126	5.0	0.062	-13.1
2.221	0.025	-150.7	0.101	24.0	0.034	9.4
2.352	0.021	-126.8	0.079	45.9	0.017	51.0
2.491	0.017	-96.9	0.060	72.3	0.013	106.3
2.637	0.017	-63.0	0.044	102.5	0.010	163.6
2.792	0.017	-36.7	0.030	138.5	0.015	-141.8
2.956	0.012	-11.1	0.021	-167.8	0.018	-120.1
3.130	0.007	45.9	0.021	-115.6	0.011	-91.5
3.313	0.007	109.2	0.021	-67.3	0.010	-2.4
3.507	0.005	146.7	0.021	-25.3	0.014	33.1
3.713	0.002	-141.0	0.012	26.4	0.008	59.8
3.930	0.002	-66.5	0.009	107.4	0.003	162.9
4.159	0.001	20.0	0.009	-177.5	0.002	-110.3
4.402	0.001	98.1	0.008	140.5	0.003	-23.2
4.659	0.000	-165.5	0.004	30.1	0.001	41.9
4.931	0.000	-33.3	0.007	165.8	0.001	-133.8
5.218	0.000	43.9	0.002	144.0	0.001	-36.8

Rotational RAOs at Heading 75°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.073	-91.7	0.019	-88.7	0.019	14.3
0.238	0.106	-92.4	0.027	-89.2	0.027	14.6
0.276	0.146	-93.1	0.037	-89.7	0.037	15.0
0.313	0.195	-94.0	0.047	-90.2	0.047	15.6
0.350	0.253	-95.1	0.059	-90.7	0.060	16.3
0.386	0.325	-96.2	0.072	-91.2	0.073	17.2
0.421	0.412	-97.6	0.086	-91.7	0.088	18.4
0.456	0.520	-99.2	0.101	-92.3	0.105	19.9
0.491	0.659	-101.0	0.117	-92.8	0.125	21.7
0.525	0.841	-103.3	0.133	-93.5	0.149	23.8
0.558	1.095	-106.1	0.151	-94.1	0.180	26.2
0.591	1.472	-110.0	0.169	-94.8	0.223	28.8
0.624	2.092	-116.0	0.188	-95.5	0.291	30.9
0.656	3.270	-126.9	0.207	-96.3	0.422	30.0
0.687	5.781	-153.7	0.227	-97.2	0.706	15.3
0.730	5.876	130.7	0.256	-98.4	0.710	-41.3
0.775	2.961	99.2	0.288	-99.9	0.393	-51.7
0.823	1.862	88.2	0.324	-101.7	0.300	-43.5
0.873	1.330	81.8	0.363	-103.9	0.274	-34.4
0.927	1.016	76.8	0.406	-106.6	0.273	-26.9
0.984	0.807	72.2	0.451	-110.1	0.281	-20.8
1.043	0.657	67.7	0.497	-114.4	0.293	-15.6
1.107	0.543	63.2	0.536	-120.0	0.305	-11.1
1.174	0.454	58.5	0.560	-127.0	0.317	-6.9
1.245	0.383	53.4	0.549	-134.6	0.328	-2.9
1.319	0.328	48.2	0.494	-140.5	0.337	1.4
1.399	0.286	43.1	0.423	-140.4	0.345	6.3
1.482	0.253	38.8	0.386	-134.9	0.348	11.7
1.571	0.227	35.7	0.378	-130.6	0.348	17.6
1.665	0.207	33.9	0.368	-128.9	0.344	24.2
1.764	0.191	33.8	0.342	-128.2	0.335	31.7
1.869	0.178	35.4	0.304	-126.8	0.321	40.4
1.980	0.166	38.7	0.258	-123.9	0.302	50.7
2.097	0.154	43.3	0.211	-119.4	0.278	63.0
2.221	0.141	49.2	0.165	-113.4	0.251	76.9
2.352	0.127	56.3	0.120	-105.0	0.221	92.5
2.491	0.111	64.2	0.083	-88.8	0.185	110.8
2.637	0.092	72.3	0.064	-65.0	0.151	133.1
2.792	0.067	78.5	0.051	-50.3	0.123	156.3
2.956	0.036	79.6	0.023	-44.2	0.086	-178.5
3.130	0.007	84.0	0.007	120.4	0.055	-130.6
3.313	0.010	-151.3	0.020	131.8	0.055	-78.1
3.507	0.007	161.2	0.011	125.7	0.043	-35.3
3.713	0.008	-3.7	0.005	-25.0	0.028	19.8
3.930	0.005	-131.6	0.003	25.6	0.019	137.2
4.159	0.012	90.6	0.010	81.5	0.018	171.6
4.402	0.030	-58.0	0.002	122.3	0.033	-74.8
4.659	0.015	-106.9	0.002	-70.6	0.014	-86.5
4.931	0.024	0.1	0.003	-13.0	0.027	10.0
5.218	0.005	-88.6	0.001	15.7	0.005	152.4

Plotted RAOs at Heading 75°



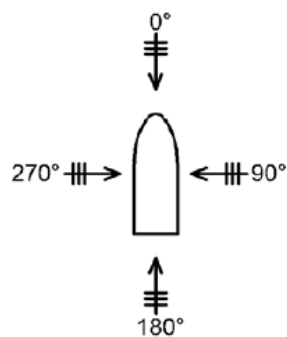
Translational RAOs at Heading 90°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.408	-14.1	0.996	-90.0	1.000	0.0
0.238	0.338	-17.3	0.994	-90.0	1.000	0.0
0.276	0.291	-19.9	0.993	-90.0	1.000	0.0
0.313	0.258	-22.0	0.991	-90.0	1.000	0.0
0.350	0.233	-23.6	0.989	-90.0	1.000	0.0
0.386	0.214	-24.9	0.988	-90.1	1.001	0.0
0.421	0.198	-25.8	0.988	-90.1	1.001	0.0
0.456	0.184	-26.5	0.989	-90.1	1.002	0.0
0.491	0.173	-27.0	0.992	-90.2	1.002	0.0
0.525	0.163	-27.3	0.999	-90.4	1.003	0.0
0.558	0.155	-27.4	1.012	-90.7	1.005	0.0
0.591	0.147	-27.4	1.035	-91.3	1.006	0.0
0.624	0.140	-27.3	1.079	-92.7	1.008	-0.1
0.656	0.134	-27.1	1.163	-96.5	1.011	-0.1
0.687	0.129	-26.8	1.282	-109.7	1.014	-0.2
0.730	0.122	-26.2	0.681	-132.4	1.019	-0.3
0.775	0.116	-25.4	0.559	-101.1	1.025	-0.5
0.823	0.110	-24.5	0.611	-92.8	1.034	-0.9
0.873	0.105	-23.4	0.631	-90.0	1.047	-1.4
0.927	0.101	-22.1	0.630	-88.4	1.063	-2.3
0.984	0.097	-20.9	0.618	-87.0	1.083	-3.6
1.043	0.094	-20.0	0.599	-85.5	1.108	-5.8
1.107	0.093	-19.9	0.573	-83.8	1.134	-9.3
1.174	0.091	-21.7	0.543	-81.9	1.150	-14.6
1.245	0.088	-26.1	0.509	-79.6	1.132	-22.4
1.319	0.079	-33.1	0.472	-76.9	1.044	-32.1
1.399	0.064	-40.0	0.433	-73.6	0.880	-41.4
1.482	0.047	-42.8	0.391	-69.6	0.685	-47.6
1.571	0.032	-38.0	0.347	-64.9	0.513	-49.3
1.665	0.023	-24.8	0.303	-59.2	0.381	-47.1
1.764	0.018	-7.0	0.258	-52.2	0.283	-41.8
1.869	0.016	9.6	0.215	-43.2	0.210	-33.8
1.980	0.014	23.3	0.174	-31.3	0.156	-23.2
2.097	0.012	35.4	0.139	-15.9	0.117	-10.4
2.221	0.010	47.5	0.111	2.9	0.087	3.9
2.352	0.008	59.8	0.086	24.8	0.064	20.9
2.491	0.006	71.8	0.065	52.4	0.049	45.6
2.637	0.004	85.0	0.055	83.7	0.044	75.5
2.792	0.003	108.7	0.048	105.5	0.041	99.0
2.956	0.001	152.2	0.032	119.4	0.028	121.7
3.130	0.001	-62.0	0.013	170.8	0.008	179.7
3.313	0.005	-19.7	0.022	-118.4	0.016	-46.9
3.507	0.008	-11.1	0.023	-98.6	0.026	-16.4
3.713	0.003	-0.6	0.013	-50.1	0.013	-3.6
3.930	0.004	158.6	0.012	20.7	0.010	-175.4
4.159	0.004	159.9	0.011	96.1	0.012	-177.2
4.402	0.000	112.0	0.013	139.8	0.002	170.7
4.659	0.000	-157.6	0.008	-87.0	0.002	-97.7
4.931	0.000	72.8	0.013	-66.7	0.002	-13.1
5.218	0.000	57.4	0.011	99.9	0.001	57.3

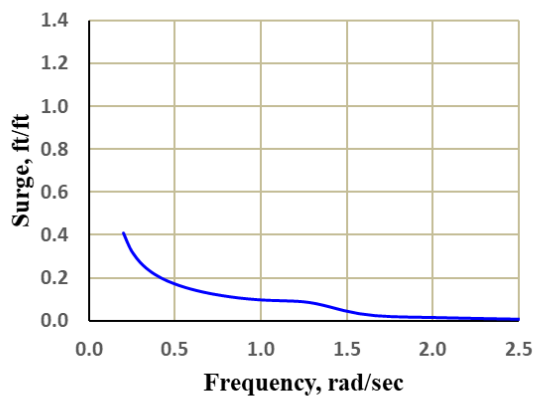
Rotational RAOs at Heading 90°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.075	-90.7	0.001	-23.6	0.005	89.2
0.238	0.109	-90.9	0.001	-30.8	0.007	88.9
0.276	0.151	-91.1	0.001	-39.4	0.010	88.5
0.313	0.201	-91.4	0.001	-50.4	0.013	88.1
0.350	0.262	-91.8	0.001	-65.3	0.017	87.7
0.386	0.336	-92.2	0.001	-84.8	0.022	87.1
0.421	0.426	-92.7	0.001	-106.5	0.028	86.4
0.456	0.537	-93.4	0.002	-125.5	0.036	85.5
0.491	0.679	-94.3	0.002	-139.7	0.047	84.3
0.525	0.867	-95.4	0.003	-149.8	0.061	82.7
0.558	1.127	-97.1	0.005	-157.1	0.082	80.5
0.591	1.512	-99.8	0.006	-162.5	0.115	77.2
0.624	2.143	-104.4	0.008	-166.8	0.170	71.8
0.656	3.340	-113.9	0.011	-170.3	0.279	61.3
0.687	5.879	-139.1	0.014	-173.3	0.522	34.9
0.730	5.943	147.8	0.018	-176.9	0.577	-40.1
0.775	2.979	119.0	0.025	179.6	0.322	-71.3
0.823	1.858	111.3	0.034	176.0	0.228	-82.2
0.873	1.313	108.9	0.047	172.0	0.187	-88.7
0.927	0.989	108.7	0.064	167.5	0.168	-93.7
0.984	0.770	110.1	0.089	162.0	0.159	-98.0
1.043	0.612	112.9	0.123	155.1	0.156	-102.1
1.107	0.493	117.2	0.170	145.9	0.158	-106.3
1.174	0.402	123.4	0.232	133.7	0.163	-110.6
1.245	0.333	131.6	0.305	117.7	0.172	-114.7
1.319	0.282	141.4	0.369	98.2	0.182	-118.1
1.399	0.248	152.2	0.395	77.6	0.192	-121.2
1.482	0.225	163.0	0.375	59.5	0.201	-124.1
1.571	0.211	172.9	0.326	45.9	0.208	-126.6
1.665	0.199	-178.4	0.270	37.2	0.214	-128.2
1.764	0.186	-170.9	0.217	33.4	0.216	-128.8
1.869	0.168	-164.2	0.172	34.3	0.213	-128.1
1.980	0.146	-157.5	0.136	39.4	0.206	-126.0
2.097	0.120	-150.1	0.108	48.1	0.194	-122.6
2.221	0.094	-141.7	0.086	59.8	0.176	-117.6
2.352	0.073	-133.0	0.070	76.4	0.152	-110.3
2.491	0.055	-124.0	0.063	98.6	0.124	-100.3
2.637	0.042	-107.1	0.064	119.4	0.097	-88.2
2.792	0.040	-75.4	0.059	137.0	0.072	-77.9
2.956	0.048	-53.8	0.041	162.0	0.043	-74.3
3.130	0.044	-48.8	0.025	-138.5	0.010	-91.6
3.313	0.024	-50.9	0.031	-73.3	0.019	124.5
3.507	0.007	-30.1	0.033	-43.0	0.025	122.9
3.713	0.008	-12.2	0.015	-32.6	0.009	-178.6
3.930	0.008	-67.5	0.009	168.0	0.023	-96.4
4.159	0.010	130.4	0.012	156.1	0.017	-66.5
4.402	0.024	97.2	0.004	147.2	0.013	21.0
4.659	0.006	-61.2	0.003	-120.9	0.006	113.5
4.931	0.014	-89.5	0.004	-27.3	0.011	177.4
5.218	0.011	99.3	0.002	57.2	0.005	-82.0

