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Hydromechanics Department Report

Parametric Investigation on the Influence of GM, Roll Damping, and Above-Water Form on the Roll Response of Model 5613

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ABSTRACT

A parametric investigation on the influence of above water hull form, vertical center of gravity, and bilge keel damping on the roll response of a notional combatant hull form was pursued via model testing of a 1/32nd scale ship model in the Maneuvering and Seakeeping (MASK) basin of the Naval Surface Warfare Center, Carderock Division (NSWCCD). Model 5613 was built with an underbody that could be joined at the waterline with three different topside hull forms – a V-flare design, a “tumblehome” wave piercing design, and a “conventional” wall sided design. The models were tested in oblique regular waves at speeds ranging from zero to 25 knots full scale. The results are presented as plots of roll damping, non-dimensional transfer functions, and tables of response amplitudes for roll and transverse accelerations at the bow, center of gravity (cg), and stern.

ADMINISTRATIVE INFORMATION

This work was conducted at the David Taylor Model Basin, Naval Surface Warfare Center, Carderock Division (NSWCCD) by the Seakeeping Division (Code 5500). The work was sponsored by Office of Naval Research, Program Element No. 602123N, Work Unit Number 03-1-5400-608, 04-1-5500-712, and 04-1-5600-255.

INTRODUCTION

As a result of advances in materials, stealth, and propulsion technology, ship designers have proposed several new and sometimes radical hull form design innovations. In particular, the departure from nominally wall-sided hulls to hull forms containing tumblehome (inward sloping sides) has become prevalent, sometimes having a large impact on the ship's seakeeping characteristics. Linear seakeeping prediction programs that do not consider the hull geometry above the calm waterline (body-linear) are essentially making the assumption that the ship is wall-sided near the waterline. As motions become larger and/or hulls become non-wall-sided, the linear seakeeping programs become inadequate. While new tools are evolving to help the ship designer understand the impact of his design decisions, the physics of nonlinear ship motions (in particular the rolling motion of a ship in waves) are still not fully predictable.^{1+, 2}

In an effort to better understand the influence of above the waterline hull geometry on roll, a series of model tests were conducted on a model that was built to accept three different above-

⁺ References are presented on page 169.

water hull shapes (topsides) – each attached in turn to the same below-the-waterline hull form (underbody). The tests were designed to create a roll response database documenting the influence of above waterline hull geometry, the effect of bilge keel span, and the effect of metacentric height on the rolling motion of a ship in waves. The models were tested in regular waves whose lengths varied from 0.5 to 4 times the ship length, (L_{pp}), at four speeds (0,5,15, and 25 knots full-scale), three relative wave headings (bow, beam, and stern-quartering) and in constant $1/60$ (H/λ) steepness. Roll decrement tests were also conducted in calm water on each hull at each ballast condition and model configuration. The roll decrement Test Matrix is presented in Table 1 below. The regular wave test matrix was the same for all three hulls in waves of steepness $H/\lambda = 1/60$. However, additional wave steepnesses were tested in beam seas for the condition (GM and bilge keel span) deemed most appropriate for the particular hull. This test matrix can be seen in Table 2.

Table 1. Roll Decay Test Matrix

		$GM_T = 1.50m$		$GM_T = 2.50m$	
		BK-span = 1.25m	BK-span = 1.75m	BK-span = 1.25m	BK-span = 1.75m
Roll Decays					
Speed (kts)					
	0	ALL	ALL	ALL	ALL
	5	ALL	ALL	ALL	ALL
	15	ALL	ALL	ALL	ALL
	25	ALL	ALL	ALL	ALL

Key: ALL = All models tested
 ONRFL = Flared hull tested
 ONRTH = Tumblehome hull tested
 ONRWS = Wall-Sided hull tested

Table 2. Regular Wave Test Matrix

		GM _T = 1.50m		GM _T = 2.50m	
		BK-span = 1.25m	BK-span = 1.75m	BK-span = 1.25m	BK-span = 1.75m
Regular Waves					
Waves	Speed (kts)				
Bow Qtr Seas (45 deg) <i>H/λ = 1/60</i>	5	ALL	ALL	ALL	ALL
	15	ALL	ALL	ALL	ALL
	25	ALL	ALL	ALL	ALL
Beam Seas (90 deg) <i>H/λ = 1/30</i>	0	ONRFL, ONRWS			ONRTH
	5	ONRFL, ONRWS			ONRTH
	15	ONRFL, ONRWS			ONRTH
	25	ONRFL, ONRWS			ONRTH
Beam Seas (90 deg) <i>H/λ = 1/60</i>	0				
	5	ALL	ALL	ALL	ALL
	15	ALL	ALL	ALL	ALL
	25	ALL	ALL	ALL	ALL
Beam Seas (90 deg) <i>H/λ = 1/90</i>	0	ONRFL, ONRWS			ONRTH
	5	ONRFL, ONRWS			ONRTH
	15	ONRFL, ONRWS			ONRTH
	25	ONRFL, ONRWS			ONRTH
Stern Qtr Seas (45 deg) <i>H/λ = 1/60</i>	5	ALL	ALL	ALL	ALL
	15	ALL	ALL	ALL	ALL
	25	ALL	ALL	ALL	ALL

Key: ALL = All models tested
 ONRFL = Flared hull tested
 ONRTH = Tumblehome hull tested
 ONRWS = Wall-Sided hull tested

MODEL DESCRIPTION

The overall ONR tasking for the roll response investigation included the design and construction of a hull model suitable to achieving the goals of the program. The only initial requirements was that the three hulls would have identical underbody lines while having three different shaped topsides - i.e. 10-degree flared sides, 10-degree tumblehome sides, and a wall-sided hull.

Hull Form Design

One of the goals was to ensure that lessons learned would be applicable to ships that would actually be designed and built, versus a simpler, mathematical type hull form. The easiest way to do this was to use an existing design as a baseline. A government-designed hull form, similar in size and characteristics to the DDG51, was chosen for the underbody. The underbody lines needed to be altered such that the each topside would be appropriately matched to the underbody. For the most part, this meant adjusting the placement of the bulb longitudinally so that the stem could transition in a reasonable manner for each of the topsides. The section shapes will, in some cases, have abrupt changes at the calm waterline, because there is no way to maintain constant curvature for all three topsides. A table of the resultant underbody's characteristics is given in Table 3. The waterline that is common to all three topsides is shown in Figure 1.

The above-water geometry maintains a constant angle of inclination (10, 0, or -10 degrees) for as much of the length of the hull as possible. In the bow region, it would have been possible to maintain the angle for all three topsides, at the expense of a "normal" looking bow. While the constant 10 degrees of tumblehome created a wave-piercing bow representative of a typical tumblehome ship, it was necessary to change the bows of the Flare and Wall-Sided topsides. A flared bow shape was added for these two cases, in order to give the designs a more realistic form. The size of the bow flare is smaller for the Wall-Sided ship than the 10-degree Flare ship. The difference in bow shape is evident in the composite profile view given in Figure 2. This figure also demonstrates the identical deck heights and hull "step" location. The section shapes of the 3 hulls can be seen in Figure 3 through Figure 5.

Table 3. Hull Characteristics

	Full-Scale (15C, SW)		1/32 Model-Scale (20C, FW)	
Lpp	154 m	505 ft	481 cm	15.8 ft (189.6 in)
Beam	18.8 m	61.7 ft	58.8 cm	1.93 ft (23.2 in)
L/B	8.2	8.2	8.2	8.2
Max. Depth	14.5 m	47.6 ft	45.3 cm	1.49 ft (17.8 in)
Max. Freeboard	9.00 m	29.5 ft	28.1 cm	0.92 ft (11.1 in)
Draft	5.50 m	18.0 ft	17.2 cm	0.56 ft (6.77 in)
Displacement	8790 tonnes	8650 LT	261 kg	575 Lbs
LCB (aft of FP)	79.6 m	261 ft	249 cm	8.16 ft
VCB (above BL)	3.26 m	10.7 ft	10.2 cm	0.33 ft (4.01 in)
KM _T	9.74 m	32.0 ft	30.4 cm	1.00 ft (12.0 in)



Figure 1. Common Waterline for Model 5613



Figure 2. Composite of Profiles for Flare, Wall-Sided, and Tumblehome Hulls

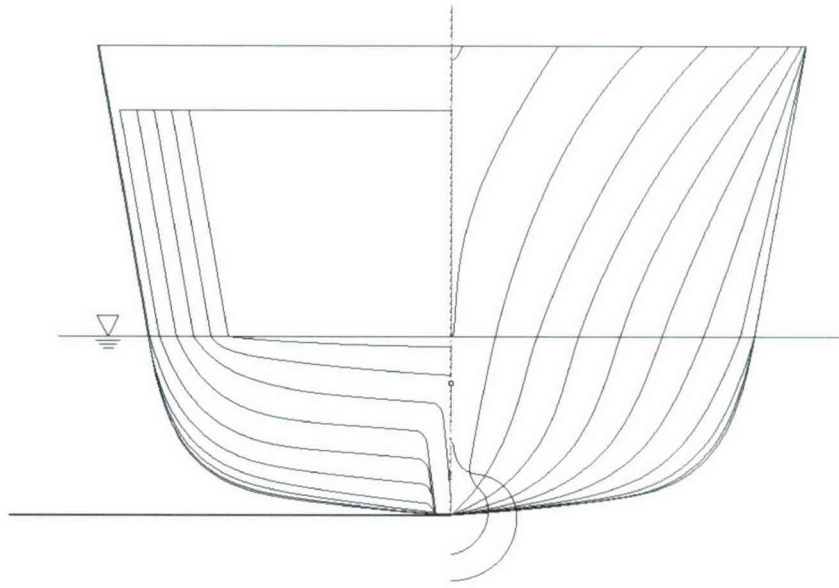


Figure 3. Body Plan of 10 Degrees Flare Topside Hull

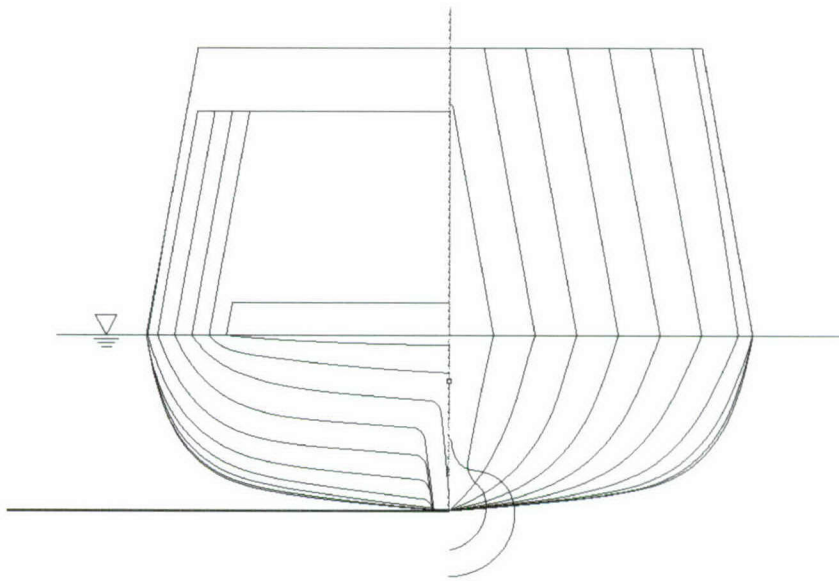


Figure 4. Body Plan of 10 Degrees Tumblehome Topside Design

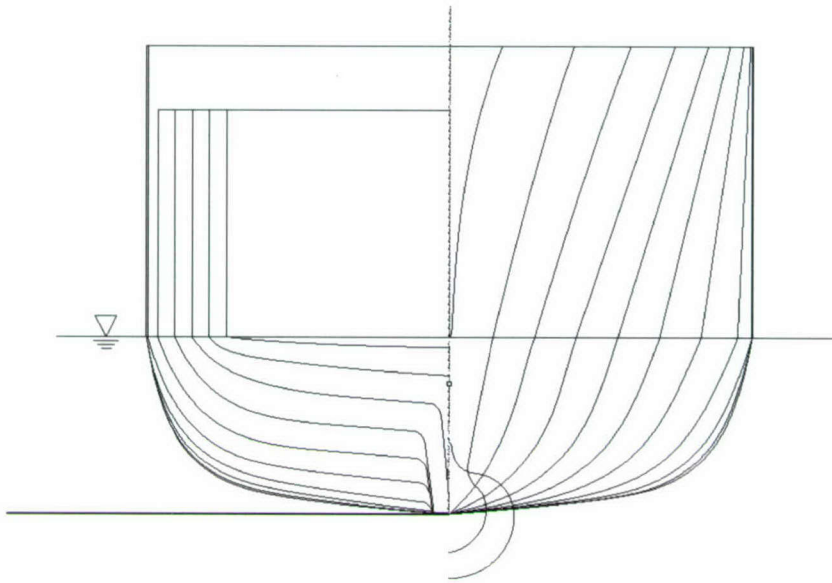


Figure 5. Body Plan of Wall-Sided Topside Design

Appendage Descriptions and Locations

An overall view of the appendages and their vertical and transverse locations is given in Figure 6. The underbody of the 3 hulls was designed to be a twin-screw, twin-rudder, centerline-skeg ship. Additionally, the ship was designed to accept a bilge keel that would be centered at midship and have a chord length equal to $1/3$ the ship length. To achieve the goals of this test program, changing the span of the bilge keels would modify roll damping. Two spans were selected for this study: 1.25 m and 2.50 m. It was decided later that the 2.5 m span exceeded that which would be practical to build and install on a ship. Instead, the large span test was conducted with a set of bilge keels whose span was reduced to 1.75 m. The bilge keel trace was determined by computing a 15-kt streamline at a point located as seen in Figure 7.

The rudders are based on those of DDG-51. The rudder post is located at station 19.1, 3.10 m off the centerline. The top of the rudder (including the rudder stool) runs from station 18.9 to 19.7. The bottom of the rudder runs from station 19.1 to 19.5. The span, excluding the rudder stool, is 5.30 m.

The shafts are supported by V-struts located at station 18.2. The shafts themselves are inclined downward at 5.0 degrees from the horizontal. The hull penetration occurs at station

15.8, 4.10 m off the centerline and the end-point of the shaft (at the forward face of the propeller hub) is at station 18.4, 0.08 m above the baseline.

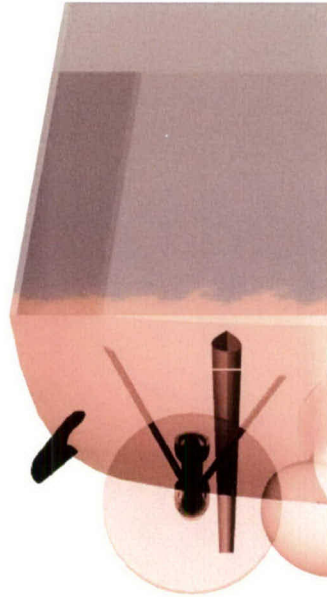


Figure 6. Body Plan View of Appendage Locations

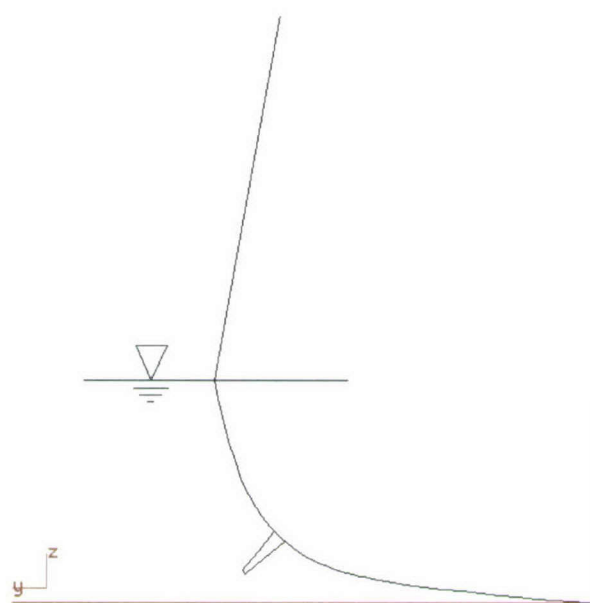


Figure 7. Station 10 Cut with Bilge Keel Cross-Section

Model Design and Construction

The scale of the model was chosen to be 1/32 - balancing the desire for: a) the largest possible model, minimize measurement error and scale effects, and provide flexibility in instrumentation and ballasting, and b) restrictions in tank size. The Maneuvering and Seakeeping (MASK) basin limits the size of the model with respect to the run length (distance and time), maximum achievable carriage speed, and wave-making capabilities.

The design of the model itself required consideration of the most efficient way to build and test the three different hull forms. It was decided that a single model with interchangeable topsides was the best route to take. This ensured that each hull had exactly the same underbody and also allowed for the model outfitting (motors, shafts, propellers, rudders, and most sensors) to remain in the model for the duration of the test program. Additionally, the cost of construction was cheaper than constructing three separate models.

Computer Sciences Corporation (CSC) was contracted for the detailed design and construction of the model, based on a proposed design-for-build provided by NSWCCD, Code 5500. The final design produced an underbody made of 1/4-inch thick fiberglass that uses a flange system at the waterline to mate with the three topside models made of plywood and a fiberglass skin. The bow bulb portion of the underbody is detachable at Station 2 and was constructed out of high-density foam.

A picture of the underbody interior is given in Figure 8, while pictures of the three topsides are given in Figure 9 and Figure 10. The underbody is resting on a cart, while the topsides (orange with black station markings) are stacked next to the model. The flange is the yellow portion of the underbody that is visible. Not pictured are alignment "pins" at the bow and stern that mate with the flange at the waterline edge of the topside. To protect the watertight integrity of the model, "RTV" silicone was applied to the flange to create a seal with the topside flange. The use of "mold release" allowed for removal of the RTV when exchanging topsides. The connection and compression of the topside to the underbody was achieved through the use of several custom c-clamps. Additionally, two threaded holes at the stern allowed for the use of screws where the shallow lines would not allow clamps. A threaded rod was also used at the bow to secure the bow bulb portion of the underbody to the topside. For connection strength in the longitudinal direction, the topside bulkhead at station 8 was connected by means of a pipe clamp to station 8 bulkhead of the underbody.

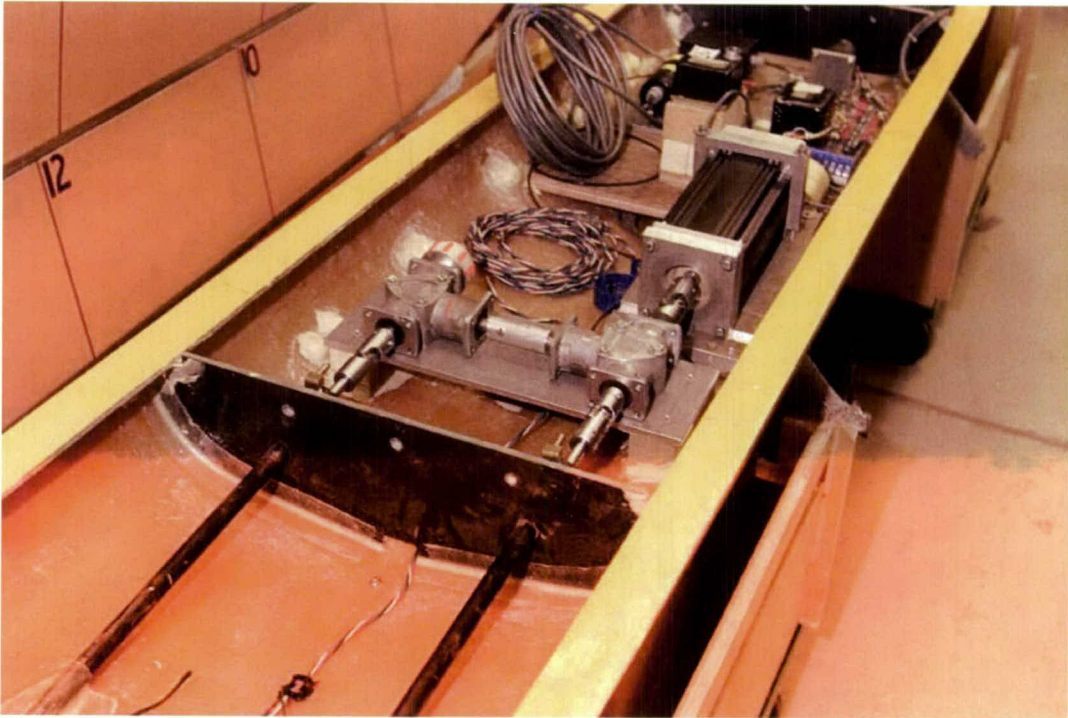


Figure 8. Interior of Model Underbody

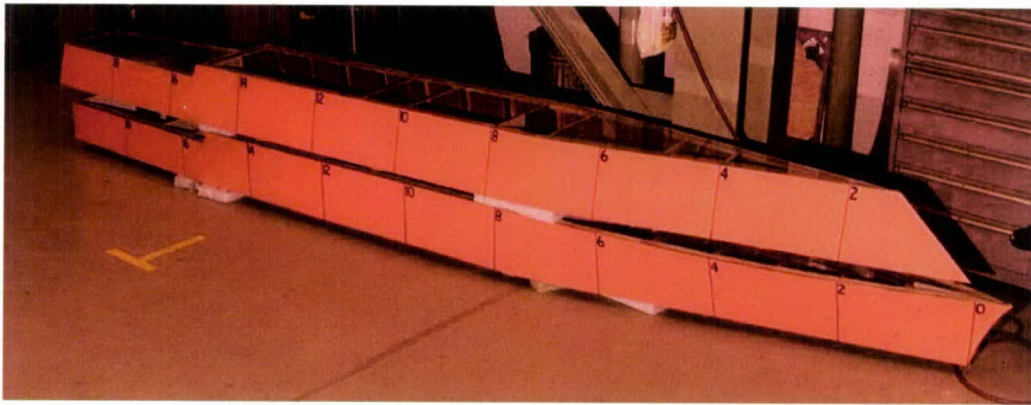


Figure 9. Tumblehome and Wall-Sided Topsides

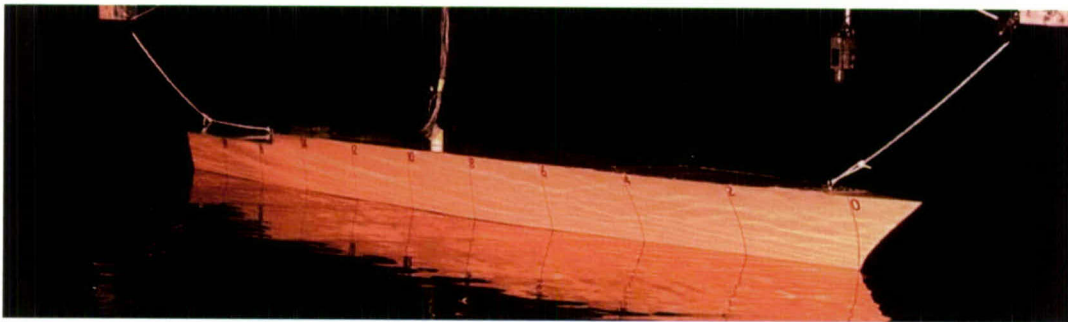


Figure 10. Hull with Flare Topside Attached, Under Carriage

The two sets of bilge keels (1.25 m and 1.75 m span, full-scale) were also produced by CSC. They were designed such that they could easily be exchanged while the model was hoisted a few inches above the water while beneath the carriage. Alignment pins and threaded holes ensured that the bilge keels were aligned properly.

The rudders and rudder stools were built by NSWCCD with the SLA rapid prototyping machine. The propellers were 4-bladed with a 6.4-inch diameter and had a P/D of 1. The propellers were installed to be outboard turning.

NSWCCD's model number convention dictated that the first hull would receive the original number and then modifications to that hull (i.e. changing topsides) would receive extensions to that model number. Thus, the model numbers tested were:

- Model 5613 Flare Hull
- Model 5613-1 Tumblehome Hull
- Model 5613-2 Wall-Sided Hull

Model Test Set-Up

Hull Ballasting

The models were ballasted to an even keel with a model-scale displacement of 575 Lbs (full-scale displacement of 8790 tonnes (SW)). The nominal radii of gyration to which the models were ballasted were $0.38*B$, $0.25*L_{pp}$, and $0.25*L_{pp}$ for roll, pitch, and yaw, respectively. These were the same for both of the tested metacentric heights of 1.5m and 2.5m, full-scale.

Ballasting of the models was achieved through a combination of direct measurement and calculation by spreadsheet. The radii of gyration and VCG of the underbody (i.e. the lower hull, all transducers, motor, props, rudders, and rudder servo motor) were determined by inclining and swinging the underbody from NSWCCD's inertia A-frame apparatus. While suspended in air, the underbody's roll and pitch periods were measured in order to determine respective mass moments of inertia. The mass moments of inertia and VCGs of each of the topsides were measured in the same manner. A spreadsheet was then used to calculate the weight and inertias of the combined models and determine the locations of ballast weights needed to achieve the desired loading condition. Finally, the model were floated and a second incline experiment performed to determine the hulls' transverse metacentric height. The achieved ballast conditions can be seen in Table 4. It is assumed that the difference in displacement and mass moments of inertia between the two bilge keel configurations is negligible.

Table 4. Achieved Ballast Conditions: KG and Radii of Gyration

	Condition	KG (full-scale)	k_4 (roll)	k_5 (pitch)	k_6 (yaw)
Flare (ONRFL) 5613	$GM_T = 1.5\text{m}$	8.25m	0.380*B	0.250*L	0.249*L
	$GM_T = 2.5\text{m}$	7.21m	0.378*B	0.249*L	0.250*L
Tumblehome (ONRTH) 5613-1	$GM_T = 1.5\text{m}$	8.23m	0.379*B	0.251*L	0.250*L
	$GM_T = 2.5\text{m}$	7.27m	0.375*B	0.250*L	0.250*L
Wall-sided (ONRWS) 5613-2	$GM_T = 1.5\text{m}$	8.29m	0.377*B	0.250*L	0.250*L
	$GM_T = 2.5\text{m}$	7.25m	0.373*B	0.250*L	0.250*L

Model Propulsion and Control

An electric motor installed in the lower hull was used to drive the model at speed. Prop RPM's were set by personnel using a motor control station located on the carriage. Model speed was adjusted in such a way as to keep the hull centered within the bounds of the carriage bay with zero relative motion between carriage and model. The rudders were stroked manually by a helmsman located on the carriage. Rudder use was minimized during transits across the basin so as not to produce a rudder-induced forced roll response.

Instrumentation

Various types of instrumentation and transducers were used in monitoring ship motions, propeller shaft speed, rudder angle, and wave environment during the experiments. Pitch, roll, and corresponding angular rates were measured using a Watson Rate sensor. The yaw rate was measured using a Humphrey yaw rate gyro. Accelerations were measured using Columbia three axis accelerometers mounted in the model at the bow, CG, and stern. Model shaft RPM was measured by an optical pickup. The rudder angle was measured using a rotary film potentiometer attached to the rudder actuator. Carriage speed was measured with a magnetic pickup wheel. Wave height profiles were measured with ultrasonic sensors mounted on the moving carriage. The locations of the wave height sensors relative to model are given in

Table 5. Table 6 presents the measured channel list as well as the location within the model of each measurement sensor.

Table 5. Approximate location of wave measurements relative to model.

	Longitudinal Distance (from midship)	Transverse Distance (from centerline)
Forward Wave Height	22.3 ft forward	0.0 ft
Beam Wave Height	0.5 ft aft	11.8 ft starboard
Test Wave Height	16.0 ft forward	12.8 ft port

Table 6. Listing of Data Channels.

Chan No.	Chan Name	Units	Instrument Group	Type Instrument	Manufacture	Model #	Location Relative to Sta 10 (inches fwd)	Location Relative to Keel (inches above)	Location Relative to Centerline (inches port)
1	Shaft Speed	rpm	Model Based	Pulse Pickup from Wheel	Data Logic Optic Elec Pulse Sensor w/Analogic Devices F to V	ET3-012	NA	NA	NA
2	Fwd Wave Ht	inch	Carriage Based	Sonic Distance Transducer	Senix	Ultra-S	NA	NA	NA
3	Beam Wave Ht	inch	Carriage Based	Sonic distance Transducer	Senix	Ultra-S	NA	NA	NA
4	Test Wave Ht	inch	Carriage Based	Sonic distance Transducer	Senix	Ultra-U	NA	NA	NA
5	Roll Angle	deg	Model Based	Rate Tranducer	Watson Industries	ADS-C232-1A	4	3.38	-3
6	Pitch Angle	deg	Model Based	Rate Tranducer	Watson Industries	ADS-C232-1A	4	3.38	-3
7	Roll Rate	dps	Model Based	Rate Tranducer	Watson Industries	ADS-C232-1A	4	3.38	-3
8	Pitch Rate	dps	Model Based Sensor	Rate Tranducer	Watson Industries	ADS-C232-1A	4	3.38	-3
9	Yaw Rate	dps	Model Based	Yaw Rate Sensor	Humphrey, Inc.	RT03-0502-1	8	3.38	-3
10	Vert CG Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	-2.5	7.9	0
11	Tran CG Acc	g's	Model Based Sensor	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	-2.5	7.9	0
12	Long CG Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	-2.5	7.9	0
13	Ver Bow Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	72	3.4	0
14	Tran Bow Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	72	3.4	0
15	Vert Str Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	-73.3	5.6	0
16	Tran Str Acc	g's	Model Based	Triaxial Accelerometer	Columbia Research Labs, Inc.	SA 307TX	-73.3	5.6	0
17	Roll Gyro	deg	Model Based	Vertical Gyro	Humphrey, Inc.	VG34-0810-1	12	3.38	-3
18	Ptich Gyro	deg	Model Based	Vertical Gyro	Humphrey, Inc.	VG34-0810-2	12	3.38	-3
19	Carr Speed	kts	Carriage Based	Pulse Pickup from Wheel combined with F to V electronics	Dynapar (pulse pickup) % Vidar 325	Rotopulse r 62-AAEF-0660-A6-52 & Vidar 325	NA	NA	NA
20	Rudder Angle	deg	Model Based	Helipot Film Pot	Bourne	8213-7715	-77	11.9	5

Video

Two carriage mounted video cameras were used to record and review the model tests.

Measurement Uncertainty

Three individual error sources are considered in the determination of the measurement uncertainty intervals associated with the type data presented herein.³ These three error sources occur in calibration, data acquisition and data reduction. These error sources have two components; the fixed error or bias and the random error or precision.

During the calibration process, the bias is derived from the accuracy of the calibration standard used for reference. For the data presented here, two types of mechanical reference were utilized. The angular measurements and the accelerations were calibrated on a mechanical tilt table estimated to be accurate to within 0.050 degrees and the linear displacement measurement was calibrated on a movable staff estimated to be accurate to within 0.01 inch. The precision index for the calibration was derived by linear regression of the calibration values about the calibration factor used in converting the measurement voltage to physical units.

In the data acquisition process, the primary error sources are bias that occur in the instruments themselves, and in the analog to digital converter (A/D) used in collecting the data. The instrument errors are those stated by the manufacturer or estimated for those made in house. The A/D is considered accurate to within 0.00488 volts, which when operated on by the calibration factor, provides its bias for each channel. The precision of the computer used in reducing the data, provides negligible error sources in the data reduction process.

The individual bias and precision error sources can be root sum squared to provide an overall bias and precision error for each measurement. From this, measurement uncertainty confidence intervals of 99% and 95% can be determined.

Test Basin

The experiment was conducted in the NSWCCD Maneuvering and Seakeeping (MASK) Basin as shown in Figure 11. The MASK is an indoor basin having an overall length of 360 feet, a width of 240 feet and a depth of 20 feet except for a 50-ft wide trench at a depth of 35 feet parallel to the long side of the basin. The basin is spanned by a 376-ft bridge supported on a rail system that permits the bridge to transverse half the width of the basin and to rotate up to 45° from the longitudinal centerline. A towing carriage rides on rails located under the bridge. The carriage has a maximum speed of 12 knots. By rotating the bridge and/or reversing the direction of travel of the carriage under the bridge, symmetric hull models can be tested at speed for nearly all headings relative to incident waves.

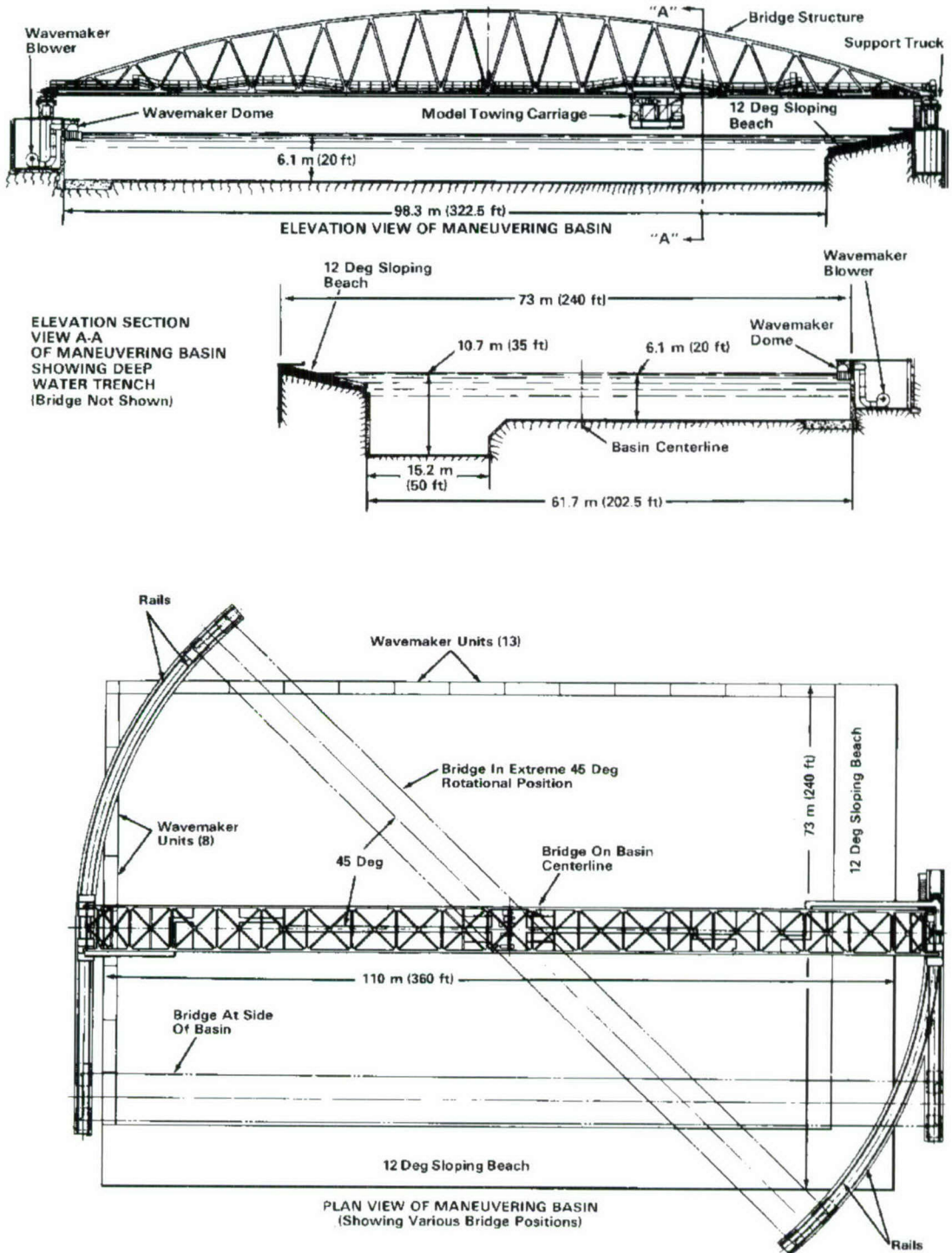


Figure 11. Maneuvering and Seakeeping Basin

Wave Generation

The MASK basin has eight pneumatic type wave maker units located along the 240-foot side of the basin and 13 units along the 360-foot side of the basin. A regular wave is generated by first inputting the frequency desired to the controller and then setting a prescribed blower RPM that will generate the proper wave height. Wave height measurements are made from the moving MASK towing carriage. The locations of the wave height sensors relative to model are given in Table 5.