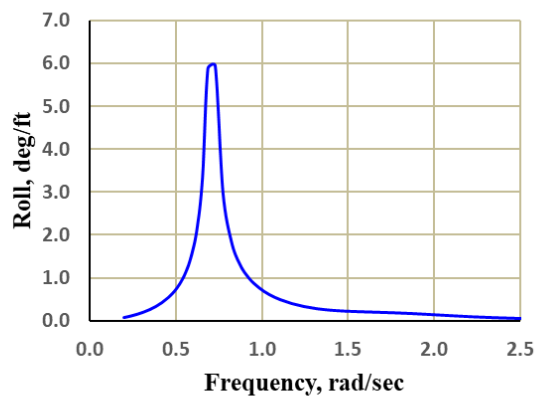
Plotted RAOs at Heading 90°



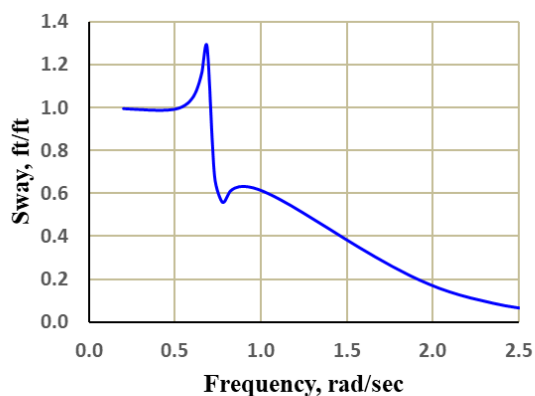
Surge



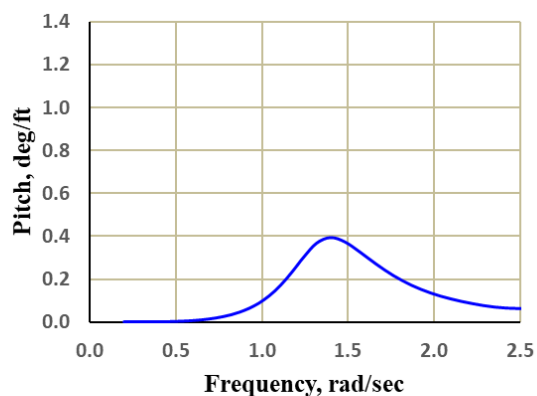
Roll



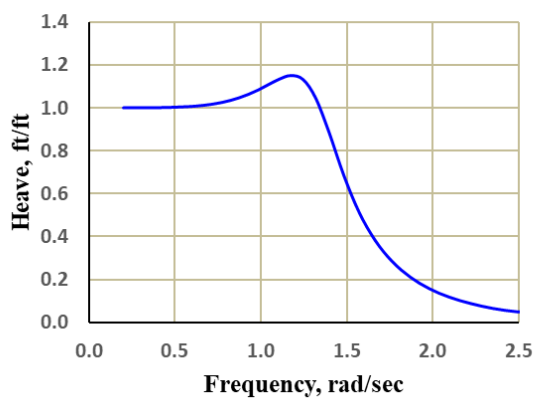
Sway



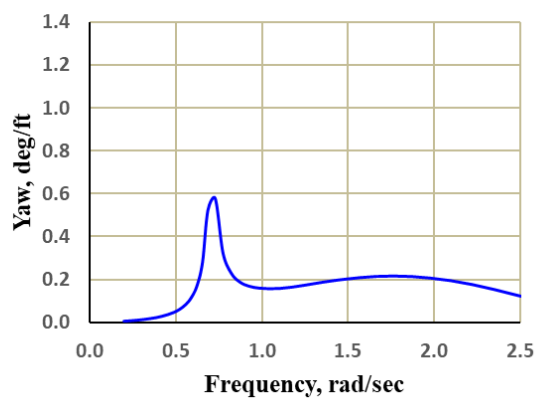
Pitch



Heave



Yaw



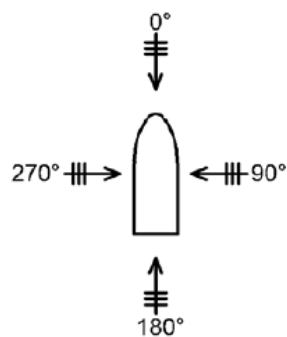
Translational RAOs at Heading 105°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.516	-35.3	0.962	-90.0	1.000	0.0
0.238	0.461	-40.6	0.960	-90.0	1.000	0.0
0.276	0.425	-44.4	0.959	-90.0	1.000	0.0
0.313	0.401	-47.3	0.957	-90.0	1.000	0.0
0.350	0.382	-49.4	0.955	-89.9	1.000	0.0
0.386	0.368	-51.0	0.954	-89.9	1.000	0.0
0.421	0.355	-52.2	0.953	-89.9	1.000	-0.1
0.456	0.345	-53.0	0.954	-89.8	1.000	-0.1
0.491	0.336	-53.5	0.957	-89.8	1.000	-0.1
0.525	0.328	-53.9	0.963	-89.7	1.000	-0.2
0.558	0.321	-54.1	0.976	-89.7	1.000	-0.2
0.591	0.314	-54.2	1.000	-89.8	1.001	-0.3
0.624	0.308	-54.1	1.046	-90.5	1.001	-0.3
0.656	0.302	-54.0	1.141	-93.1	1.002	-0.4
0.687	0.297	-53.8	1.306	-104.5	1.003	-0.5
0.730	0.290	-53.4	0.816	-130.8	1.005	-0.8
0.775	0.283	-52.8	0.597	-108.7	1.007	-1.1
0.823	0.276	-52.2	0.608	-99.3	1.011	-1.5
0.873	0.269	-51.4	0.612	-95.6	1.016	-2.2
0.927	0.262	-50.5	0.602	-93.7	1.022	-3.3
0.984	0.255	-49.6	0.582	-92.3	1.029	-4.9
1.043	0.248	-48.7	0.554	-91.0	1.035	-7.5
1.107	0.241	-48.1	0.520	-89.6	1.036	-11.4
1.174	0.232	-48.1	0.479	-88.2	1.019	-17.3
1.245	0.221	-49.3	0.432	-86.4	0.962	-25.7
1.319	0.202	-51.7	0.381	-84.1	0.836	-36.2
1.399	0.172	-54.0	0.326	-81.0	0.647	-46.1
1.482	0.138	-54.2	0.268	-76.6	0.451	-52.4
1.571	0.106	-51.5	0.210	-70.0	0.292	-53.4
1.665	0.078	-46.0	0.156	-59.6	0.181	-49.5
1.764	0.055	-37.8	0.111	-42.6	0.106	-41.8
1.869	0.036	-26.6	0.083	-16.2	0.055	-30.6
1.980	0.020	-9.7	0.074	15.0	0.021	-13.5
2.097	0.009	25.1	0.075	40.0	0.003	83.1
2.221	0.007	94.3	0.072	57.1	0.012	177.8
2.352	0.008	137.7	0.059	70.6	0.016	-155.0
2.491	0.009	166.2	0.038	84.7	0.016	-129.2
2.637	0.009	-166.5	0.017	106.6	0.012	-96.3
2.792	0.007	-145.7	0.006	149.6	0.009	-42.5
2.956	0.003	-135.2	0.002	-112.4	0.008	14.8
3.130	0.001	93.6	0.003	-31.4	0.006	85.6
3.313	0.002	138.2	0.003	-49.6	0.006	-176.4
3.507	0.003	-134.1	0.004	-131.9	0.010	-104.4
3.713	0.002	-95.0	0.004	172.5	0.007	-65.0
3.930	0.001	113.3	0.005	87.5	0.003	135.1
4.159	0.001	-162.0	0.003	49.6	0.003	170.4
4.402	0.000	-166.1	0.006	-42.9	0.002	-16.0
4.659	0.000	128.7	0.002	-28.9	0.000	109.2
4.931	0.001	-73.5	0.005	-164.7	0.001	18.7
5.218	0.000	-113.0	0.001	89.1	0.001	98.8