EXPERIMENTAL PROCEDURE

While running at speed under the MASK carriage, the model was released from restraining lines. Model course and speed were maintained manually. Tethering lines, required for accelerating and decelerating the model, along with transducer signal cables, were the only interconnections from the carriage to the model. While data was being recorded, the lines and cables were slack and did not affect the model's response to waves.

Calm water Roll Extinction tests were performed at four ship speeds. The procedure involved exciting the hull to roll by sharply depressing and releasing the gunwale to initiate the model to roll. This exercise was repeated several times for each hull form, bilge keel pair, speed, and load condition. A typical roll decay time history for the Tumblehome Hull is presented in Figure 12 (page 21). A non-dimensional roll decay coefficient n , defined as $1/2\pi * \ln(\phi_1/\phi_2)$ - where ϕ_1 and ϕ_2 are successive cycles in the roll decay time history - were derived from the roll decay data and are presented in the results.

Waves

The test matrix prescribed waves from three relative headings (bow, beam and quartering) and 4 hull speeds (0, 5, 15, and 25 knots). Table 7 through Table 9 (pages 93-95) present a summary of test conditions and run numbers recorded for each hull. Wave lengths ranged from less than one to about four ship lengths. Wave heights were varied for each wavelength in order to preserve a constant wave steepness across the range of wave lengths generated. The target wave steepness for the experiment was chosen to be 1/60. Waves at steepnesses of 1/30 and 1/90 were also generated for a limited number of experimental conditions.

Motions

Individual runs for each test condition were evaluated for quality and consistency. The evaluations were based on 1) the quality of the wave environment - a comparison of the measured wave steepness to an ideal wave steepness and 2) an evaluation of the quality of the

model's control and track (from inspection of the amount of rudder required to keep the model on course). If excessive rudder was used or if the measured wave elevation was too far out of compliance from the requested wave, the run was repeated. A good run was further inspected to determine the best portion of the run that would be used in the final analysis to derive the motion transfer functions. A response transfer function was calculated and plotted for each wave. Angular (roll and pitch) responses were non-dimensionalized by wave slope ($k*a$) while accelerations were divided by ω^2 .

RESULTS

The effect of increased span of the bilge keels on roll decay can be seen in Figure 13 which shows a comparison of decay coefficients for a bare hull (bilge keels removed), for bilge keels with 1.25 meter span, and for bilge keels with 1.75 meter span - all for the Wall Sided Hull ballasted to a 2.5 meter GM. The plot shows a dramatic increase in roll damping for a hull with bilge keels but with a smaller improvement recorded for increased span.

Figure 14 shows the Flared Hull roll decay coefficient for three different bilge keel spans at zero speed and ballasted to a GM of 1.5 meters. The plot shows incremental increase in damping with increase in bilge keel span. A corresponding increase in roll period was also noted. For the 1.25 meter span, the roll period was measured to be 12.7 seconds (full scale time). The 1.75 meter span bilge keels produced a roll period of 13.8 seconds, while the 2.5 meter span bilge keels produced a roll period of 14 seconds at zero hull speed.

Plots of Roll Decay Coefficient versus Mean Roll Angle for each speed, geometry, and load condition for the Flared Hull are presented in Figures 15 through 30. Plots of Roll Decay Coefficient versus Mean Roll Angle for each speed, geometry, and load condition for the Tumblehome Hull are presented in Figures 31 through 46. Plots of Roll Decay Coefficient versus Mean Roll Angle for each speed, geometry, and load condition for the Wall-sided Hull are presented in Figures 47 through 62. Run number and roll decay series within each run are shown in the legends. The results displayed exhibit the common response of increased damping with increasing hull speed. Figures 63 through 74 confirms this damping behavior by showing cross plots of the roll decay data versus ship speed for specific mean roll angles. Mean roll angles of 2, 5, 10, and 15 degrees have been plotted versus ship speed.

Figures 75 through 54 show plots of hull response (roll motion and CG transverse acceleration non-dimensional transfer functions) versus wavelength for each hull and relative wave heading. The data has been arranged to display the effect attributed to metacentric height (GM) on hull response to the waves. Each page contains two plots. The upper plot shows response curves for a hull ballasted to a GM of 1.5 meters while the lower plot shows response curves for a hull ballasted to a GM of 2.5 meters - each for a given speed and bilge keel set. The results show that increasing the GM will shift the hull peak response curve to the left for all hull geometries. Upon closer inspection, the response curves for each hull geometry also reveal a hierarchy that shows the peak of the response curve for the Tumblehome hull consistently shifted to the right (a lower wave frequency) as compared to the other two hull forms for any given condition – especially for the 2.5 meter GM ballast condition.

Motion and acceleration amplitudes for all conditions and speeds are presented in Table 10 through Table 81 (pages 96-167). Also included in the tables are values of wave height/wavelength and wavelength/ship length. The header for each table is colorized to match the color of the transfer function response curve plots – green is for the Flared hull, blue is for the Tumblehome hull, and red is for the Wall-sided hull.

CONCLUSIONS

A series of model tests were successfully conducted on models 5613 – a flared type hull, 5613-1 – a tumblehome type hull, and 5613-2 – a wall-sided hull – to document the effect of above waterline geometry on the roll response of a ship. Also investigated were the effect of bilge keel span on each hull and the effect of metacentric height on the roll response of each hull. Calm water roll decay tests showed increased damping with increased bilge keel span as well as an increase to the natural roll period for increased span. The regular wave test revealed the dominant role of metacentric height in governing the roll response of a ship in waves. For a given condition, the roll response curves reveal that above water hull geometry does influence the motions of the ship in waves. A hierarchy is revealed that shows the peak of the response curve for the Tumblehome hull consistently shifted to the right as compared to the other two hull forms.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the contributions of Gordon Minard (formerly of Code 5500) and Dennis Ralston (Code 5100) in the initial preparation of the model. The authors would also like to acknowledge the fine photographic support of Martin Sheehan (Code 34) during the preparation of the model for visual presentation and video support during and after the

test. Also essential to the successful completion of the test were Lauren Watson, Floyd Farmer, Jose Tejada, and Lloyd McCoy.

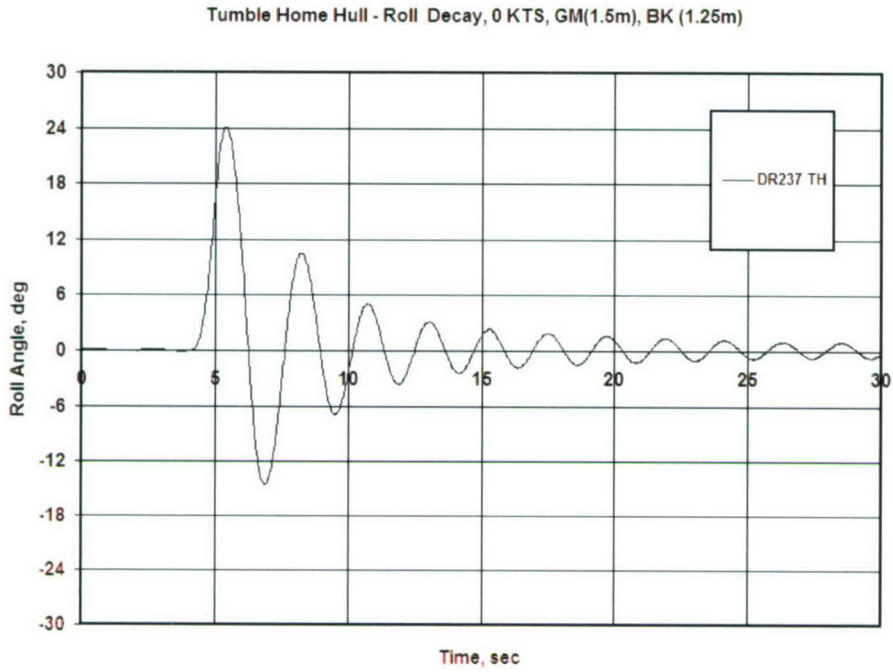


Figure 12. Typical Roll Decay Time History for Tumblehome Hull

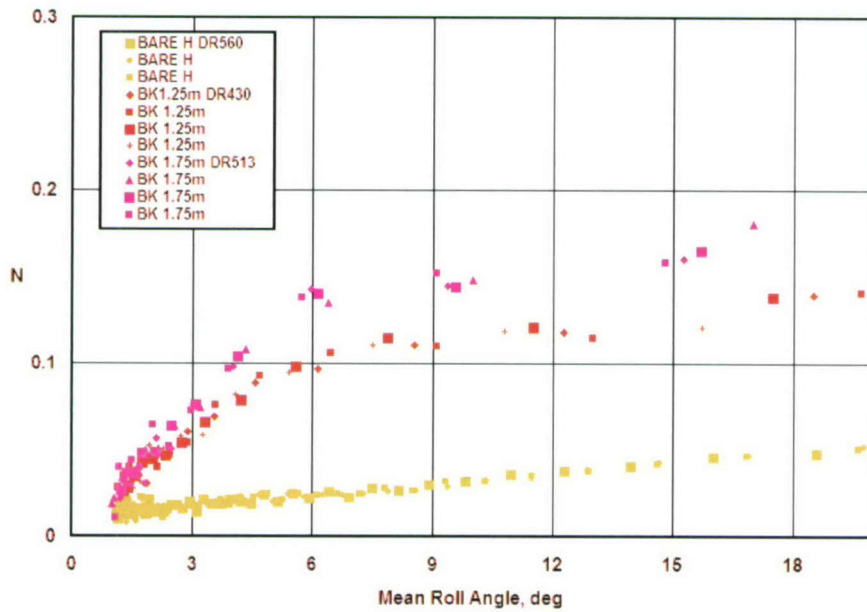


Figure 13. Effect of removing Bilge Keels on Roll Decay Coefficient for Wall Sided Hull with GM=2.5m and 0 Kts Speed

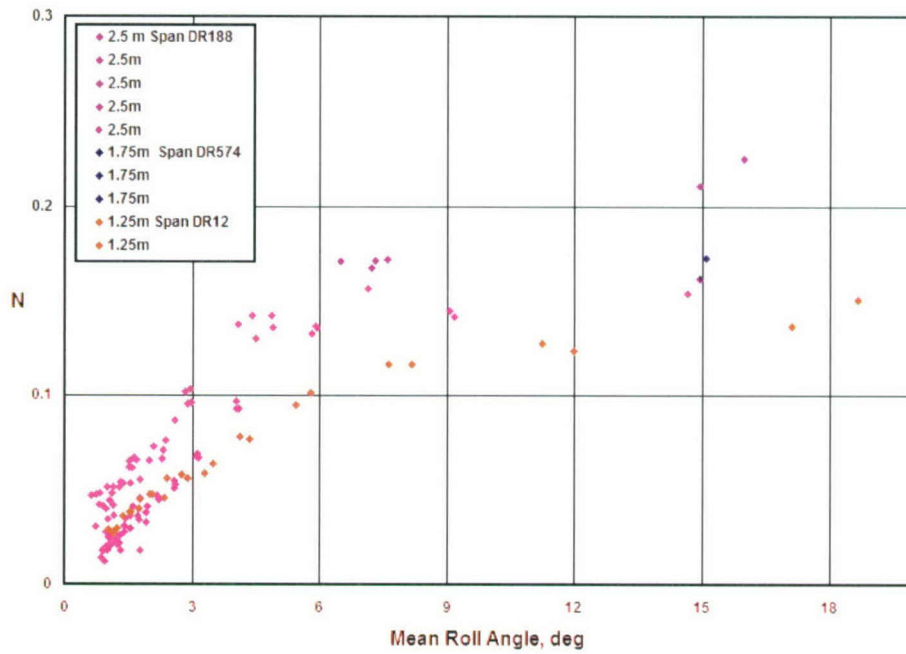


Figure 14 Effect of Bilge Keel Span on Roll Decay Coefficient for Flared Hull with GM=1.5m and 0 Kts Speed

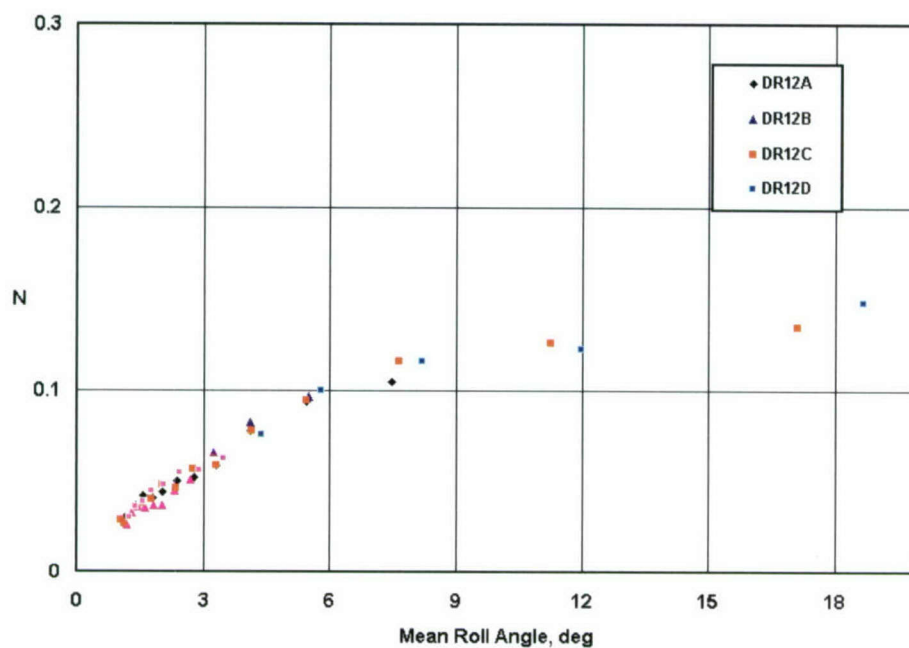


Figure 15. Flared Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK= 1.25m

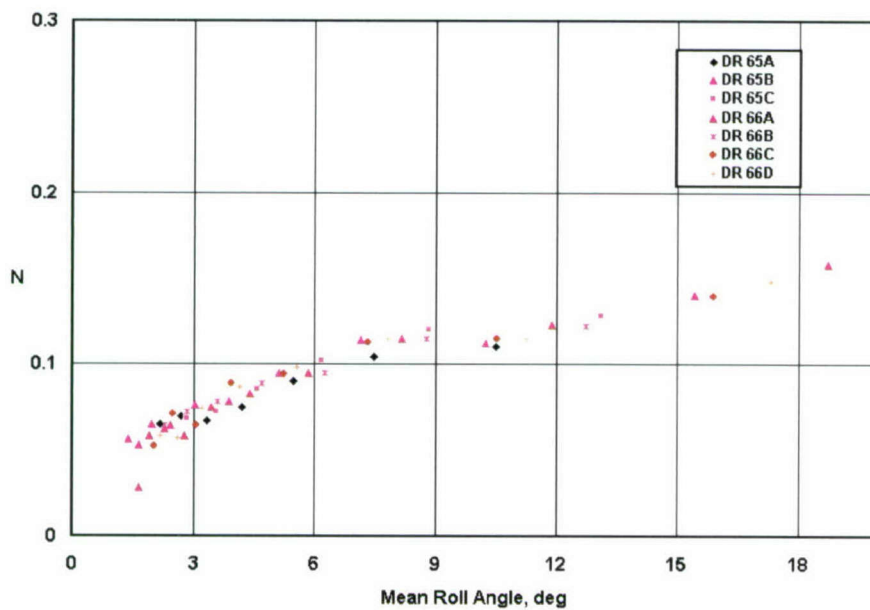


Figure 16. Flared Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.25m.

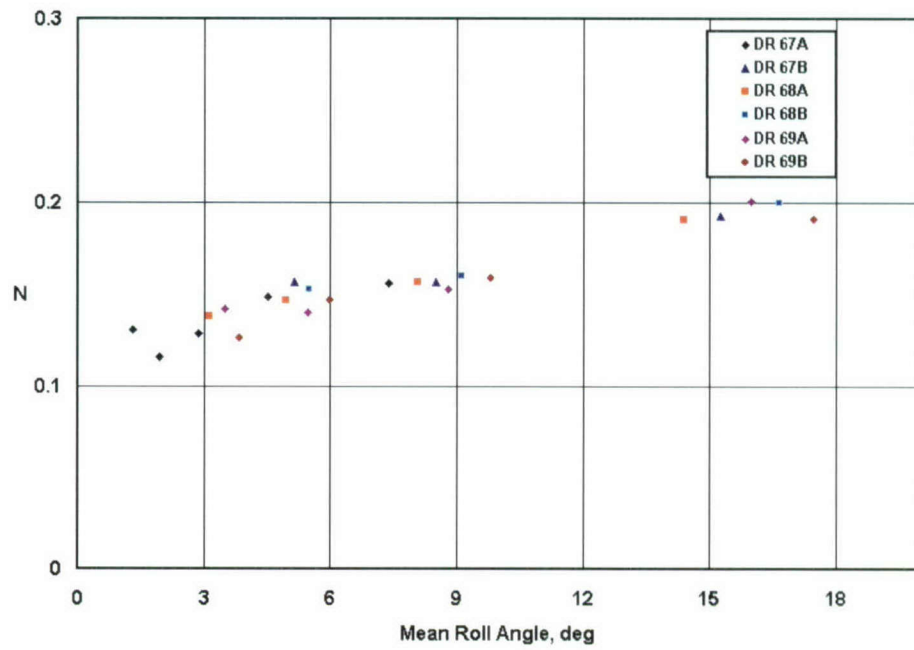


Figure 17. Flared Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.25m.

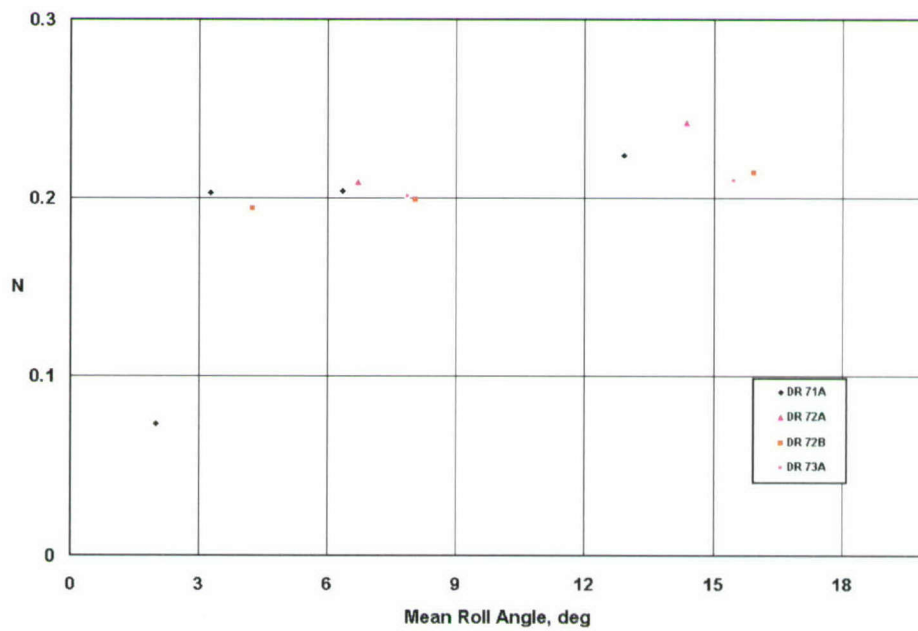


Figure 18. Flared Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.25m.

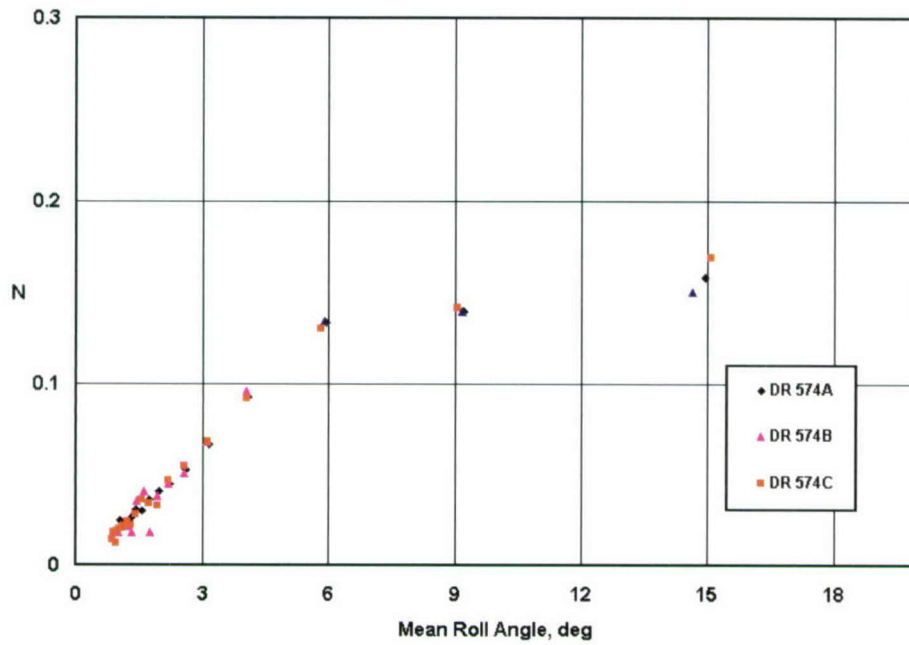


Figure 19. Flared Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK= 1.75m.

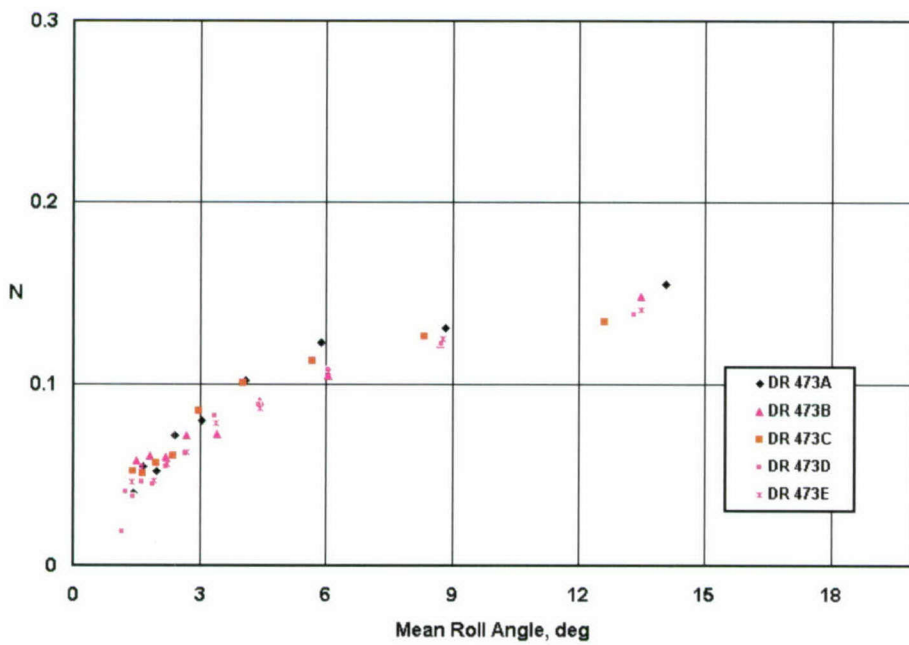


Figure 20. Flared Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.75m.

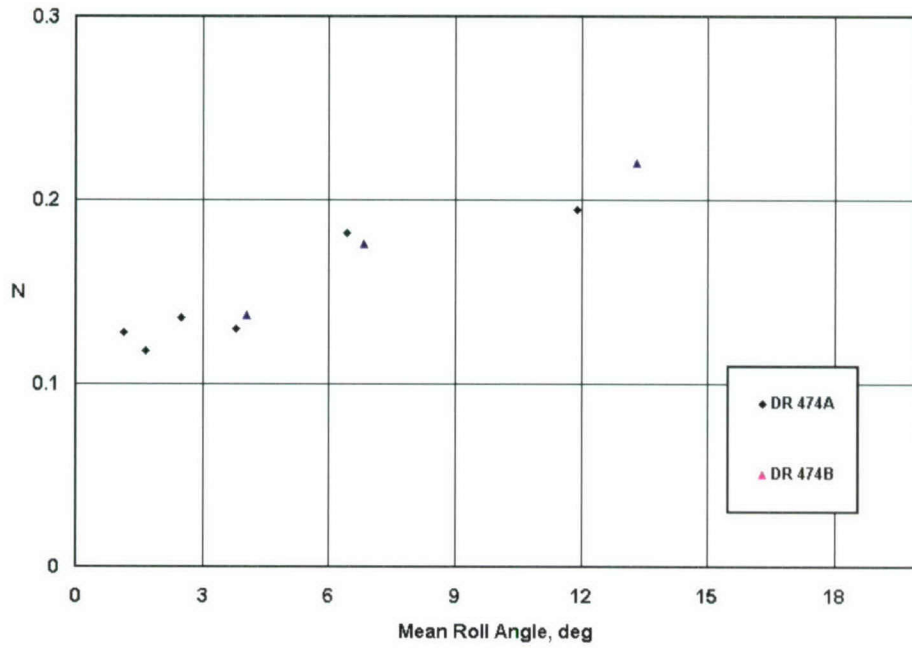


Figure 21. Flared Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.75m.

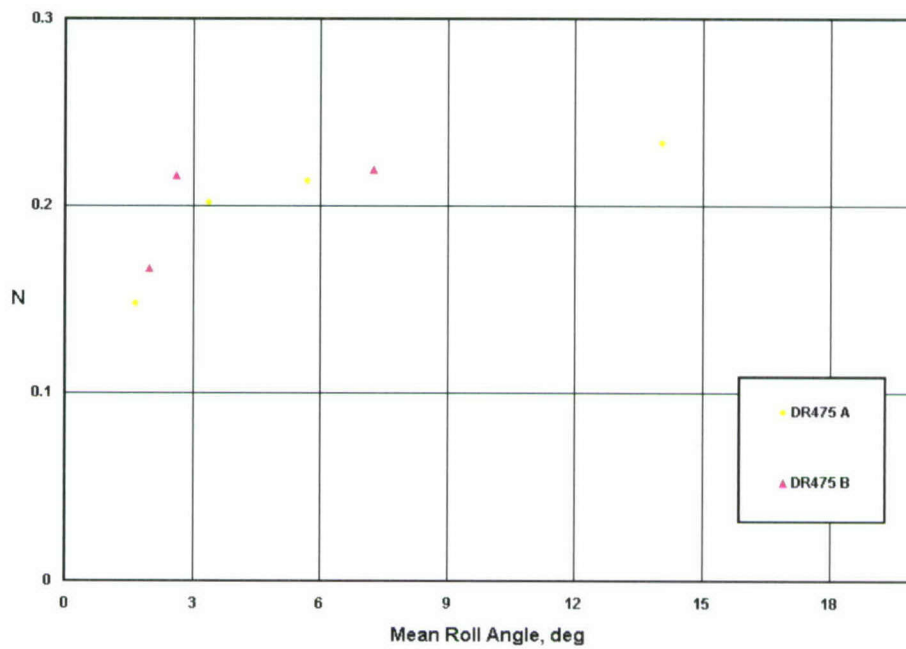


Figure 22. Flared Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.75m.

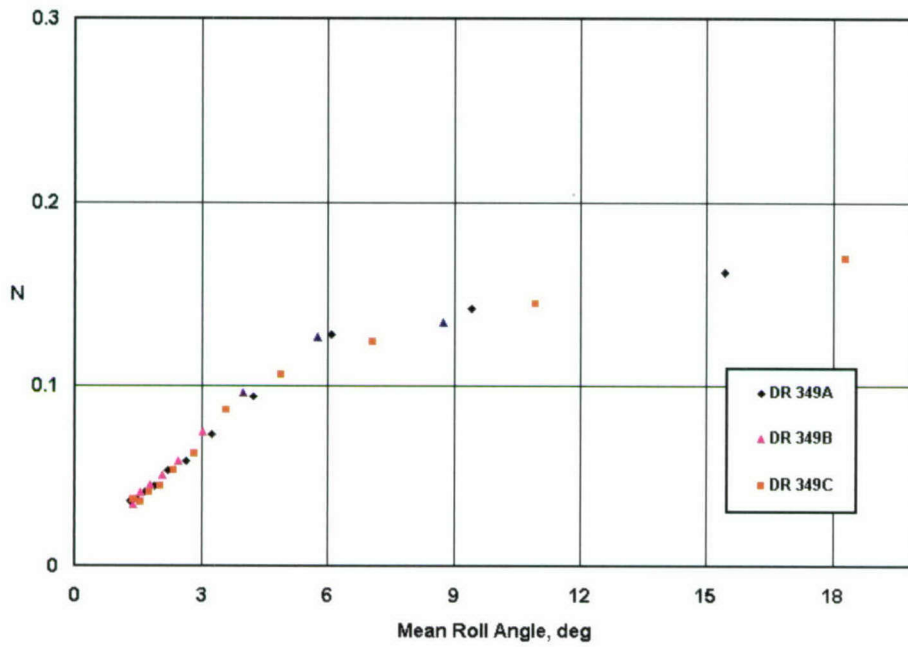


Figure 23. Flared Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.75m.

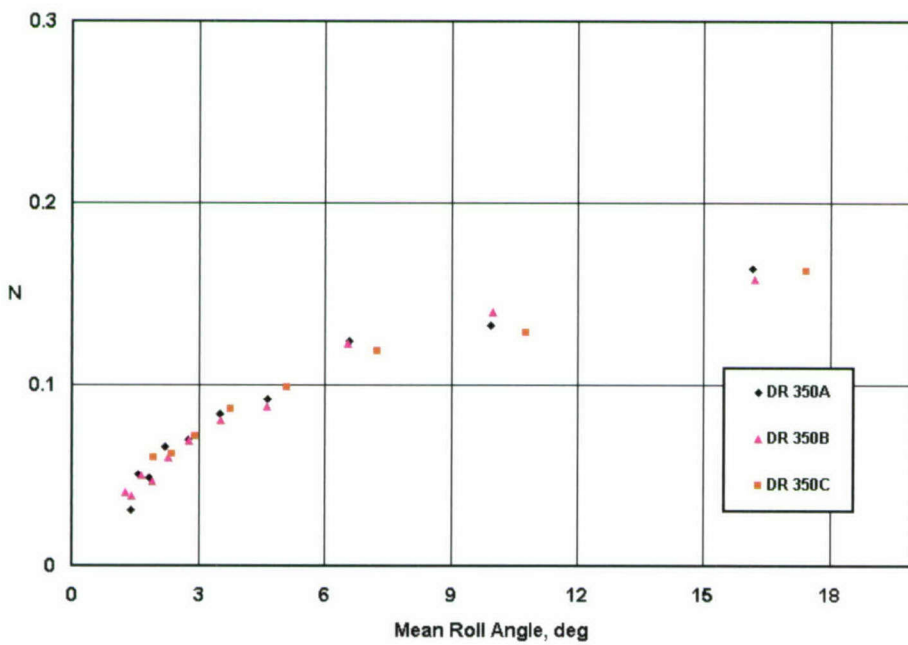


Figure 24. Flared Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.75m.

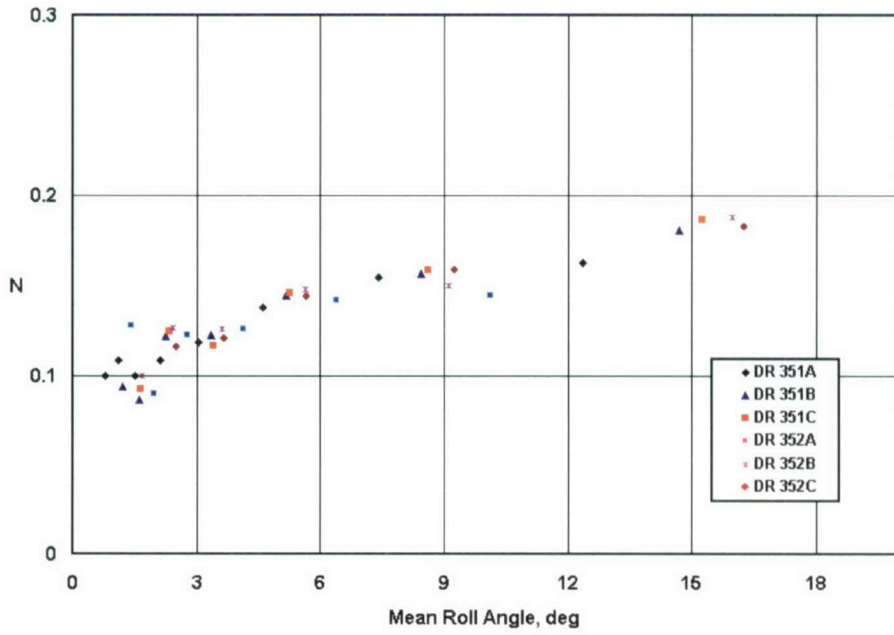


Figure 25. Flared Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.75m.