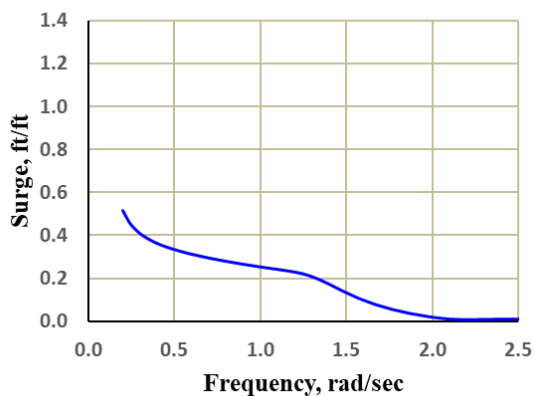
Rotational RAOs at Heading 105°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.073	-89.6	0.019	88.1	0.019	165.6
0.238	0.106	-89.4	0.027	88.6	0.027	165.3
0.276	0.146	-89.1	0.036	89.0	0.036	164.8
0.313	0.195	-88.8	0.046	89.3	0.047	164.1
0.350	0.253	-88.5	0.058	89.7	0.058	163.3
0.386	0.325	-88.2	0.070	90.0	0.071	162.2
0.421	0.412	-87.9	0.084	90.4	0.085	160.8
0.456	0.520	-87.6	0.098	90.7	0.100	158.8
0.491	0.659	-87.5	0.113	91.1	0.117	156.3
0.525	0.842	-87.6	0.130	91.5	0.137	153.0
0.558	1.096	-88.2	0.147	92.0	0.159	148.3
0.591	1.474	-89.6	0.165	92.4	0.187	141.6
0.624	2.095	-92.8	0.183	92.9	0.226	130.9
0.656	3.278	-100.9	0.203	93.4	0.292	112.0
0.687	5.792	-124.7	0.223	94.0	0.420	71.3
0.730	5.907	164.6	0.252	94.7	0.373	-35.4
0.775	3.004	138.3	0.285	95.6	0.247	-101.1
0.823	1.911	133.5	0.323	96.6	0.243	-130.6
0.873	1.390	134.4	0.366	97.7	0.264	-145.0
0.927	1.089	137.8	0.418	98.8	0.292	-153.1
0.984	0.896	142.9	0.480	99.8	0.321	-158.0
1.043	0.766	149.2	0.555	100.5	0.350	-161.4
1.107	0.674	156.2	0.649	100.3	0.377	-163.9
1.174	0.608	163.6	0.763	98.5	0.403	-166.1
1.245	0.556	171.2	0.884	94.1	0.424	-167.8
1.319	0.509	178.6	0.973	86.9	0.436	-169.3
1.399	0.461	-174.1	0.980	78.8	0.436	-170.5
1.482	0.406	-166.7	0.899	72.6	0.420	-171.6
1.571	0.341	-158.6	0.772	70.0	0.387	-172.5
1.665	0.269	-148.9	0.634	71.5	0.335	-173.0
1.764	0.190	-135.1	0.504	76.9	0.268	-172.6
1.869	0.116	-110.0	0.389	86.1	0.189	-170.6
1.980	0.078	-54.7	0.288	99.3	0.105	-164.6
2.097	0.105	-0.7	0.204	117.0	0.030	-133.6
2.221	0.142	26.7	0.134	141.0	0.044	-14.5
2.352	0.153	47.3	0.083	177.1	0.079	2.7
2.491	0.135	69.7	0.061	-128.2	0.084	11.6
2.637	0.102	99.7	0.063	-80.2	0.062	18.4
2.792	0.072	140.0	0.054	-43.5	0.029	17.5
2.956	0.049	-171.9	0.030	7.2	0.009	-53.0
3.130	0.029	-113.7	0.022	115.0	0.015	-89.5
3.313	0.015	-26.7	0.036	-170.5	0.010	-79.3
3.507	0.014	71.8	0.034	-117.3	0.002	-176.6
3.713	0.006	157.9	0.015	-42.1	0.011	132.9
3.930	0.008	-45.9	0.010	115.8	0.007	92.7
4.159	0.008	71.1	0.013	-145.3	0.009	20.6
4.402	0.003	128.4	0.005	9.5	0.003	135.0
4.659	0.007	0.1	0.004	129.6	0.004	-134.9
4.931	0.005	34.2	0.005	-31.4	0.006	65.6
5.218	0.005	-61.7	0.002	155.7	0.000	162.0

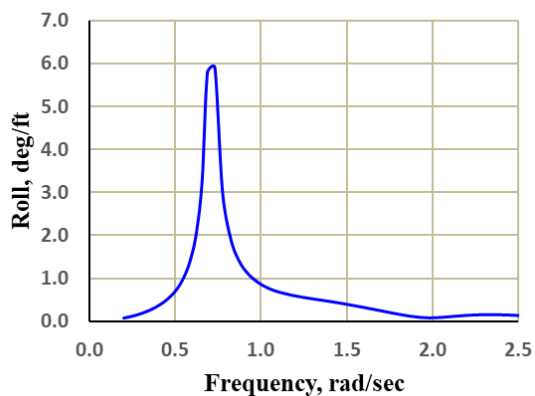
Plotted RAOs at Heading 105°



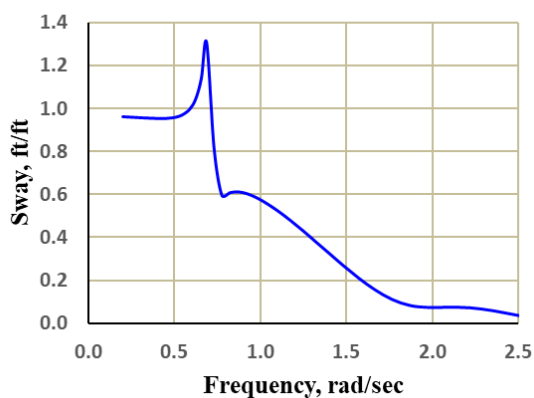
Surge



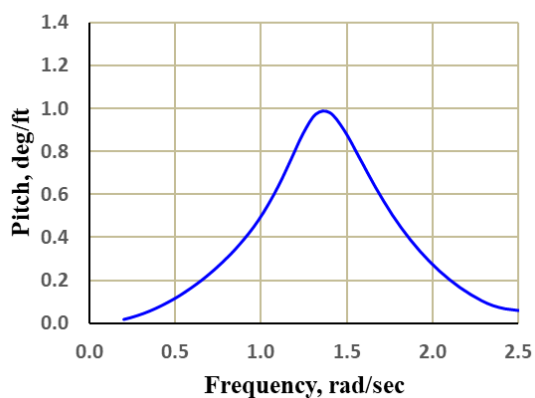
Roll



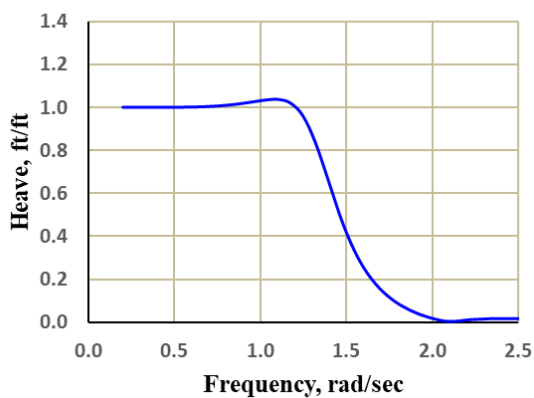
Sway



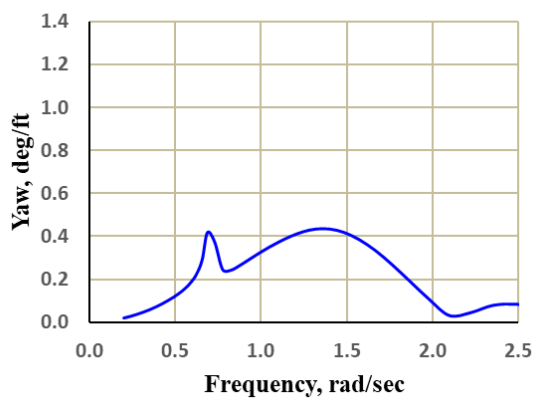
Pitch



Heave



Yaw



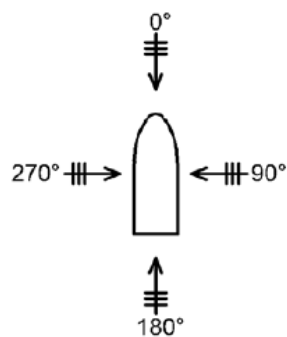
Translational RAOs at Heading 120°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.657	-47.4	0.862	-90.0	1.000	0.0
0.238	0.613	-52.3	0.861	-90.0	1.000	0.0
0.276	0.585	-55.6	0.859	-89.9	0.999	0.0
0.313	0.565	-57.8	0.857	-89.9	0.999	-0.1
0.350	0.550	-59.4	0.855	-89.8	0.998	-0.1
0.386	0.537	-60.4	0.854	-89.8	0.998	-0.1
0.421	0.526	-61.1	0.852	-89.7	0.997	-0.2
0.456	0.516	-61.6	0.852	-89.5	0.996	-0.3
0.491	0.507	-61.8	0.854	-89.3	0.994	-0.3
0.525	0.498	-61.8	0.858	-89.1	0.992	-0.4
0.558	0.490	-61.8	0.869	-88.8	0.990	-0.5
0.591	0.481	-61.6	0.889	-88.5	0.987	-0.7
0.624	0.474	-61.4	0.932	-88.5	0.984	-0.8
0.656	0.466	-61.1	1.026	-90.0	0.981	-1.0
0.687	0.458	-60.7	1.217	-99.9	0.977	-1.2
0.730	0.447	-60.1	0.843	-129.7	0.971	-1.6
0.775	0.435	-59.5	0.575	-113.9	0.963	-2.1
0.823	0.422	-58.7	0.551	-104.3	0.953	-2.8
0.873	0.408	-57.8	0.537	-100.2	0.941	-3.7
0.927	0.392	-56.8	0.515	-98.0	0.925	-5.2
0.984	0.373	-55.8	0.484	-96.5	0.903	-7.2
1.043	0.353	-54.8	0.447	-95.2	0.873	-10.4
1.107	0.329	-54.0	0.401	-93.8	0.829	-15.1
1.174	0.301	-53.6	0.349	-92.0	0.759	-22.1
1.245	0.267	-53.8	0.292	-89.4	0.648	-32.2
1.319	0.223	-54.6	0.233	-85.3	0.489	-45.3
1.399	0.172	-54.7	0.176	-77.9	0.305	-59.9
1.482	0.119	-52.1	0.127	-64.4	0.149	-75.7
1.571	0.073	-44.9	0.096	-42.6	0.055	-106.5
1.665	0.038	-28.1	0.085	-18.5	0.037	-176.4
1.764	0.018	16.9	0.081	-1.9	0.049	163.1
1.869	0.018	75.5	0.070	6.5	0.049	167.4
1.980	0.019	101.1	0.051	9.0	0.039	-177.6
2.097	0.015	114.2	0.027	4.8	0.026	-150.7
2.221	0.006	120.2	0.007	-28.5	0.016	-105.6
2.352	0.002	-16.7	0.006	-134.3	0.012	-49.8
2.491	0.005	-26.5	0.005	179.8	0.009	2.9
2.637	0.002	-17.0	0.006	84.8	0.006	52.8
2.792	0.003	156.5	0.008	58.9	0.001	76.2
2.956	0.004	156.5	0.004	23.2	0.003	-44.0
3.130	0.001	124.1	0.003	-88.0	0.003	-2.6
3.313	0.000	65.3	0.004	-154.4	0.003	95.9
3.507	0.002	-161.1	0.004	147.5	0.003	179.9
3.713	0.001	-142.7	0.001	61.6	0.001	-132.2
3.930	0.000	-97.5	0.001	-106.5	0.001	118.0
4.159	0.001	-133.5	0.003	90.7	0.001	-18.6
4.402	0.000	-153.6	0.001	-125.4	0.000	-41.7
4.659	0.000	144.0	0.006	112.0	0.001	17.0
4.931	0.000	50.2	0.001	-154.3	0.000	-127.4
5.218	0.000	-112.5	0.003	157.4	0.000	131.8