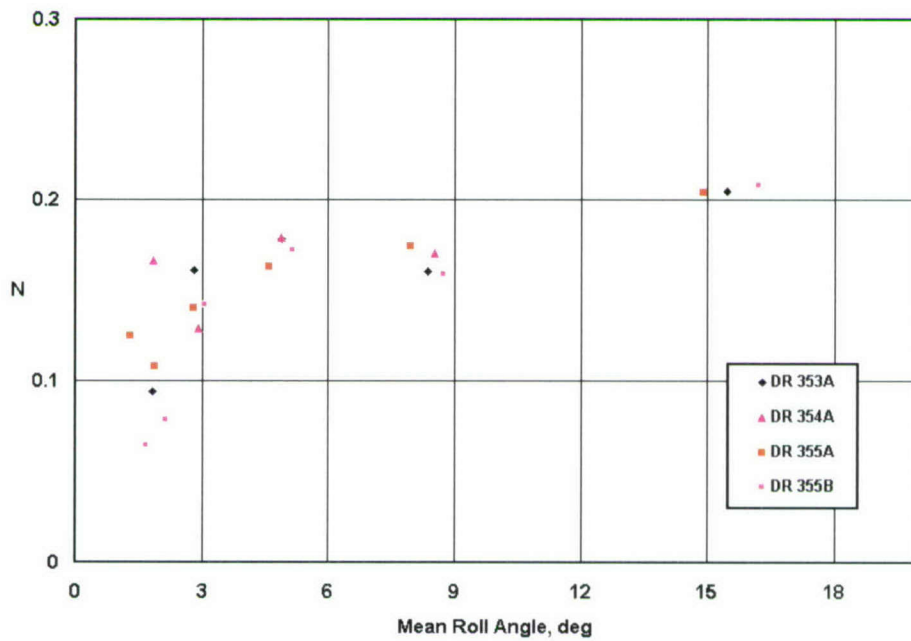


Figure 26. Flared Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.75m

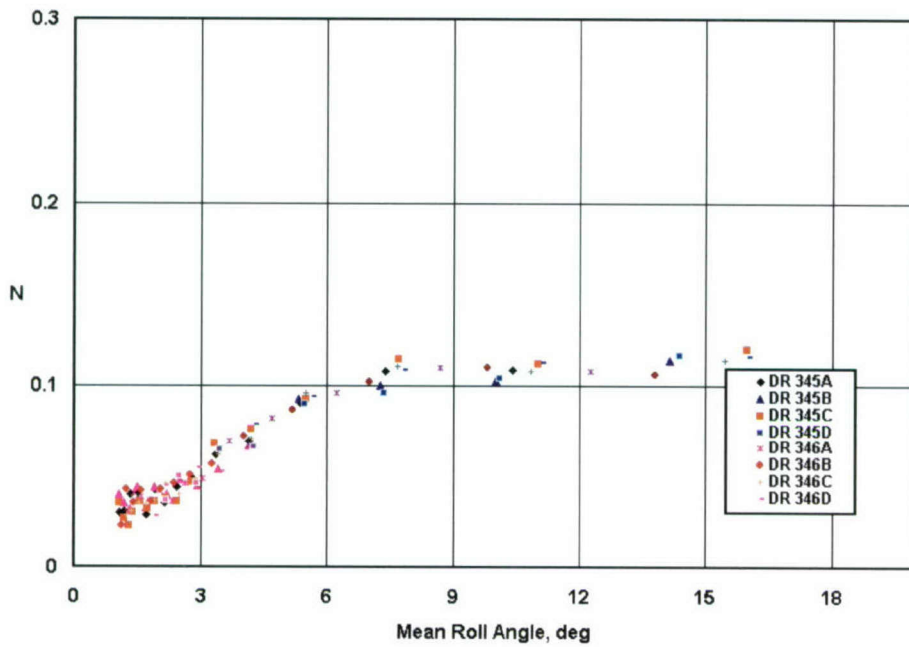


Figure 27. Flared Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.25m.

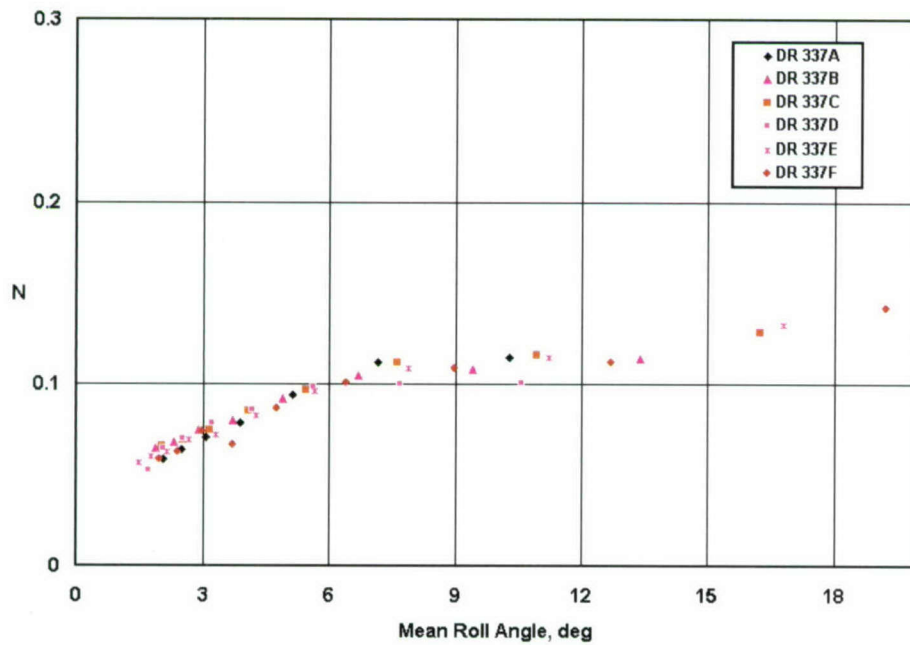


Figure 28. Flared Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.25m.

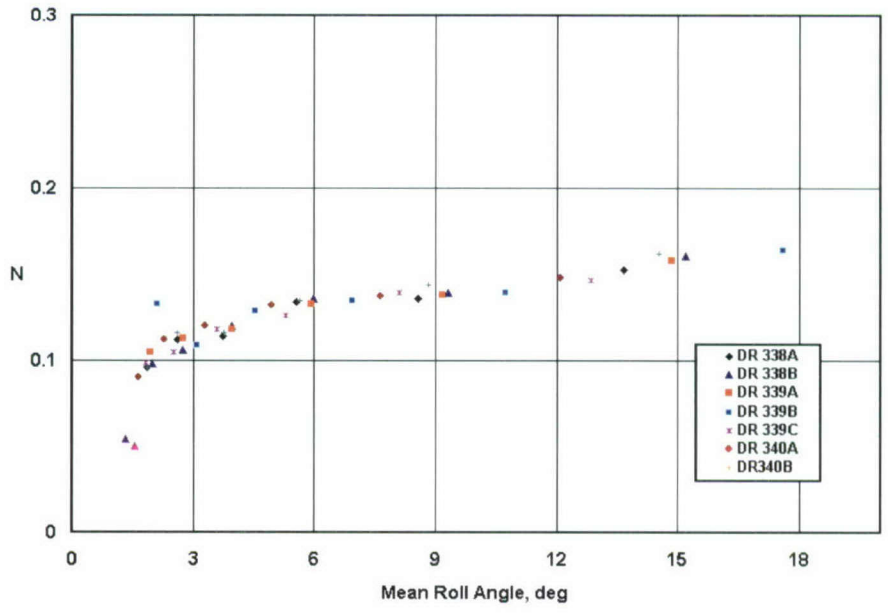


Figure 29. Flared Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.25m.

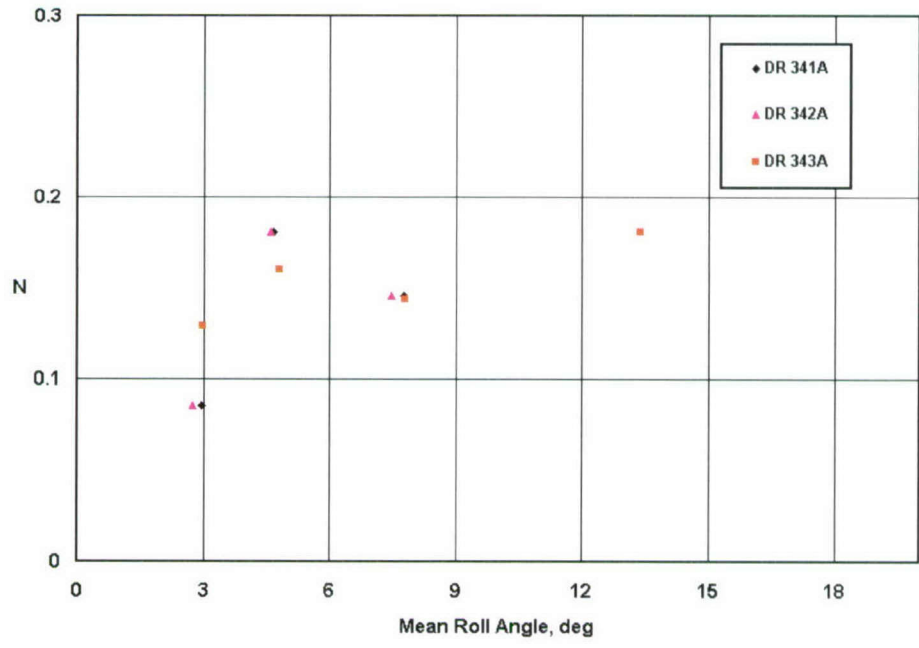


Figure 30. Flared Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.25m

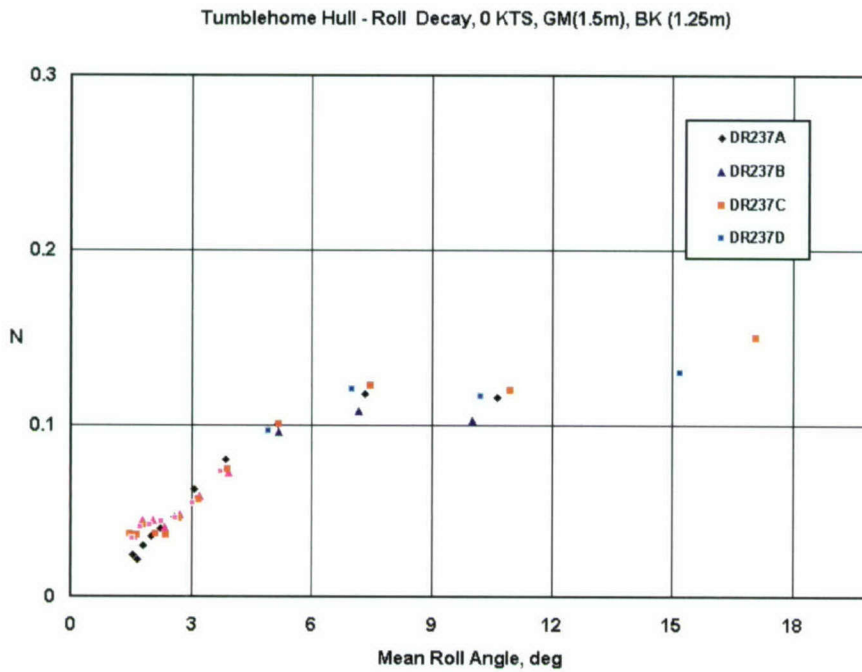


Figure 31. Tumblehome Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK=1.25m.

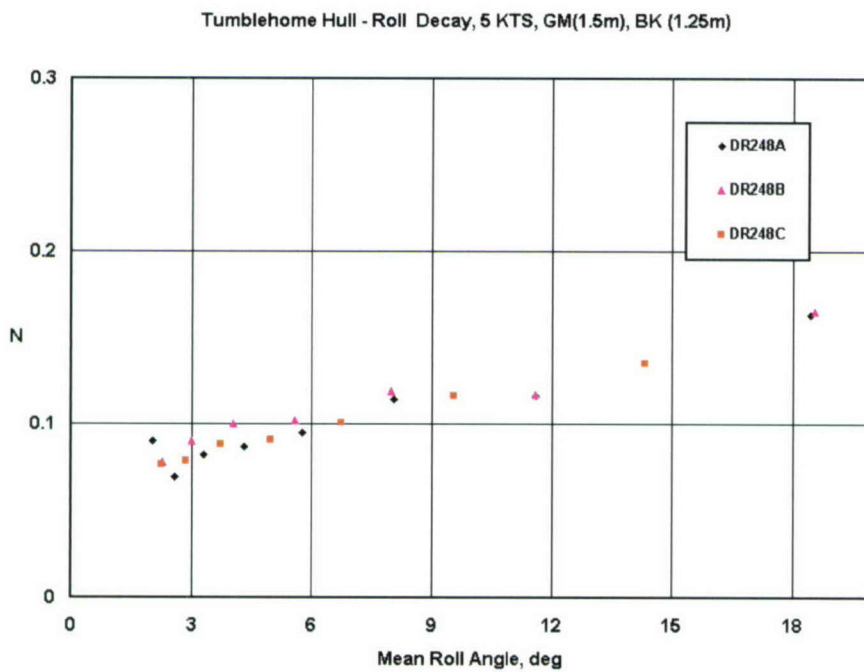


Figure 32. Tumblehome Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.25m.

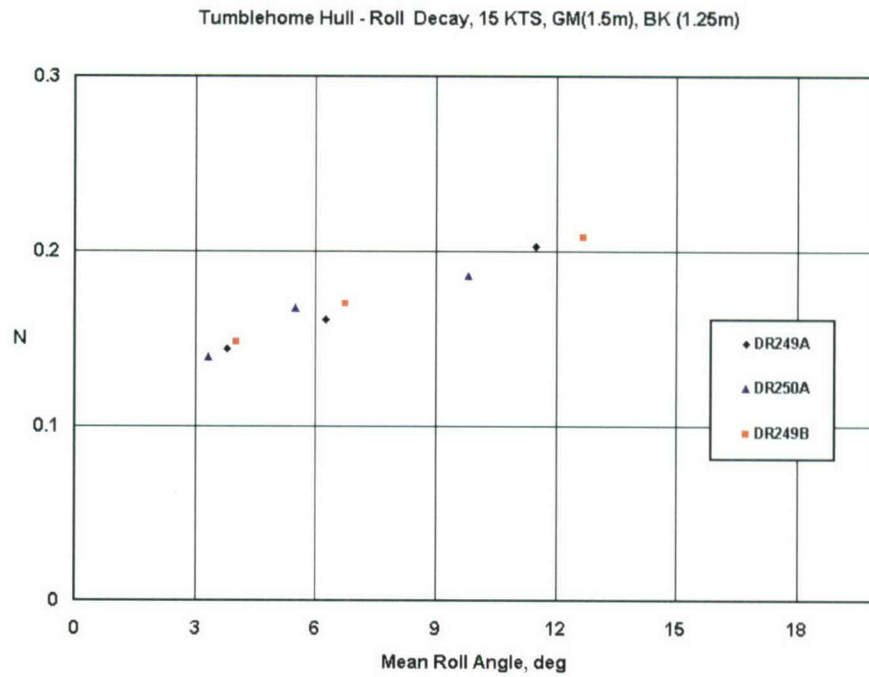


Figure 33. Tumblehome Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.25m.

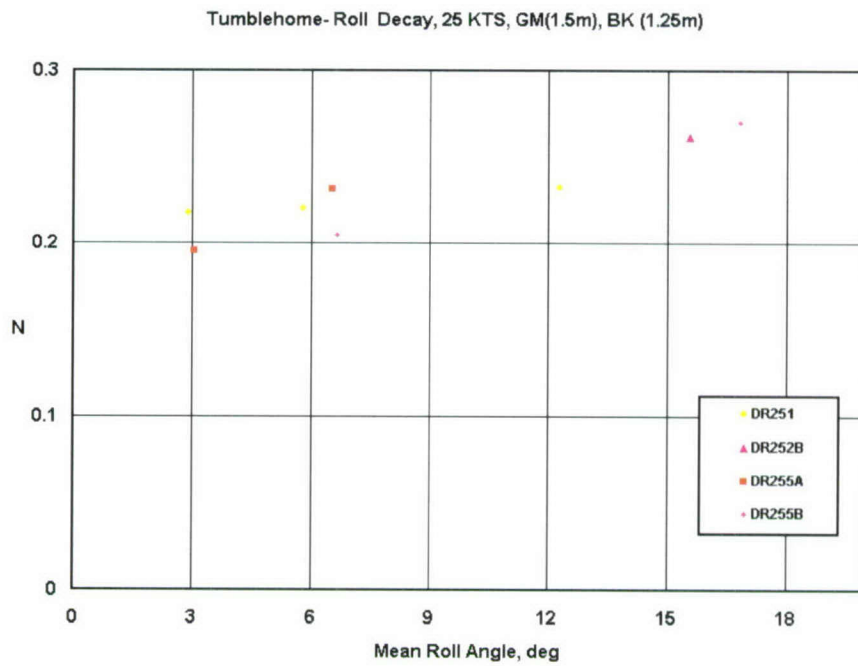


Figure 34. Tumblehome Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.25m.

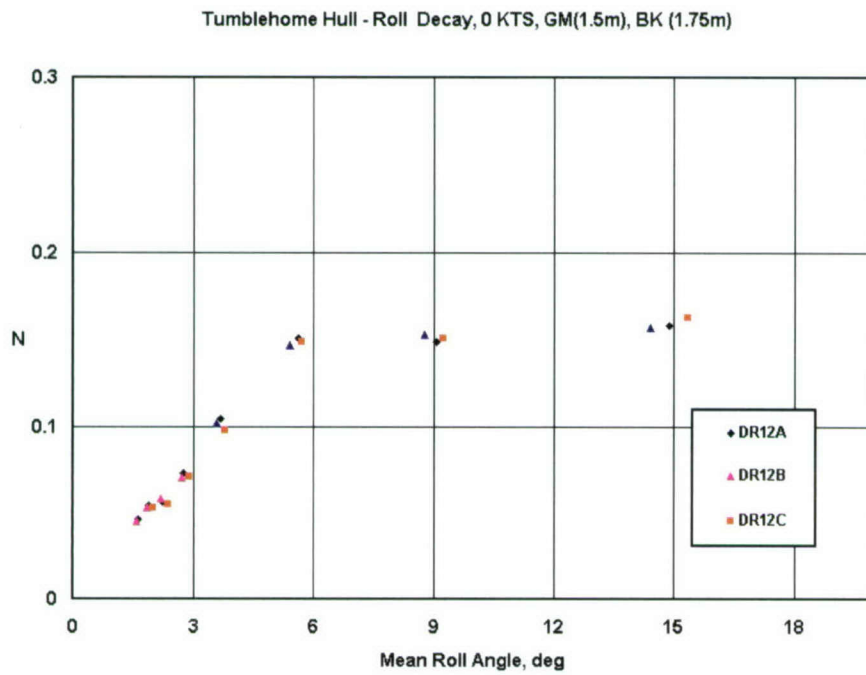


Figure 35. Tumblehome Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK=1.75m.

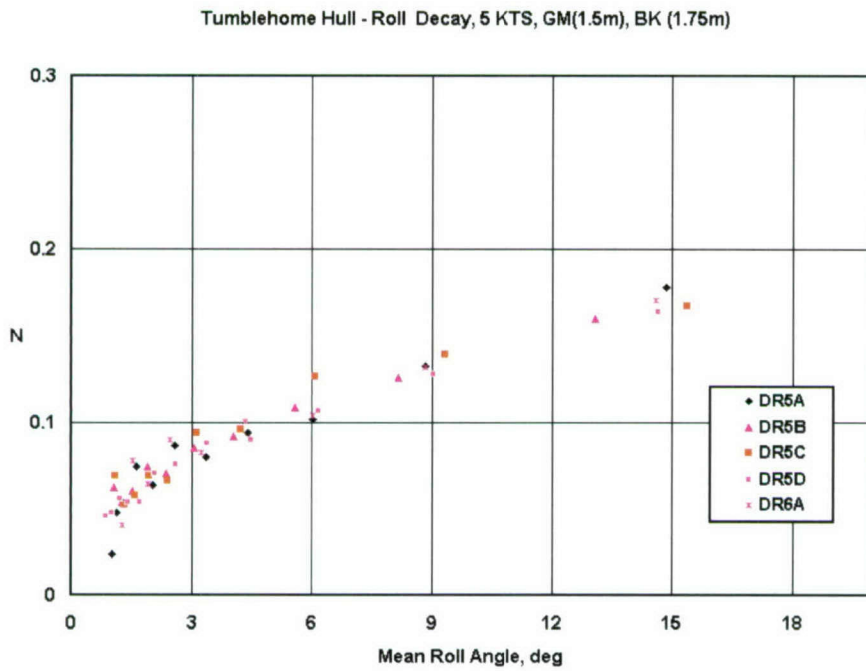


Figure 36. Tumblehome Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.75m.

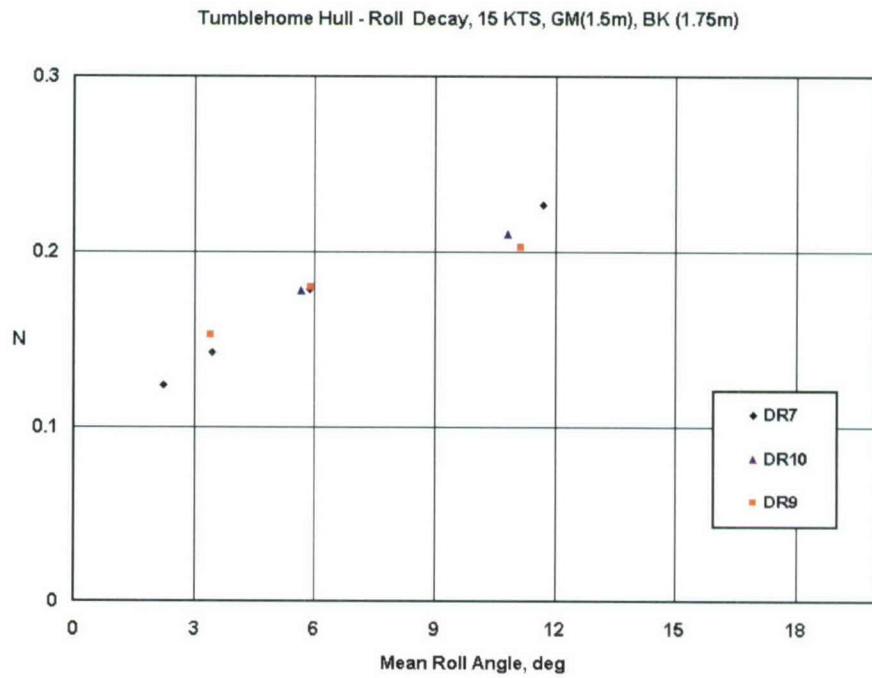


Figure 37. Tumblehome Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.75m.

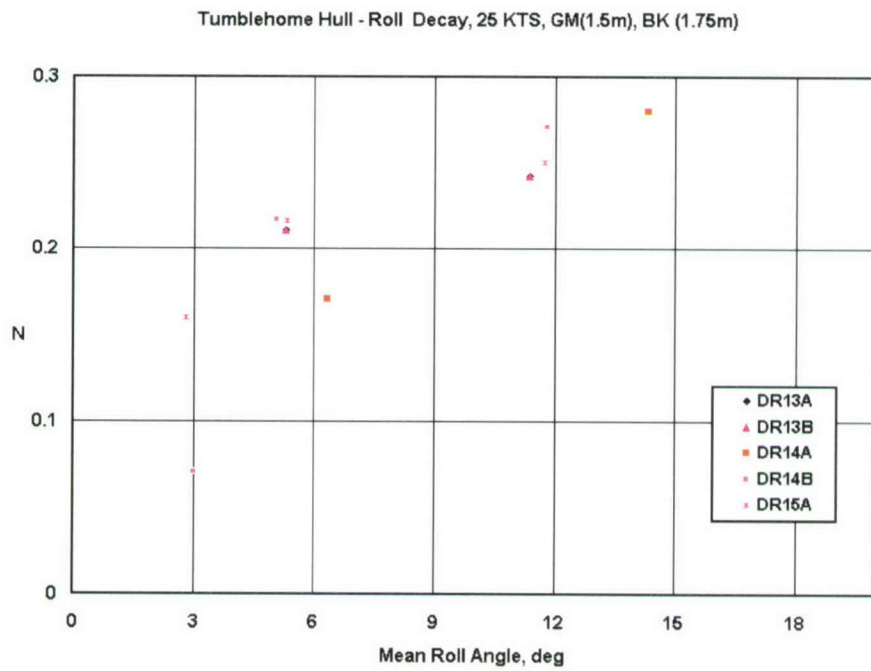


Figure 38. Tumblehome Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.75m.

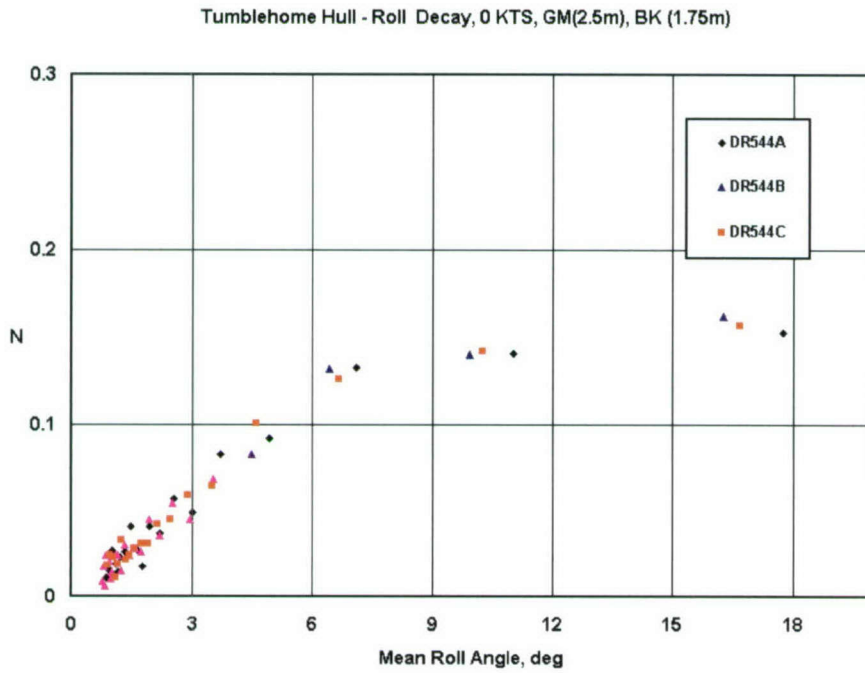


Figure 39. Tumblehome Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.75m.

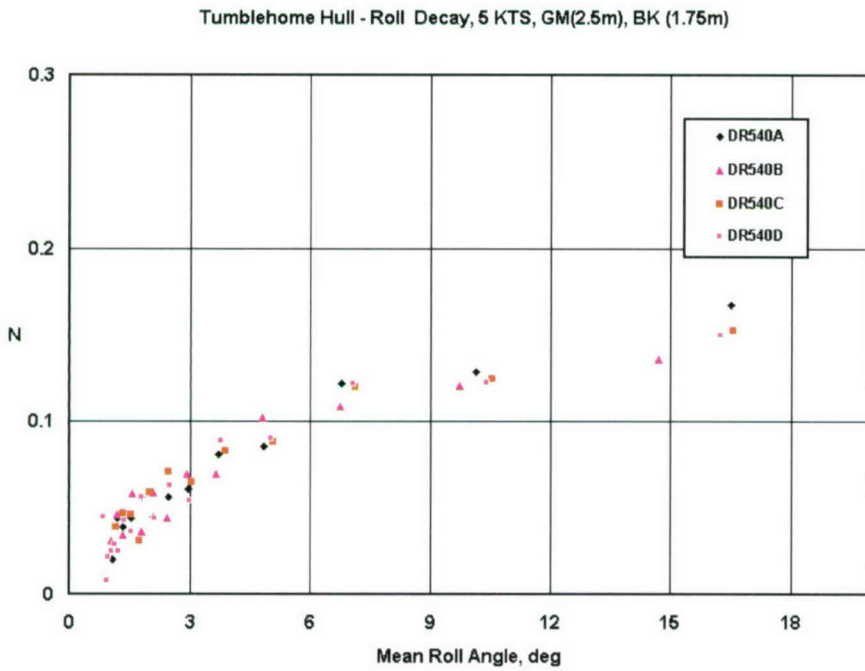


Figure 40. Tumblehome Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.75m.

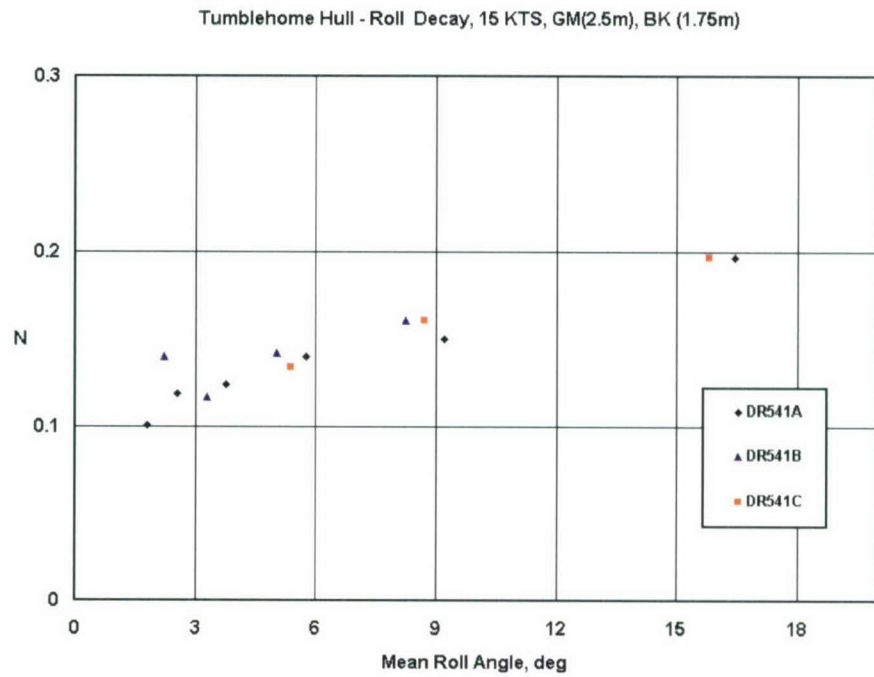


Figure 41. Tumblehome Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.75m.

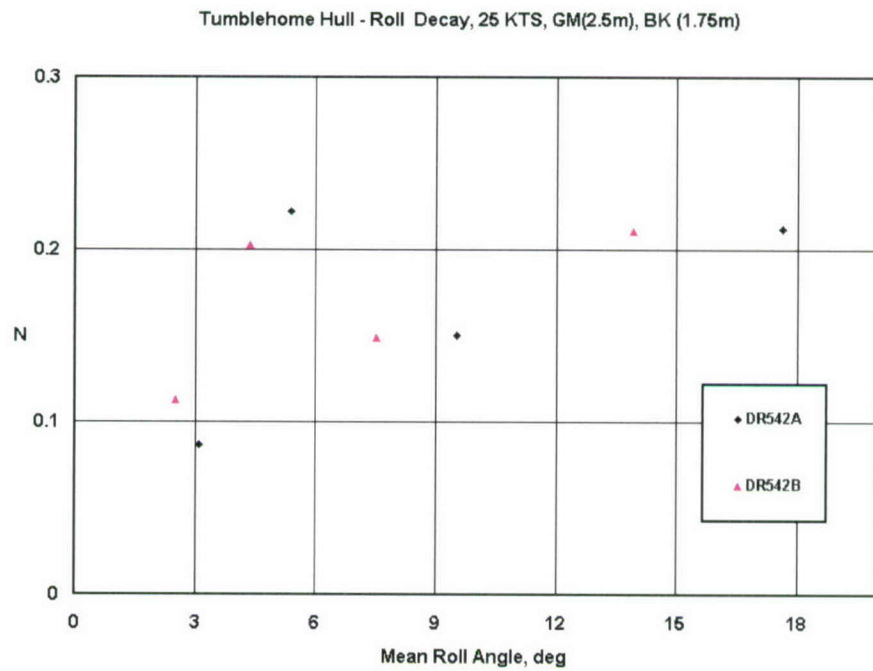


Figure 42. Tumblehome Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.75m

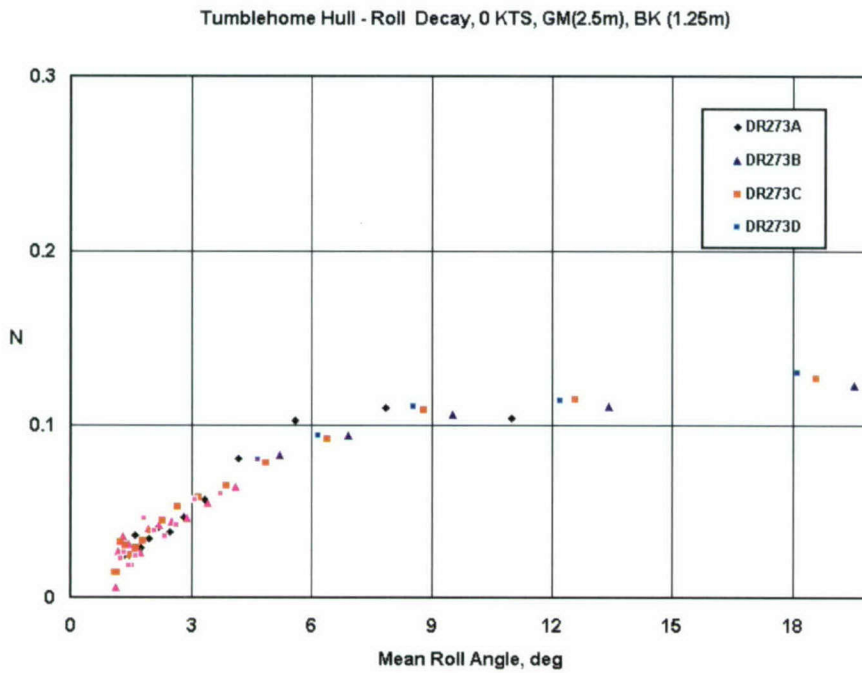


Figure 43. Tumblehome Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.25m.