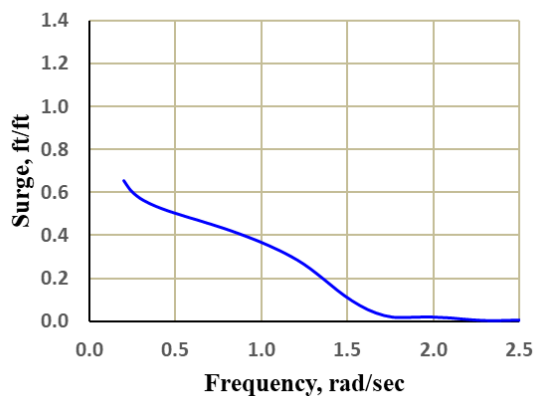
Rotational RAOs at Heading 120°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.065	-88.6	0.037	89.2	0.032	172.2
0.238	0.095	-88.0	0.052	89.5	0.046	171.9
0.276	0.131	-87.2	0.070	89.8	0.061	171.6
0.313	0.175	-86.4	0.090	90.1	0.079	171.1
0.350	0.228	-85.4	0.112	90.4	0.098	170.5
0.386	0.292	-84.4	0.136	90.6	0.120	169.7
0.421	0.371	-83.3	0.162	91.0	0.143	168.8
0.456	0.470	-82.2	0.190	91.3	0.168	167.5
0.491	0.596	-81.2	0.220	91.6	0.195	166.0
0.525	0.764	-80.4	0.251	92.0	0.224	163.9
0.558	0.999	-79.9	0.283	92.3	0.257	161.0
0.591	1.351	-80.3	0.317	92.7	0.295	156.8
0.624	1.935	-82.5	0.352	93.1	0.341	150.0
0.656	3.054	-89.4	0.387	93.6	0.403	136.8
0.687	5.476	-112.0	0.424	94.0	0.469	103.8
0.730	5.671	177.9	0.476	94.6	0.177	-20.2
0.775	2.915	153.1	0.532	95.3	0.220	-138.0
0.823	1.892	149.7	0.595	96.1	0.307	-160.1
0.873	1.408	151.7	0.664	96.9	0.366	-168.8
0.927	1.130	155.9	0.739	97.8	0.414	-173.8
0.984	0.948	161.3	0.821	98.6	0.453	-177.3
1.043	0.816	167.5	0.909	99.1	0.482	179.8
1.107	0.708	174.1	1.002	99.1	0.500	177.0
1.174	0.612	-178.7	1.092	98.0	0.505	174.1
1.245	0.516	-170.5	1.152	95.4	0.493	170.9
1.319	0.417	-160.3	1.139	91.3	0.459	167.6
1.399	0.316	-145.4	1.020	87.7	0.400	163.9
1.482	0.230	-120.6	0.824	87.4	0.316	159.3
1.571	0.195	-82.4	0.610	92.2	0.214	153.0
1.665	0.223	-47.3	0.417	103.7	0.108	141.5
1.764	0.262	-24.8	0.264	124.4	0.028	80.5
1.869	0.271	-8.4	0.165	159.8	0.063	-12.1
1.980	0.234	7.7	0.129	-152.5	0.088	-28.5
2.097	0.162	29.3	0.120	-110.1	0.075	-42.9
2.221	0.090	68.2	0.099	-72.0	0.043	-74.1
2.352	0.061	132.2	0.069	-24.1	0.033	-140.6
2.491	0.045	-175.7	0.052	41.1	0.033	-177.3
2.637	0.017	-83.2	0.046	103.9	0.014	142.7
2.792	0.035	17.9	0.032	165.8	0.015	29.5
2.956	0.032	64.9	0.016	-110.1	0.013	-9.8
3.130	0.013	148.3	0.011	16.4	0.012	-109.1
3.313	0.009	-86.3	0.014	129.5	0.011	-155.8
3.507	0.006	-11.2	0.014	-140.8	0.007	103.9
3.713	0.004	-94.2	0.007	-42.8	0.003	-6.4
3.930	0.006	97.0	0.005	-168.2	0.005	-176.1
4.159	0.011	-148.5	0.003	-56.1	0.005	-146.3
4.402	0.005	84.1	0.003	-147.8	0.004	-156.9
4.659	0.022	-110.7	0.005	62.7	0.011	-129.3
4.931	0.007	36.3	0.002	-57.4	0.005	1.5
5.218	0.004	6.7	0.003	-140.2	0.003	91.4

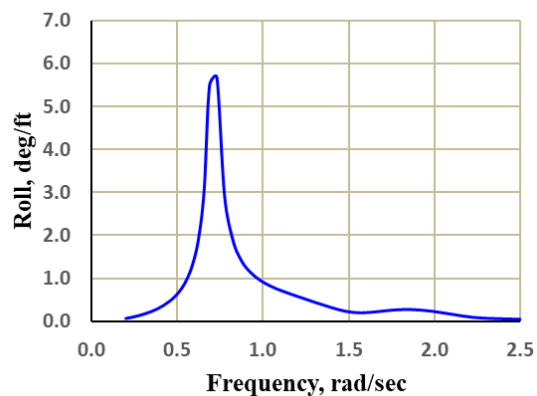
Plotted RAOs at Heading 120°



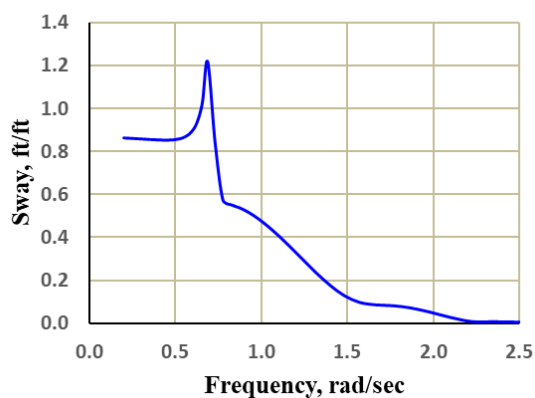
Surge



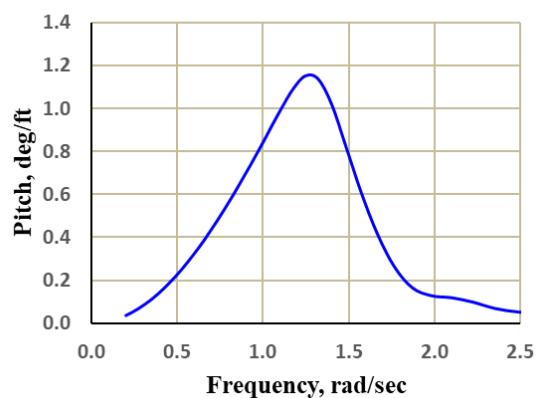
Roll



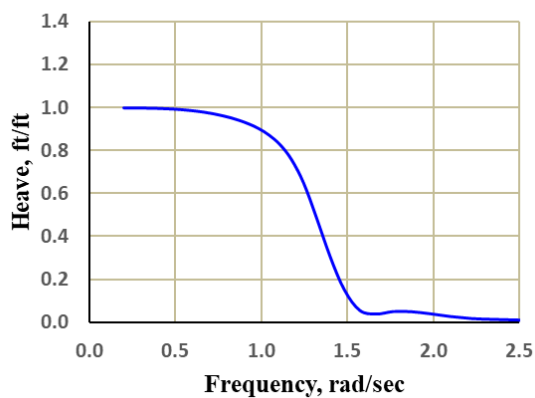
Sway



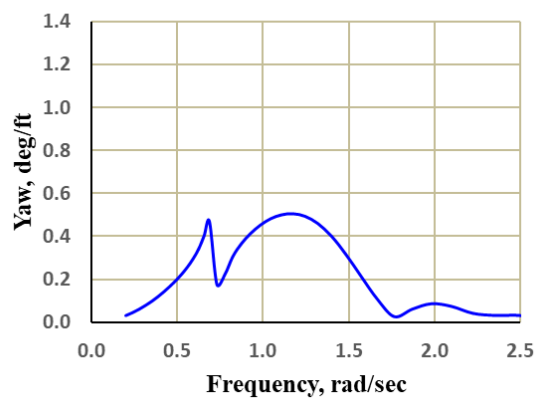
Pitch



Heave



Yaw



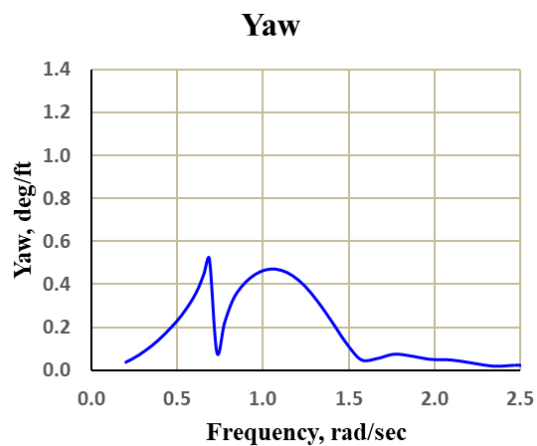
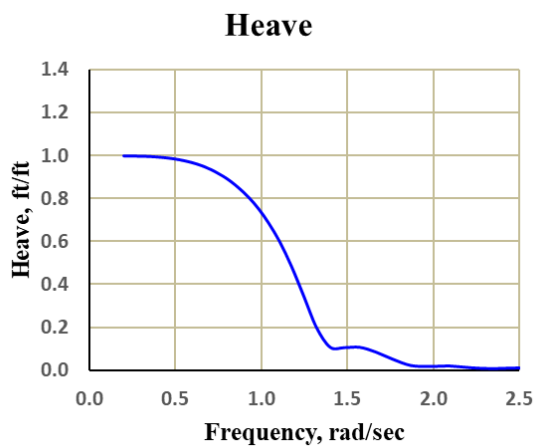
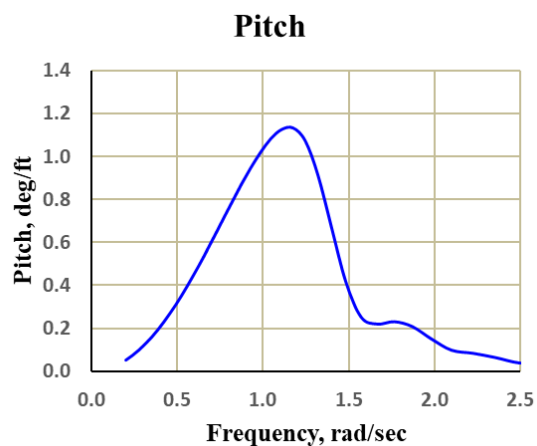
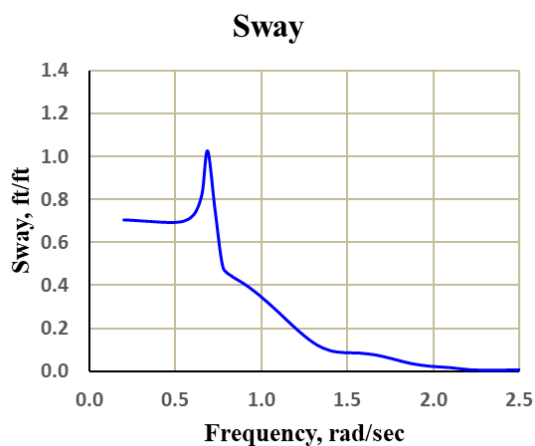
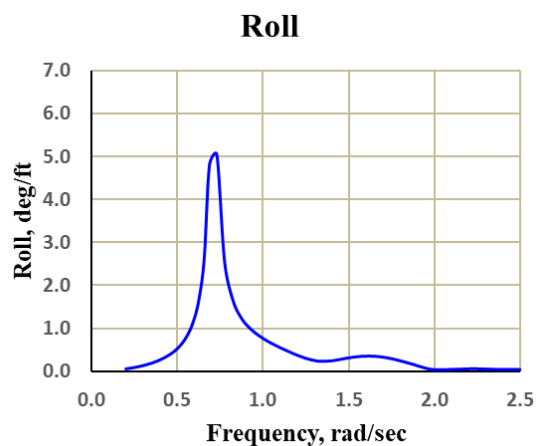
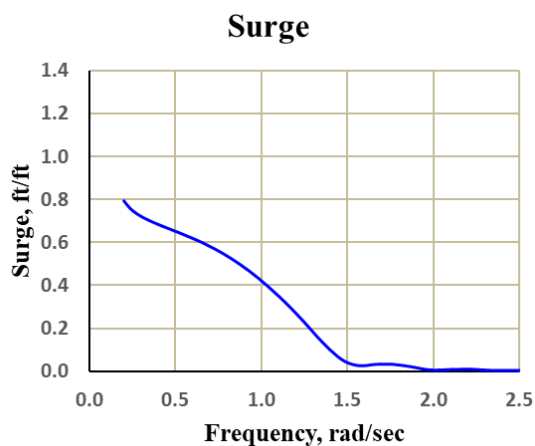
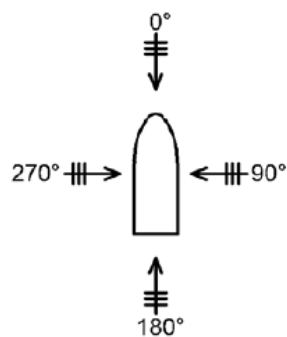
Translational RAOs at Heading 135°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.793	-54.2	0.704	-90.0	1.000	0.0
0.238	0.756	-58.4	0.703	-89.9	0.999	-0.1
0.276	0.732	-61.1	0.701	-89.9	0.999	-0.1
0.313	0.715	-62.9	0.699	-89.8	0.998	-0.1
0.350	0.700	-64.1	0.697	-89.8	0.997	-0.2
0.386	0.687	-64.8	0.695	-89.6	0.995	-0.3
0.421	0.676	-65.2	0.693	-89.5	0.993	-0.4
0.456	0.664	-65.4	0.692	-89.2	0.990	-0.5
0.491	0.654	-65.5	0.692	-88.9	0.986	-0.6
0.525	0.643	-65.4	0.694	-88.5	0.982	-0.8
0.558	0.632	-65.2	0.701	-88.0	0.976	-1.0
0.591	0.621	-65.0	0.717	-87.3	0.969	-1.2
0.624	0.610	-64.6	0.751	-86.6	0.962	-1.4
0.656	0.598	-64.3	0.833	-87.1	0.953	-1.7
0.687	0.586	-63.9	1.025	-95.7	0.943	-2.1
0.730	0.568	-63.3	0.751	-129.8	0.926	-2.7
0.775	0.548	-62.6	0.486	-117.3	0.906	-3.4
0.823	0.524	-61.8	0.444	-107.8	0.880	-4.5
0.873	0.498	-60.9	0.419	-103.3	0.846	-5.9
0.927	0.467	-59.9	0.391	-100.8	0.805	-7.8
0.984	0.431	-58.9	0.356	-99.0	0.752	-10.7
1.043	0.390	-57.9	0.315	-97.1	0.684	-14.9
1.107	0.344	-56.9	0.268	-94.7	0.597	-21.3
1.174	0.291	-56.0	0.217	-91.0	0.485	-31.3
1.245	0.230	-55.3	0.167	-84.4	0.346	-47.2
1.319	0.164	-54.0	0.123	-72.5	0.200	-74.7
1.399	0.098	-48.8	0.095	-53.3	0.107	-129.2
1.482	0.046	-29.7	0.086	-32.7	0.105	175.2
1.571	0.025	31.6	0.084	-20.8	0.106	154.5
1.665	0.031	77.1	0.075	-19.1	0.084	151.3
1.764	0.031	93.7	0.056	-27.4	0.050	160.7
1.869	0.020	105.3	0.035	-49.7	0.021	-163.3
1.980	0.005	134.1	0.023	-90.3	0.017	-80.4
2.097	0.007	-88.4	0.016	-127.2	0.019	-39.8
2.221	0.009	-71.3	0.006	-154.2	0.011	-2.2
2.352	0.003	-48.2	0.004	30.3	0.007	111.8
2.491	0.003	104.2	0.005	5.6	0.010	166.1
2.637	0.002	121.8	0.001	-112.9	0.004	-133.8
2.792	0.001	-0.6	0.003	151.3	0.004	-29.3
2.956	0.001	84.2	0.003	64.7	0.002	-57.6
3.130	0.001	101.3	0.002	19.6	0.003	-73.6
3.313	0.001	44.5	0.001	118.7	0.001	-4.4
3.507	0.001	42.7	0.003	36.7	0.002	-168.7
3.713	0.001	-54.9	0.002	-48.8	0.001	116.1
3.930	0.000	-151.2	0.001	-110.0	0.000	151.0
4.159	0.000	-21.8	0.001	-74.5	0.001	83.5
4.402	0.000	-156.6	0.004	170.5	0.001	-55.6
4.659	0.000	10.9	0.002	-67.2	0.001	-176.7
4.931	0.000	-176.0	0.002	-56.8	0.000	105.5
5.218	0.000	47.8	0.000	-177.0	0.000	169.6

Rotational RAOs at Heading 135°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.053	-87.8	0.052	89.6	0.037	174.2
0.238	0.077	-86.7	0.074	89.9	0.053	173.9
0.276	0.107	-85.6	0.099	90.2	0.071	173.6
0.313	0.143	-84.2	0.127	90.5	0.091	173.1
0.350	0.186	-82.7	0.159	90.8	0.113	172.5
0.386	0.239	-81.1	0.193	91.2	0.137	171.8
0.421	0.305	-79.4	0.230	91.5	0.164	171.0
0.456	0.387	-77.6	0.269	91.9	0.192	169.9
0.491	0.493	-75.9	0.310	92.2	0.223	168.6
0.525	0.634	-74.3	0.353	92.6	0.256	166.9
0.558	0.833	-73.0	0.398	93.0	0.292	164.7
0.591	1.134	-72.5	0.444	93.4	0.334	161.4
0.624	1.635	-73.8	0.491	93.9	0.385	156.2
0.656	2.612	-79.7	0.538	94.3	0.451	146.0
0.687	4.809	-101.3	0.586	94.8	0.517	119.6
0.730	5.045	-173.7	0.652	95.4	0.083	30.1
0.775	2.555	162.5	0.722	96.2	0.220	-164.0
0.823	1.659	159.8	0.796	97.0	0.326	-175.2
0.873	1.234	162.2	0.872	97.9	0.388	179.0
0.927	0.980	166.7	0.947	98.8	0.430	175.0
0.984	0.803	172.4	1.020	99.7	0.458	171.5
1.043	0.660	179.3	1.083	100.4	0.470	168.1
1.107	0.532	-172.1	1.127	100.7	0.464	164.3
1.174	0.412	-160.5	1.134	100.3	0.438	159.7
1.245	0.303	-142.1	1.074	99.0	0.389	154.3
1.319	0.234	-111.2	0.914	97.9	0.318	147.6
1.399	0.241	-73.9	0.668	100.5	0.227	138.5
1.482	0.299	-48.4	0.415	113.7	0.128	123.2
1.571	0.346	-33.7	0.252	147.8	0.049	77.3
1.665	0.342	-24.1	0.220	-165.1	0.055	-14.6
1.764	0.276	-16.1	0.231	-131.1	0.075	-48.8
1.869	0.162	-8.0	0.208	-103.8	0.065	-80.0
1.980	0.041	2.3	0.150	-71.0	0.050	-128.6
2.097	0.040	-163.3	0.098	-18.6	0.048	-178.0
2.221	0.056	-136.3	0.084	43.8	0.033	141.4
2.352	0.041	-77.2	0.064	98.7	0.018	51.2
2.491	0.037	-4.9	0.039	-179.0	0.023	-11.1
2.637	0.026	76.6	0.037	-94.8	0.009	-95.6
2.792	0.021	161.9	0.019	-6.6	0.015	175.1
2.956	0.010	-48.4	0.015	112.6	0.006	67.2
3.130	0.013	44.4	0.007	-98.3	0.006	-10.8
3.313	0.005	170.5	0.010	44.1	0.005	178.3
3.507	0.001	115.3	0.004	156.7	0.005	36.2
3.713	0.005	-108.9	0.005	-16.3	0.006	-67.7
3.930	0.007	80.2	0.004	-170.9	0.001	-93.1
4.159	0.010	-109.6	0.004	33.0	0.007	-137.0
4.402	0.009	-3.4	0.004	-107.2	0.011	-20.9
4.659	0.007	133.5	0.001	161.3	0.010	136.9
4.931	0.006	84.4	0.002	160.5	0.003	100.9
5.218	0.004	-110.6	0.002	77.0	0.006	-88.3