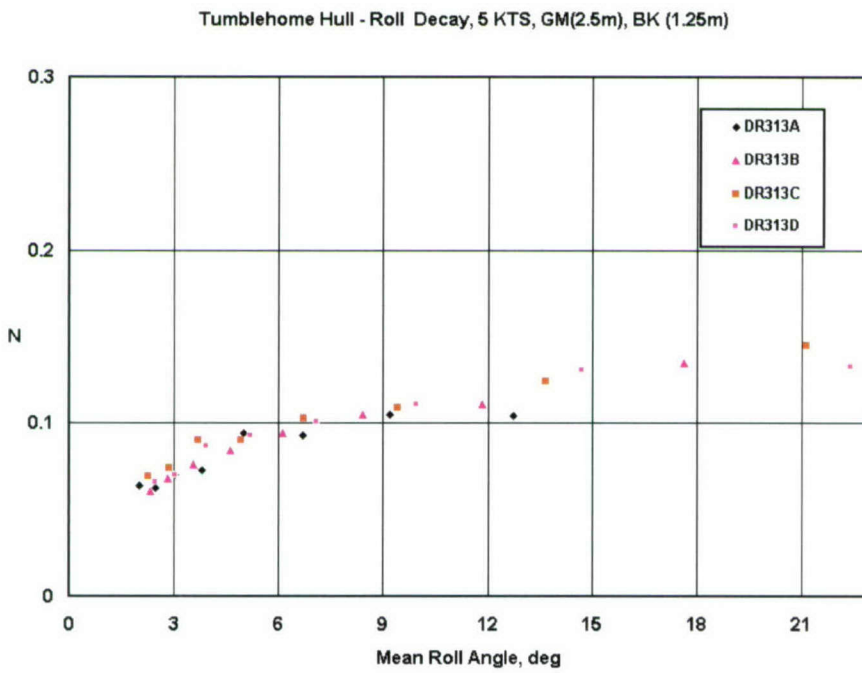


Figure 44. Tumblehome Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.25m.

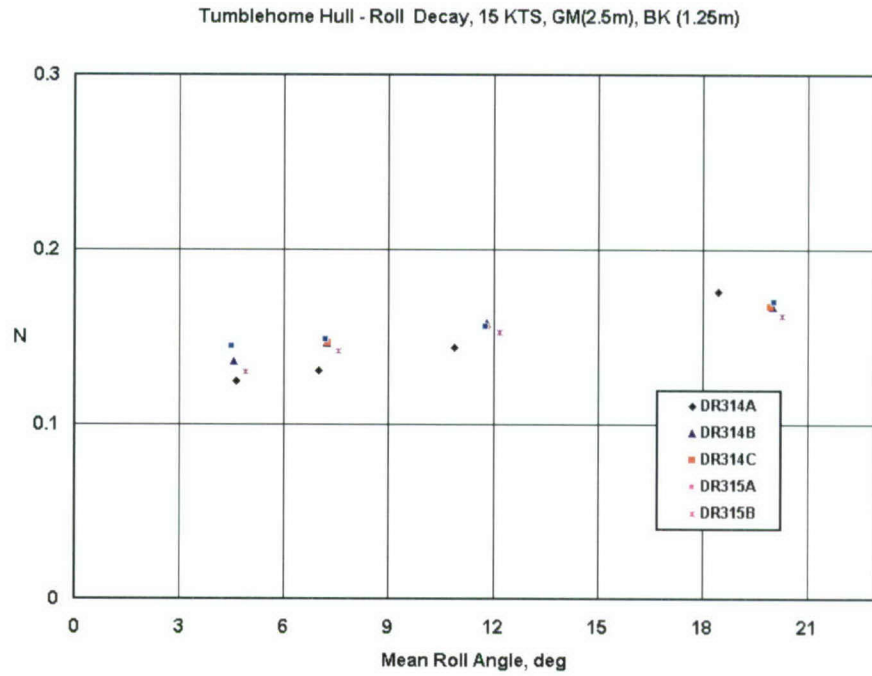


Figure 45. Tumblehome Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.25m.

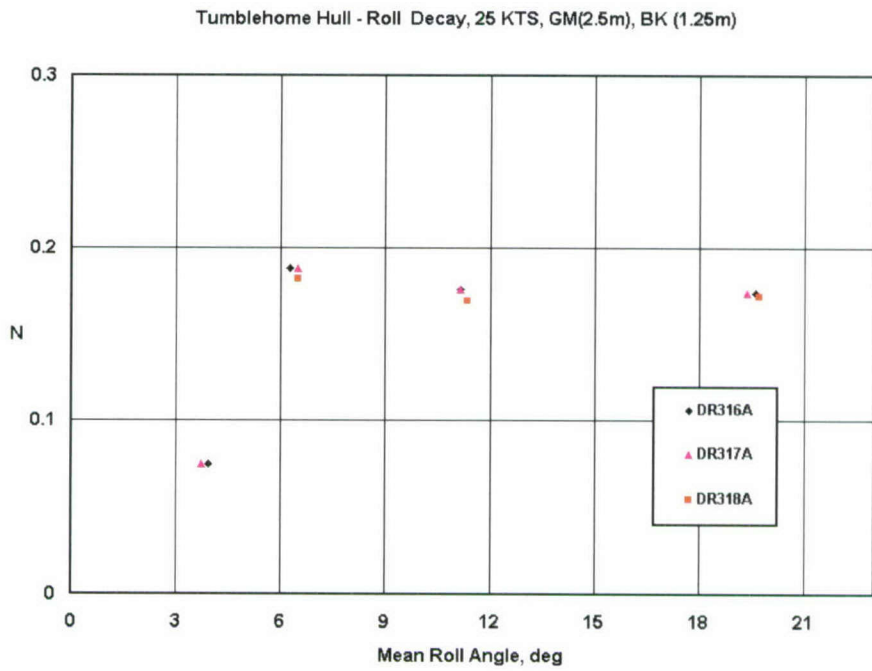


Figure 46. Tumblehome Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.25m

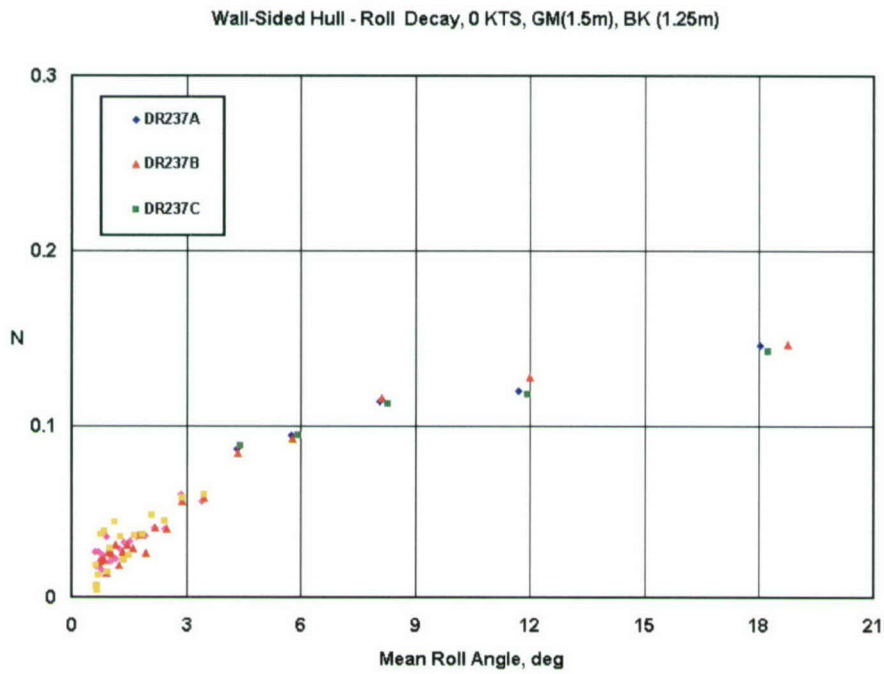


Figure 47. Wall Sided Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK=1.25m.

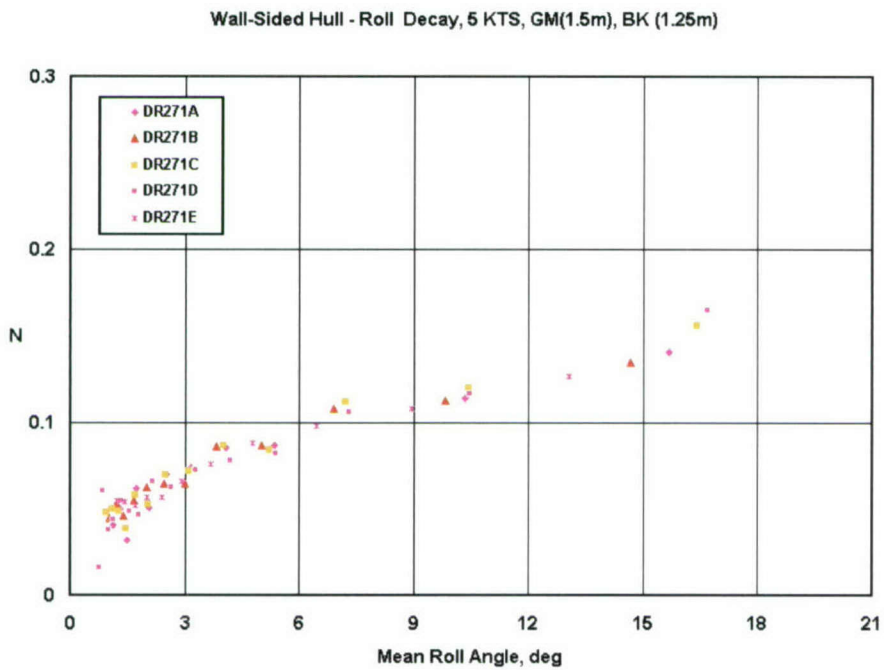


Figure 48. Wall Sided Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.25m.

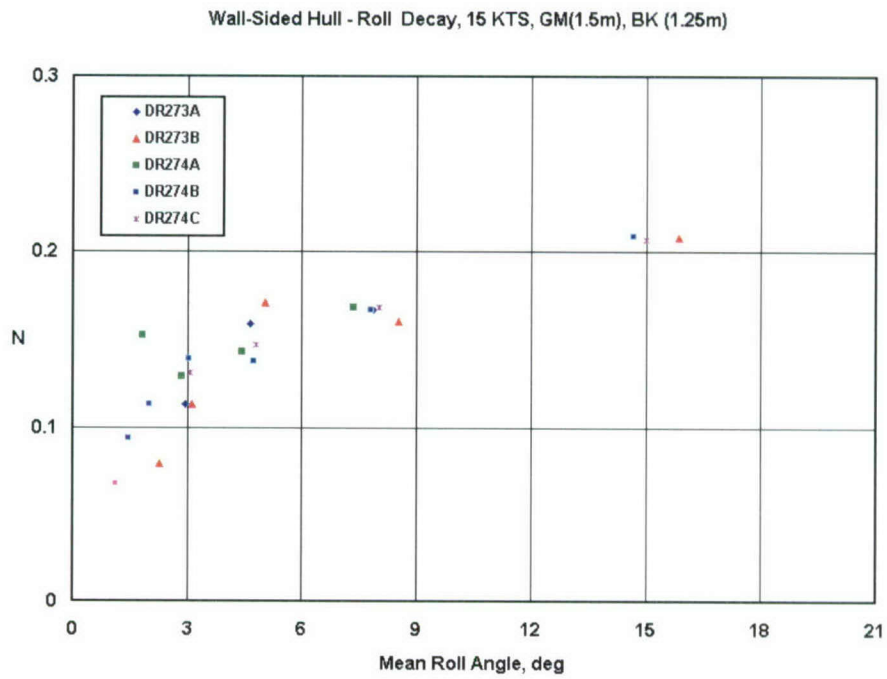


Figure 49. Wall Sided Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.25m.

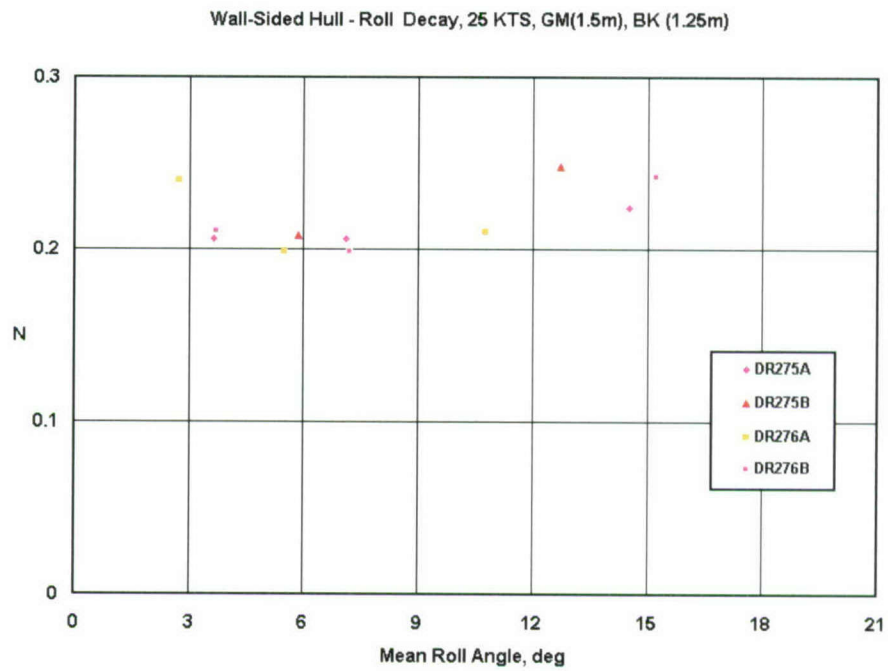


Figure 50. Wall Sided Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.25m.

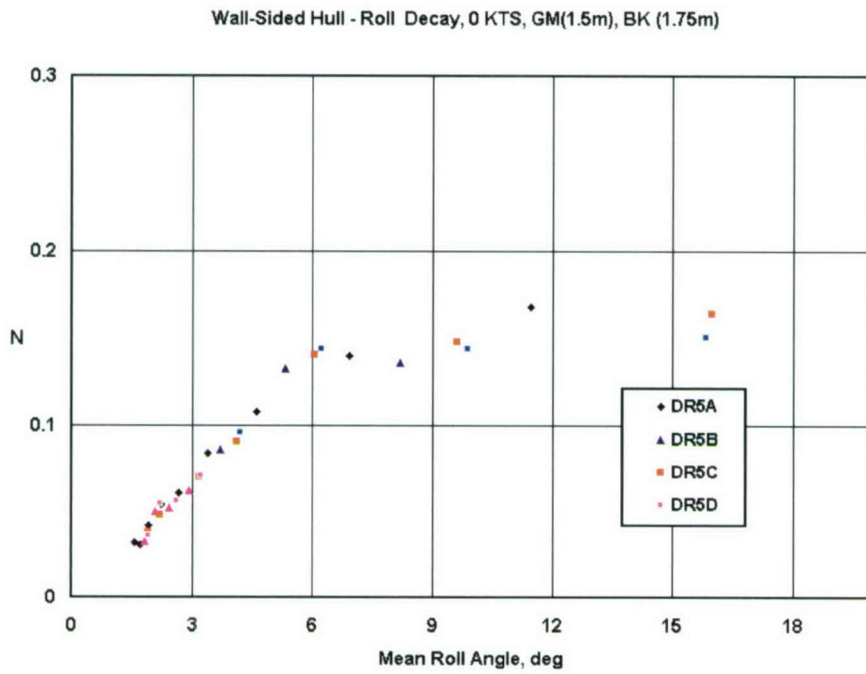


Figure 51. Wall Sided Hull Roll Decay Coefficient at 0 Kts for GM=1.5m and BK=1.75m.

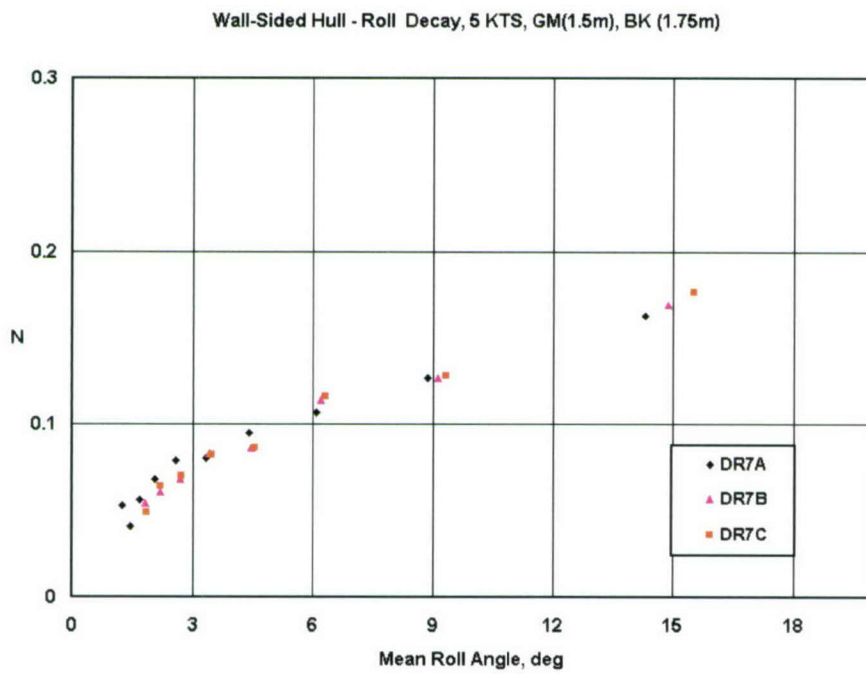


Figure 52. Wall Sided Hull Roll Decay Coefficient at 5 Kts for GM=1.5m and BK=1.75m.