Plotted RAOs at Heading 135°



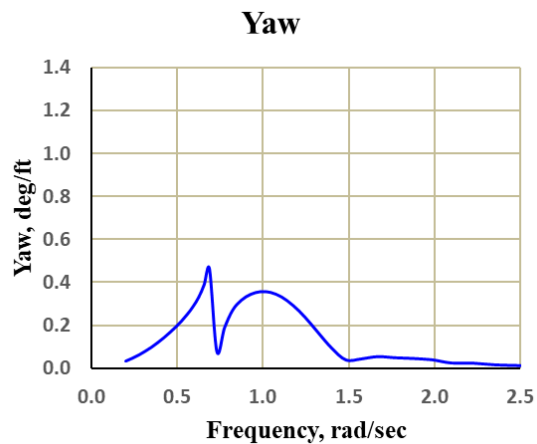
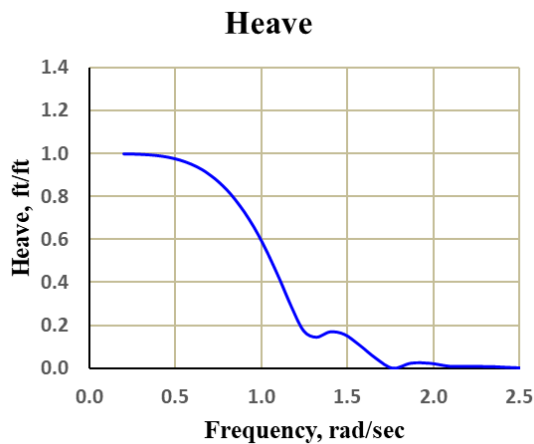
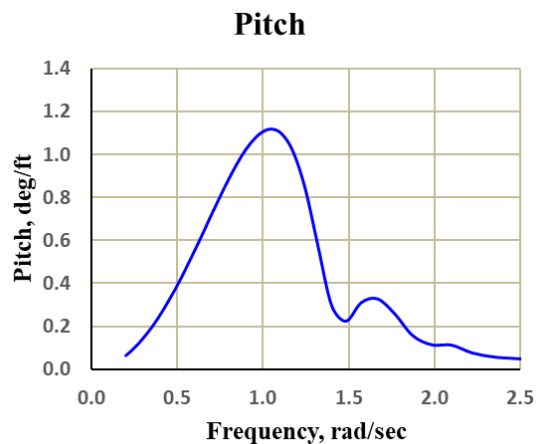
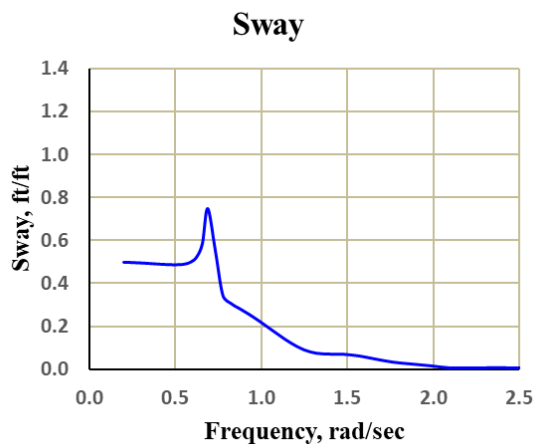
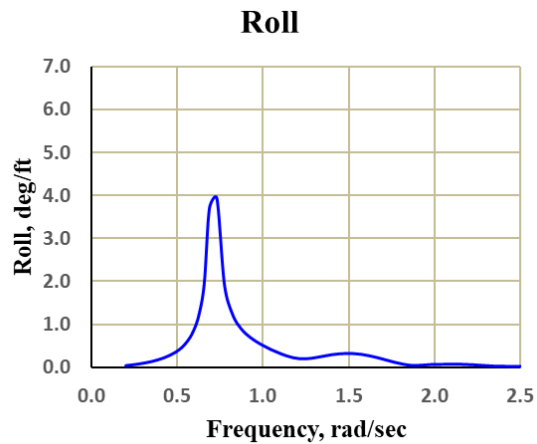
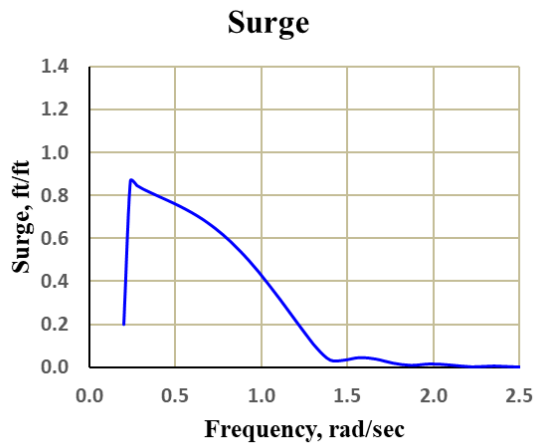
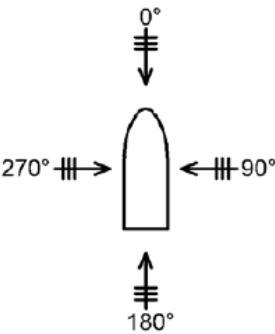
Translational RAOs at Heading 150°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.199	-57.9	0.498	-90.0	0.999	0.0
0.238	0.870	-61.7	0.497	-89.9	0.999	-0.1
0.276	0.848	-64.0	0.495	-89.9	0.998	-0.1
0.313	0.831	-65.5	0.494	-89.8	0.997	-0.2
0.350	0.817	-66.5	0.492	-89.7	0.995	-0.3
0.386	0.803	-67.1	0.490	-89.5	0.992	-0.4
0.421	0.790	-67.4	0.488	-89.3	0.989	-0.5
0.456	0.778	-67.5	0.487	-89.0	0.984	-0.7
0.491	0.765	-67.4	0.486	-88.6	0.978	-0.9
0.525	0.751	-67.3	0.486	-88.0	0.971	-1.1
0.558	0.737	-67.0	0.490	-87.3	0.962	-1.4
0.591	0.723	-66.7	0.500	-86.2	0.952	-1.7
0.624	0.707	-66.4	0.523	-85.0	0.940	-2.1
0.656	0.691	-66.0	0.584	-84.4	0.926	-2.5
0.687	0.674	-65.6	0.748	-91.5	0.909	-3.0
0.730	0.648	-65.0	0.560	-131.7	0.884	-3.8
0.775	0.619	-64.4	0.344	-119.6	0.851	-4.8
0.823	0.584	-63.6	0.305	-109.8	0.810	-6.3
0.873	0.544	-62.8	0.281	-105.0	0.759	-8.2
0.927	0.497	-61.9	0.255	-102.0	0.696	-10.9
0.984	0.444	-60.9	0.225	-99.6	0.619	-14.9
1.043	0.384	-59.8	0.192	-96.6	0.525	-21.0
1.107	0.317	-58.6	0.155	-92.2	0.413	-31.0
1.174	0.244	-57.4	0.120	-84.5	0.288	-48.8
1.245	0.166	-55.4	0.090	-71.1	0.176	-85.6
1.319	0.091	-49.5	0.074	-51.8	0.147	-147.7
1.399	0.033	-16.8	0.070	-34.5	0.172	170.2
1.482	0.033	66.8	0.068	-27.5	0.159	149.8
1.571	0.044	89.0	0.061	-31.2	0.109	140.7
1.665	0.037	99.8	0.046	-45.9	0.048	139.7
1.764	0.018	118.0	0.032	-74.2	0.002	-108.7
1.869	0.008	-144.1	0.024	-109.0	0.026	-37.2
1.980	0.015	-100.3	0.016	-132.6	0.025	-21.2
2.097	0.010	-88.1	0.005	-123.3	0.011	23.7
2.221	0.001	53.2	0.005	-51.8	0.011	124.8
2.352	0.005	92.4	0.006	-85.2	0.010	171.3
2.491	0.000	-147.7	0.006	-138.4	0.004	-71.8
2.637	0.003	-75.3	0.001	150.4	0.006	18.9
2.792	0.000	77.8	0.002	16.0	0.004	125.2
2.956	0.000	112.1	0.001	-104.7	0.002	-122.0
3.130	0.001	-31.2	0.000	-21.9	0.001	73.7
3.313	0.000	135.4	0.001	-104.5	0.003	-152.6
3.507	0.001	-63.6	0.001	136.9	0.001	9.1
3.713	0.001	135.1	0.001	51.1	0.001	28.5
3.930	0.000	65.1	0.000	41.9	0.001	-152.3
4.159	0.000	-44.0	0.003	64.8	0.000	-62.5
4.402	0.000	-176.6	0.003	-93.8	0.000	-79.2
4.659	0.000	10.8	0.001	99.8	0.001	178.6
4.931	0.000	123.1	0.001	-2.1	0.000	149.4
5.218	0.000	-114.8	0.001	-29.3	0.000	81.3

Rotational RAOs at Heading 150°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.038	-87.0	0.064	89.8	0.032	175.1
0.238	0.055	-85.7	0.090	90.2	0.046	174.8
0.276	0.076	-84.2	0.121	90.5	0.061	174.4
0.313	0.101	-82.5	0.156	90.8	0.079	173.9
0.350	0.132	-80.5	0.194	91.2	0.098	173.3
0.386	0.170	-78.4	0.236	91.5	0.119	172.6
0.421	0.217	-76.2	0.281	91.9	0.141	171.8
0.456	0.276	-73.9	0.328	92.3	0.166	170.8
0.491	0.352	-71.6	0.378	92.7	0.192	169.5
0.525	0.455	-69.4	0.430	93.1	0.220	168.0
0.558	0.600	-67.5	0.483	93.6	0.251	166.0
0.591	0.821	-66.3	0.537	94.0	0.286	163.3
0.624	1.192	-66.8	0.592	94.5	0.329	158.8
0.656	1.929	-71.6	0.647	95.0	0.388	150.3
0.687	3.705	-91.8	0.701	95.5	0.463	127.0
0.730	3.932	-170.4	0.773	96.2	0.077	64.9
0.775	1.896	167.1	0.848	97.0	0.188	-176.6
0.823	1.214	165.3	0.923	97.8	0.271	176.7
0.873	0.887	168.2	0.993	98.8	0.316	172.0
0.927	0.686	173.3	1.054	99.8	0.344	168.1
0.984	0.538	-179.8	1.100	100.8	0.356	164.2
1.043	0.414	-170.4	1.120	101.7	0.352	160.1
1.107	0.305	-156.2	1.098	102.3	0.331	155.1
1.174	0.221	-131.8	1.014	102.6	0.292	148.8
1.245	0.194	-94.6	0.841	102.9	0.236	140.7
1.319	0.233	-62.5	0.575	106.6	0.166	129.5
1.399	0.290	-44.7	0.296	128.3	0.093	110.7
1.482	0.321	-34.9	0.224	-168.3	0.038	58.5
1.571	0.299	-29.2	0.310	-132.4	0.042	-28.5
1.665	0.223	-26.3	0.328	-113.3	0.053	-69.6
1.764	0.116	-29.7	0.260	-92.1	0.048	-112.3
1.869	0.040	-82.0	0.158	-55.1	0.045	-163.7
1.980	0.064	-130.0	0.114	11.2	0.039	151.2
2.097	0.070	-111.2	0.112	66.1	0.024	92.1
2.221	0.057	-75.5	0.075	121.7	0.023	10.2
2.352	0.025	-43.8	0.056	-149.0	0.015	-41.0
2.491	0.015	169.8	0.049	-72.5	0.012	-175.9
2.637	0.021	-138.3	0.034	30.1	0.008	127.3
2.792	0.016	-30.7	0.027	133.0	0.011	-6.1
2.956	0.012	109.1	0.018	-97.8	0.002	-140.8
3.130	0.007	-103.1	0.013	52.7	0.001	158.7
3.313	0.012	60.0	0.011	-156.6	0.001	-39.9
3.507	0.010	-128.6	0.008	-21.2	0.005	178.6
3.713	0.009	55.5	0.003	160.8	0.003	35.3
3.930	0.002	-143.4	0.004	87.0	0.004	117.2
4.159	0.009	-78.8	0.004	-58.0	0.008	-68.1
4.402	0.011	142.2	0.003	-145.6	0.007	105.8
4.659	0.009	96.8	0.003	-176.0	0.001	-163.1
4.931	0.005	14.3	0.003	132.3	0.004	-51.8
5.218	0.004	104.5	0.001	135.4	0.005	99.8

Plotted RAOs at Heading 150°



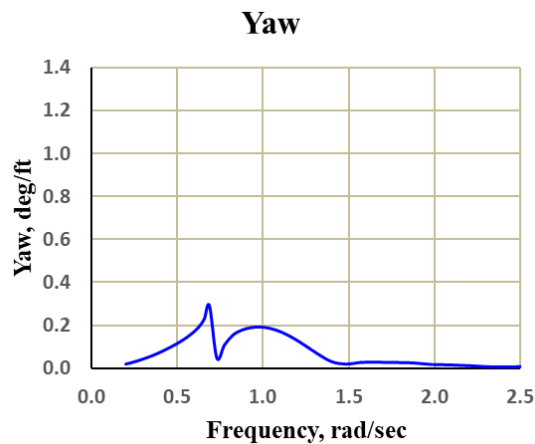
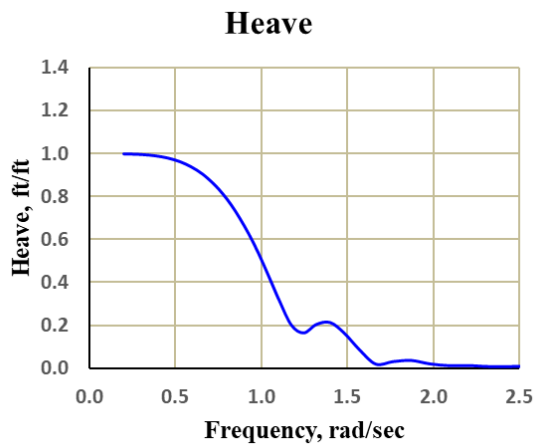
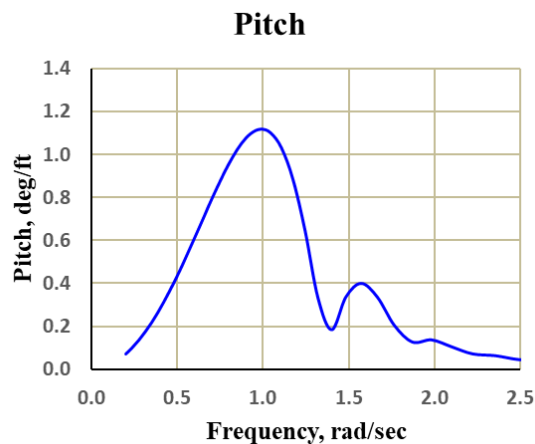
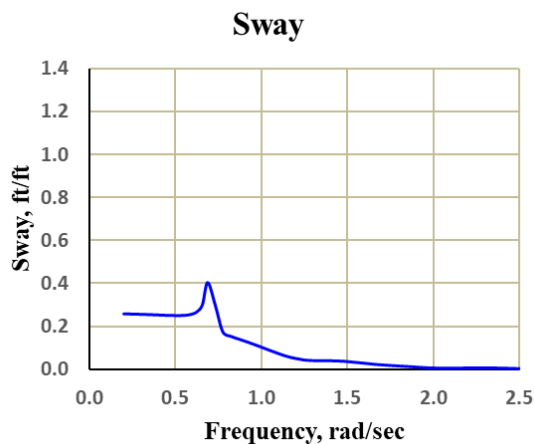
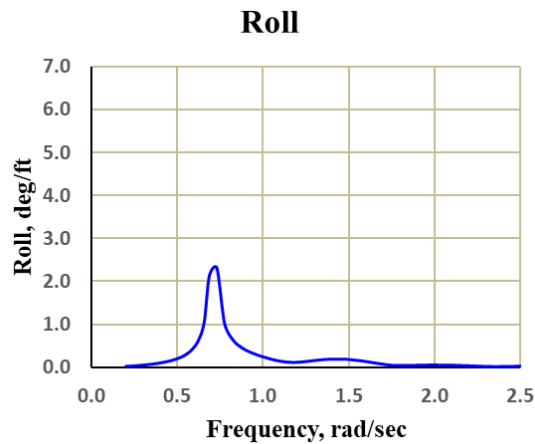
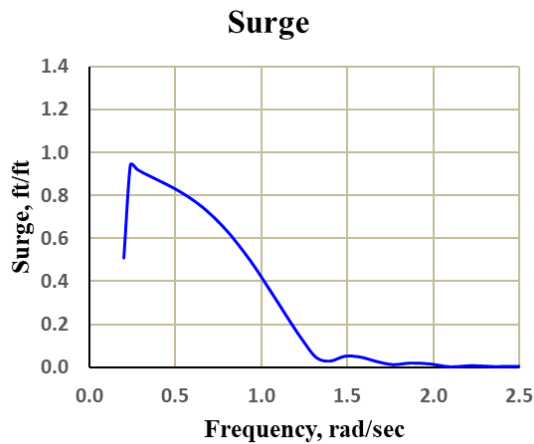
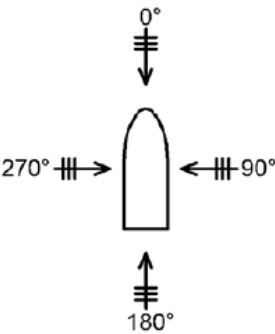
Translational RAOs at Heading 165°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.508	-59.9	0.258	-89.9	0.999	-0.1
0.238	0.942	-63.3	0.257	-89.9	0.999	-0.1
0.276	0.921	-65.5	0.256	-89.9	0.998	-0.1
0.313	0.905	-66.9	0.255	-89.8	0.996	-0.2
0.350	0.890	-67.7	0.254	-89.6	0.994	-0.3
0.386	0.876	-68.2	0.253	-89.5	0.990	-0.4
0.421	0.862	-68.4	0.252	-89.2	0.986	-0.6
0.456	0.848	-68.5	0.251	-88.9	0.980	-0.8
0.491	0.833	-68.4	0.250	-88.4	0.973	-1.0
0.525	0.818	-68.2	0.250	-87.7	0.963	-1.3
0.558	0.802	-68.0	0.251	-86.7	0.952	-1.7
0.591	0.784	-67.7	0.256	-85.4	0.939	-2.1
0.624	0.765	-67.3	0.267	-83.6	0.924	-2.5
0.656	0.746	-67.0	0.299	-81.8	0.906	-3.0
0.687	0.724	-66.6	0.404	-86.7	0.886	-3.6
0.730	0.693	-66.0	0.301	-136.8	0.853	-4.6
0.775	0.656	-65.4	0.174	-121.7	0.813	-5.9
0.823	0.612	-64.7	0.153	-111.0	0.762	-7.7
0.873	0.562	-63.9	0.139	-105.7	0.700	-10.1
0.927	0.504	-63.0	0.124	-102.3	0.624	-13.6
0.984	0.439	-62.1	0.107	-99.2	0.533	-18.8
1.043	0.365	-61.0	0.089	-95.1	0.426	-27.1
1.107	0.286	-59.8	0.070	-88.4	0.309	-42.1
1.174	0.202	-58.2	0.054	-77.0	0.200	-72.9
1.245	0.118	-54.8	0.043	-59.4	0.164	-129.6
1.319	0.044	-38.2	0.039	-41.2	0.204	-175.9
1.399	0.028	65.7	0.039	-31.7	0.213	157.5
1.482	0.050	91.9	0.036	-33.1	0.162	140.6
1.571	0.047	100.9	0.030	-45.4	0.084	128.3
1.665	0.027	116.7	0.022	-69.9	0.018	90.6
1.764	0.011	-167.4	0.016	-102.8	0.030	-19.3
1.869	0.019	-112.2	0.012	-128.1	0.036	-18.6
1.980	0.015	-99.2	0.006	-127.9	0.019	6.9
2.097	0.001	-56.7	0.004	-80.0	0.011	100.6
2.221	0.007	84.7	0.006	-91.4	0.011	159.5
2.352	0.002	106.5	0.005	-126.8	0.006	-95.7
2.491	0.003	-95.5	0.003	-140.7	0.008	-8.6
2.637	0.000	-7.8	0.001	-67.3	0.006	103.9
2.792	0.002	121.4	0.002	-115.4	0.005	-146.9
2.956	0.002	-116.2	0.001	-108.8	0.005	-18.8
3.130	0.001	82.5	0.001	-110.4	0.003	104.9
3.313	0.000	-11.2	0.001	-179.6	0.002	-69.0
3.507	0.000	100.5	0.001	62.8	0.002	150.7
3.713	0.000	-71.2	0.002	-56.3	0.001	-7.1
3.930	0.000	175.9	0.002	-134.2	0.001	-136.3
4.159	0.000	84.0	0.002	98.2	0.001	110.1
4.402	0.000	28.3	0.002	-66.0	0.001	13.5
4.659	0.000	-64.2	0.001	108.8	0.001	-38.9
4.931	0.000	63.9	0.000	-43.0	0.001	-83.8
5.218	0.000	-102.1	0.001	60.8	0.000	48.2

Rotational RAOs at Heading 165°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.019	-86.5	0.071	90.0	0.019	175.5
0.238	0.028	-85.0	0.101	90.3	0.026	175.1
0.276	0.039	-83.2	0.135	90.6	0.035	174.7
0.313	0.052	-81.2	0.174	91.0	0.045	174.2
0.350	0.069	-79.0	0.217	91.4	0.056	173.6
0.386	0.088	-76.5	0.263	91.8	0.068	172.9
0.421	0.113	-73.9	0.313	92.2	0.081	172.1
0.456	0.144	-71.2	0.366	92.6	0.095	171.1
0.491	0.184	-68.5	0.421	93.0	0.110	169.9
0.525	0.238	-65.8	0.477	93.5	0.126	168.5
0.558	0.315	-63.4	0.535	93.9	0.144	166.6
0.591	0.432	-61.6	0.594	94.4	0.164	164.1
0.624	0.632	-61.1	0.653	94.9	0.190	160.2
0.656	1.038	-64.3	0.711	95.4	0.227	152.8
0.687	2.139	-82.2	0.768	95.9	0.289	131.3
0.730	2.307	-172.6	0.843	96.7	0.046	52.4
0.775	1.017	167.2	0.918	97.5	0.108	179.3
0.823	0.637	166.8	0.988	98.4	0.153	173.0
0.873	0.456	170.6	1.050	99.4	0.175	168.4
0.927	0.343	176.7	1.096	100.4	0.188	164.2
0.984	0.259	-174.8	1.117	101.5	0.191	160.0
1.043	0.189	-161.9	1.100	102.6	0.184	155.2
1.107	0.134	-139.8	1.029	103.5	0.167	149.3
1.174	0.110	-103.5	0.881	104.3	0.139	141.7
1.245	0.129	-68.6	0.641	106.3	0.104	131.3
1.319	0.164	-49.0	0.332	118.7	0.065	115.6
1.399	0.188	-38.8	0.184	-167.8	0.030	82.3
1.482	0.184	-33.5	0.336	-125.2	0.019	-6.1
1.571	0.148	-31.6	0.399	-111.1	0.027	-63.6
1.665	0.089	-35.8	0.335	-95.6	0.027	-107.4
1.764	0.038	-68.6	0.204	-66.3	0.026	-158.7
1.869	0.041	-121.5	0.127	-0.8	0.024	153.3
1.980	0.049	-115.3	0.137	59.3	0.017	98.4
2.097	0.045	-90.1	0.105	108.6	0.014	22.6
2.221	0.027	-74.0	0.071	-171.0	0.010	-28.5
2.352	0.012	-139.2	0.063	-93.3	0.005	-173.5
2.491	0.020	-142.4	0.045	6.2	0.006	124.2
2.637	0.015	-82.5	0.043	109.0	0.006	-4.2
2.792	0.003	138.7	0.038	-135.6	0.001	-37.2
2.956	0.013	-141.7	0.028	-13.5	0.003	152.3
3.130	0.006	4.4	0.019	131.9	0.003	-24.6
3.313	0.014	-159.0	0.011	-46.8	0.005	169.3
3.507	0.013	-2.3	0.010	145.9	0.006	8.7
3.713	0.010	-171.5	0.009	-12.9	0.002	-113.9
3.930	0.007	77.8	0.008	-141.5	0.002	139.2
4.159	0.008	-28.9	0.008	108.0	0.002	-109.5
4.402	0.006	-91.0	0.007	19.2	0.002	-5.0
4.659	0.007	-153.4	0.006	-40.0	0.002	176.7
4.931	0.002	175.2	0.003	-62.1	0.001	-54.0
5.218	0.002	-141.2	0.001	-85.5	0.002	151.9

Plotted RAOs at Heading 165°



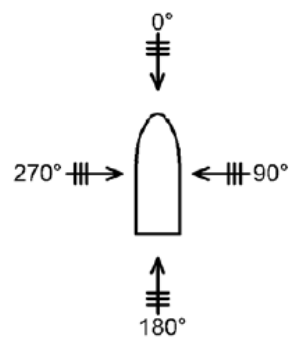
Translational RAOs at Heading 180°

Frequency (rad/s)	Surge Amplitude (ft/ft)	Surge Phase (deg)	Sway Amplitude (ft/ft)	Sway Phase (deg)	Heave Amplitude (ft/ft)	Heave Phase (deg)
0.200	0.817	-60.4	0.000	0.0	0.999	-0.1
0.238	0.967	-63.9	0.000	0.0	0.999	-0.1
0.276	0.947	-66.0	0.000	0.0	0.998	-0.2
0.313	0.930	-67.3	0.000	0.0	0.996	-0.2
0.350	0.915	-68.1	0.000	0.0	0.993	-0.3
0.386	0.901	-68.5	0.000	0.0	0.990	-0.5
0.421	0.887	-68.7	0.000	0.0	0.985	-0.6
0.456	0.872	-68.8	0.000	0.0	0.979	-0.9
0.491	0.857	-68.7	0.000	0.0	0.971	-1.1
0.525	0.840	-68.5	0.000	0.0	0.961	-1.4
0.558	0.823	-68.3	0.000	0.0	0.949	-1.8
0.591	0.805	-68.0	0.000	0.0	0.935	-2.2
0.624	0.785	-67.6	0.000	0.0	0.918	-2.7
0.656	0.763	-67.3	0.000	0.0	0.899	-3.2
0.687	0.741	-66.9	0.000	0.0	0.877	-3.9
0.730	0.707	-66.3	0.000	0.0	0.842	-4.9
0.775	0.667	-65.7	0.000	0.0	0.799	-6.3
0.823	0.620	-65.0	0.000	0.0	0.745	-8.2
0.873	0.567	-64.3	0.000	0.0	0.679	-10.8
0.927	0.505	-63.4	0.000	0.0	0.599	-14.6
0.984	0.434	-62.5	0.000	0.0	0.504	-20.4
1.043	0.357	-61.4	0.000	0.0	0.394	-29.9
1.107	0.273	-60.2	0.000	0.0	0.277	-47.4
1.174	0.186	-58.4	0.000	0.0	0.183	-84.7
1.245	0.101	-54.4	0.000	0.0	0.178	-141.8
1.319	0.029	-27.2	0.000	0.0	0.224	178.7
1.399	0.035	81.6	0.000	0.0	0.221	154.3
1.482	0.054	96.3	0.000	0.0	0.158	137.3
1.571	0.045	104.9	0.000	0.0	0.074	121.5
1.665	0.022	128.0	0.000	0.0	0.019	47.8
1.764	0.015	-143.6	0.000	0.0	0.038	-16.7
1.869	0.021	-109.9	0.000	0.0	0.036	-13.2
1.980	0.012	-99.2	0.000	0.0	0.016	21.2
2.097	0.003	69.1	0.000	0.0	0.012	117.3
2.221	0.007	86.1	0.000	0.0	0.009	177.4
2.352	0.001	170.7	0.000	0.0	0.008	-66.3
2.491	0.003	-96.5	0.000	0.0	0.007	6.9
2.637	0.002	78.1	0.000	0.0	0.006	135.2
2.792	0.002	144.3	0.000	0.0	0.006	-107.1
2.956	0.002	-106.2	0.000	0.0	0.007	3.1
3.130	0.001	67.9	0.000	0.0	0.003	134.3
3.313	0.000	96.0	0.000	0.0	0.002	-86.0
3.507	0.000	-79.0	0.000	0.0	0.002	-156.7
3.713	0.000	107.7	0.000	0.0	0.003	46.4
3.930	0.000	-111.7	0.000	0.0	0.002	-100.6
4.159	0.000	-86.4	0.000	0.0	0.001	140.9
4.402	0.000	115.4	0.000	0.0	0.000	88.9
4.659	0.000	61.1	0.000	0.0	0.001	78.9
4.931	0.000	37.2	0.000	0.0	0.001	94.6
5.218	0.000	81.3	0.000	0.0	0.001	161.5

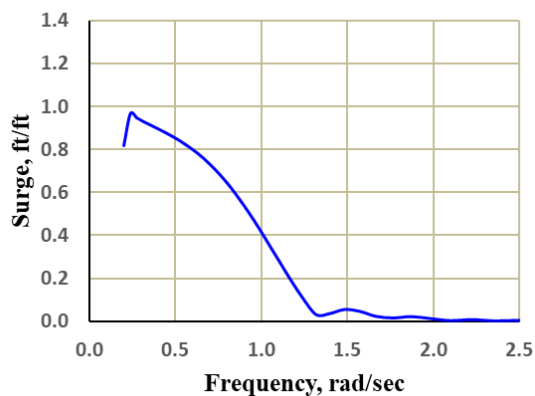
Rotational RAOs at Heading 180°

Frequency (rad/s)	Roll Amplitude (deg/ft)	Roll Phase (deg)	Pitch Amplitude (deg/ft)	Pitch Phase (deg)	Yaw Amplitude (deg/ft)	Yaw Phase (deg)
0.200	0.000	0.0	0.074	90.0	0.000	0.0
0.238	0.000	0.0	0.104	90.3	0.000	0.0
0.276	0.000	0.0	0.140	90.7	0.000	0.0
0.313	0.000	0.0	0.180	91.1	0.000	0.0
0.350	0.000	0.0	0.224	91.4	0.000	0.0
0.386	0.000	0.0	0.273	91.8	0.000	0.0
0.421	0.000	0.0	0.324	92.2	0.000	0.0
0.456	0.000	0.0	0.378	92.7	0.000	0.0
0.491	0.000	0.0	0.435	93.1	0.000	0.0
0.525	0.000	0.0	0.493	93.6	0.000	0.0
0.558	0.000	0.0	0.553	94.0	0.000	0.0
0.591	0.000	0.0	0.613	94.5	0.000	0.0
0.624	0.000	0.0	0.673	95.0	0.000	0.0
0.656	0.000	0.0	0.732	95.5	0.000	0.0
0.687	0.000	0.0	0.790	96.1	0.000	0.0
0.730	0.000	0.0	0.865	96.8	0.000	0.0
0.775	0.000	0.0	0.939	97.6	0.000	0.0
0.823	0.000	0.0	1.008	98.6	0.000	0.0
0.873	0.000	0.0	1.066	99.6	0.000	0.0
0.927	0.000	0.0	1.105	100.7	0.000	0.0
0.984	0.000	0.0	1.116	101.8	0.000	0.0
1.043	0.000	0.0	1.086	102.9	0.000	0.0
1.107	0.000	0.0	0.996	103.8	0.000	0.0
1.174	0.000	0.0	0.828	104.9	0.000	0.0
1.245	0.000	0.0	0.566	107.7	0.000	0.0
1.319	0.000	0.0	0.253	127.1	0.000	0.0
1.399	0.000	0.0	0.212	-143.7	0.000	0.0
1.482	0.000	0.0	0.382	-117.5	0.000	0.0
1.571	0.000	0.0	0.417	-106.0	0.000	0.0
1.665	0.000	0.0	0.322	-89.7	0.000	0.0
1.764	0.000	0.0	0.179	-54.1	0.000	0.0
1.869	0.000	0.0	0.131	19.3	0.000	0.0
1.980	0.000	0.0	0.142	72.3	0.000	0.0
2.097	0.000	0.0	0.099	126.0	0.000	0.0
2.221	0.000	0.0	0.076	-150.3	0.000	0.0
2.352	0.000	0.0	0.060	-73.0	0.000	0.0
2.491	0.000	0.0	0.049	33.8	0.000	0.0
2.637	0.000	0.0	0.045	136.8	0.000	0.0
2.792	0.000	0.0	0.043	-107.3	0.000	0.0
2.956	0.000	0.0	0.034	18.1	0.000	0.0
3.130	0.000	0.0	0.022	157.2	0.000	0.0
3.313	0.000	0.0	0.010	-1.1	0.000	0.0
3.507	0.000	0.0	0.013	-140.4	0.000	0.0
3.713	0.000	0.0	0.014	51.6	0.000	0.0
3.930	0.000	0.0	0.010	-95.2	0.000	0.0
4.159	0.000	0.0	0.006	166.9	0.000	0.0
4.402	0.000	0.0	0.005	100.3	0.000	0.0
4.659	0.000	0.0	0.003	69.1	0.000	0.0
4.931	0.000	0.0	0.004	86.4	0.000	0.0
5.218	0.000	0.0	0.004	139.5	0.000	0.0

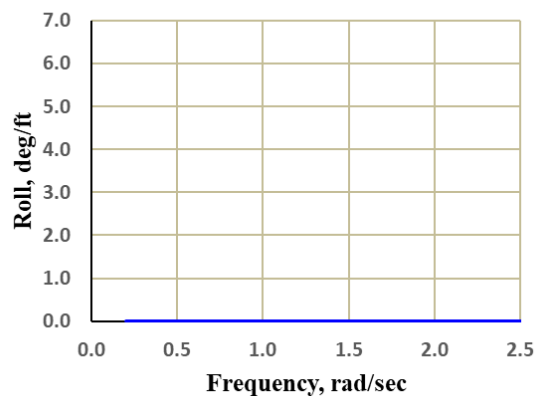
Plotted RAOs at Heading 180°



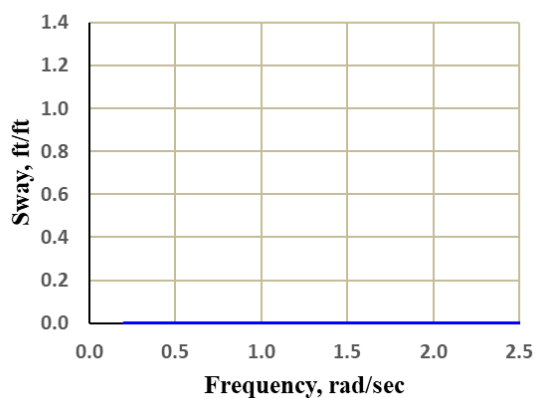
Surge



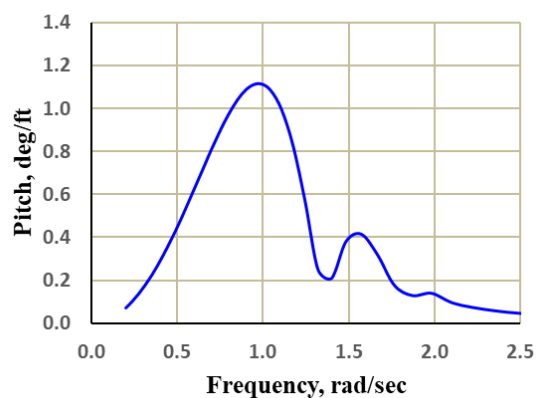
Roll



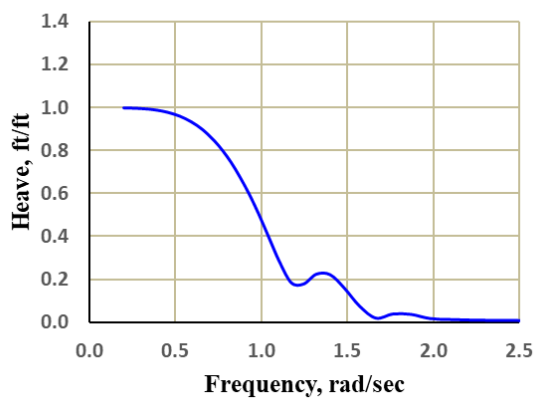
Sway



Pitch



Heave



Yaw