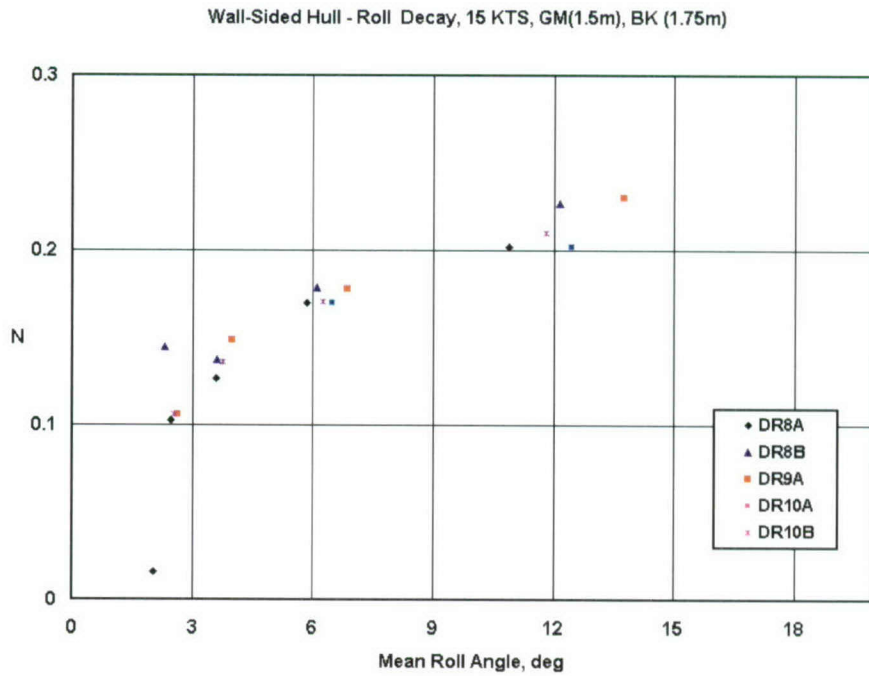


Figure 53. Wall Sided Hull Roll Decay Coefficient at 15 Kts for GM=1.5m and BK=1.75m.

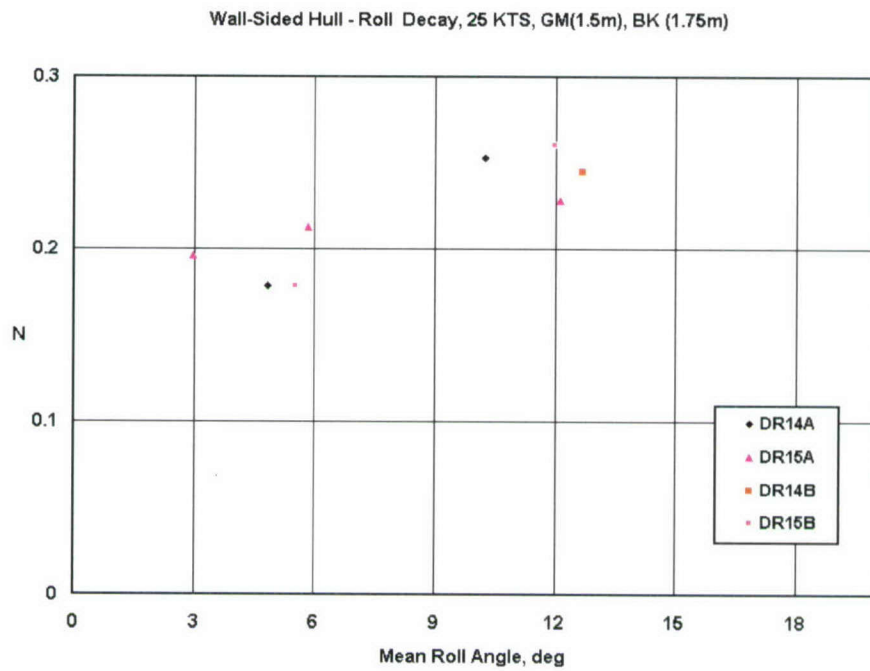


Figure 54. Wall Sided Hull Roll Decay Coefficient at 25 Kts for GM=1.5m and BK=1.75m.

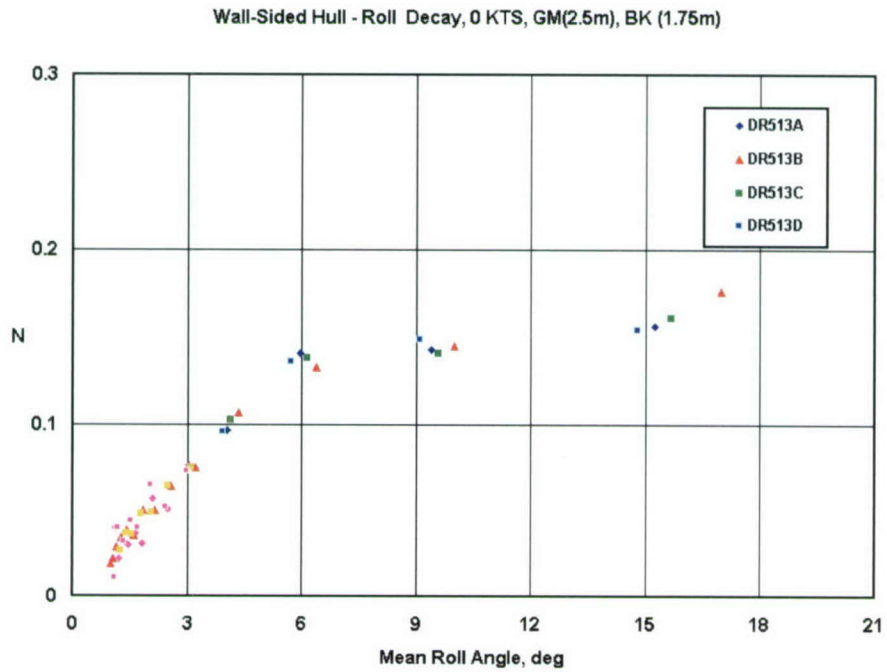


Figure 55. Wall Sided Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.75m.

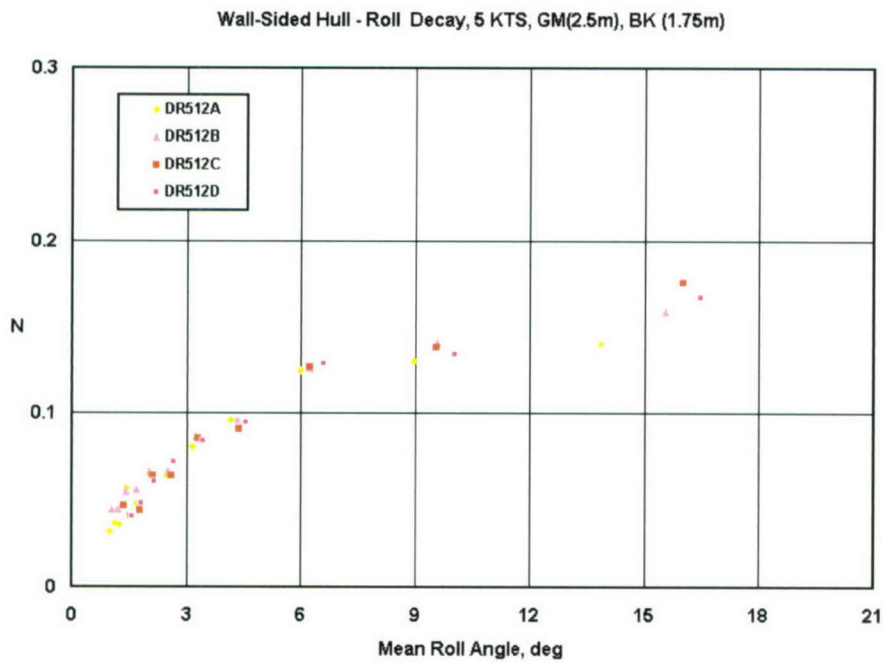


Figure 56. Wall Sided Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.75m.

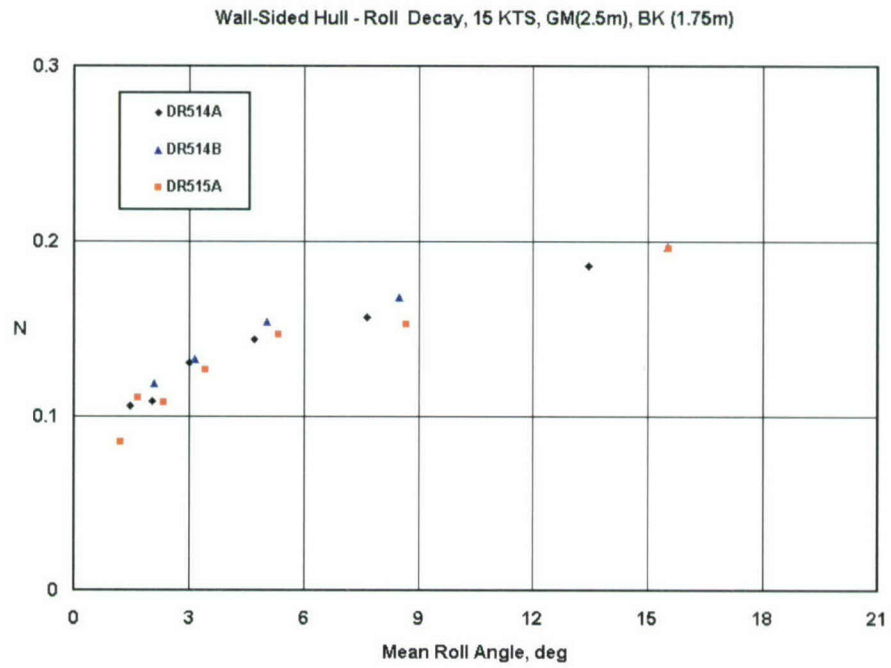


Figure 57. Wall Sided Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.75m.

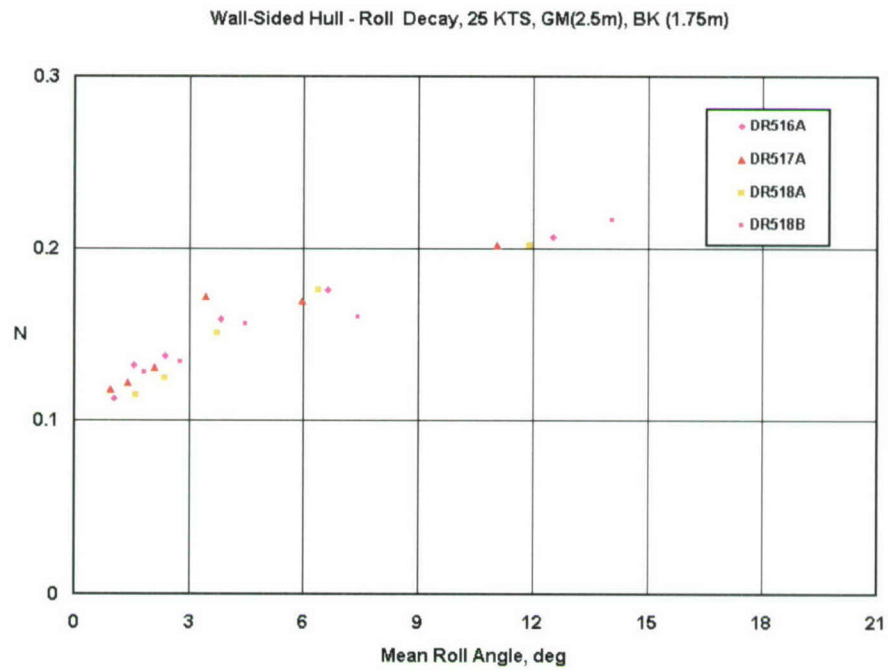


Figure 58. Wall Sided Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.75m

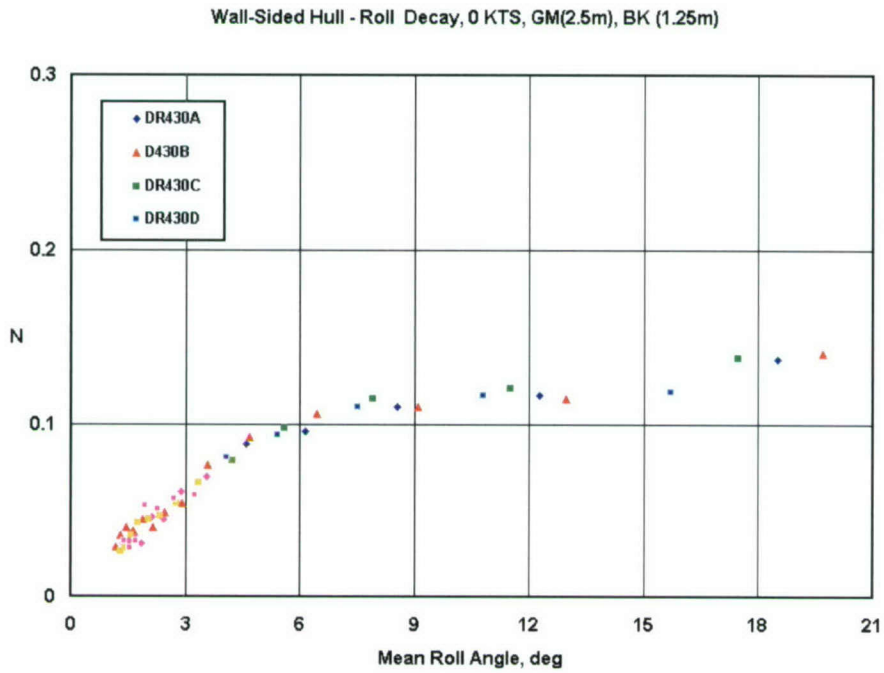


Figure 59. Wall Sided Hull Roll Decay Coefficient at 0 Kts for GM=2.5m and BK= 1.25m.

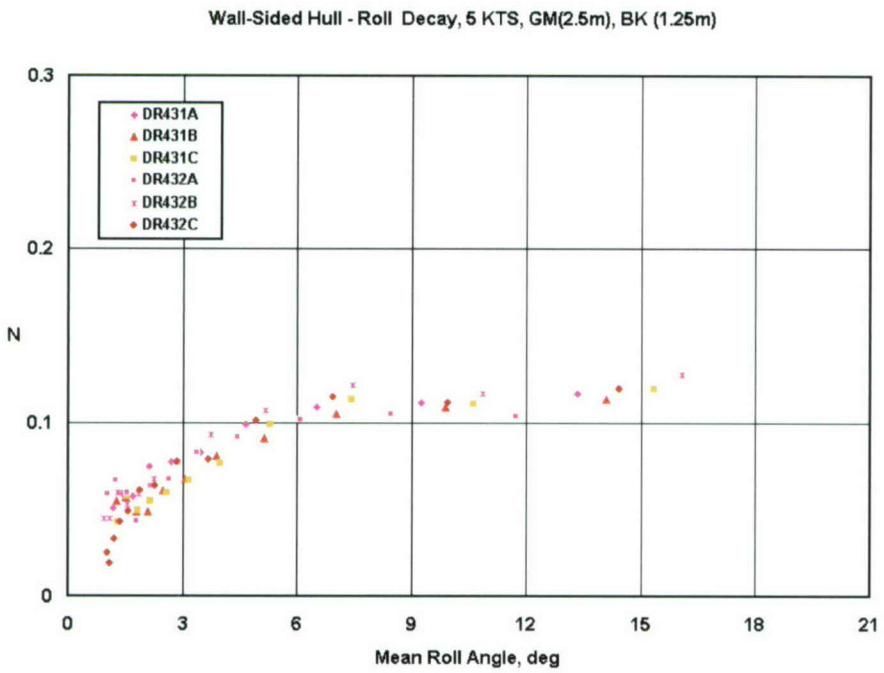


Figure 60. Wall Sided Hull Roll Decay Coefficient at 5 Kts for GM=2.5m and BK=1.25m.

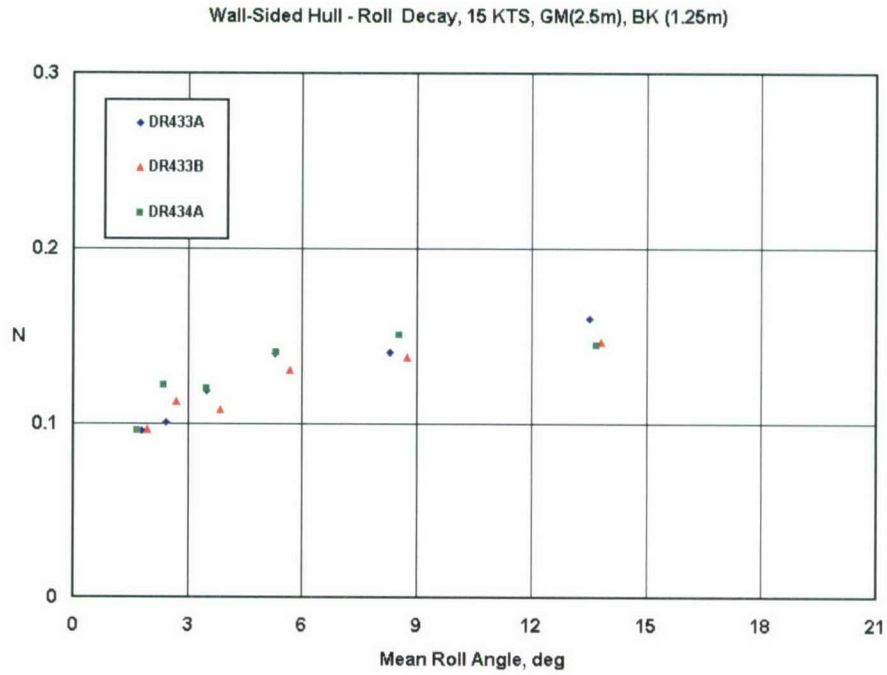


Figure 61. Wall Sided Hull Roll Decay Coefficient at 15 Kts for GM=2.5m and BK=1.25m.

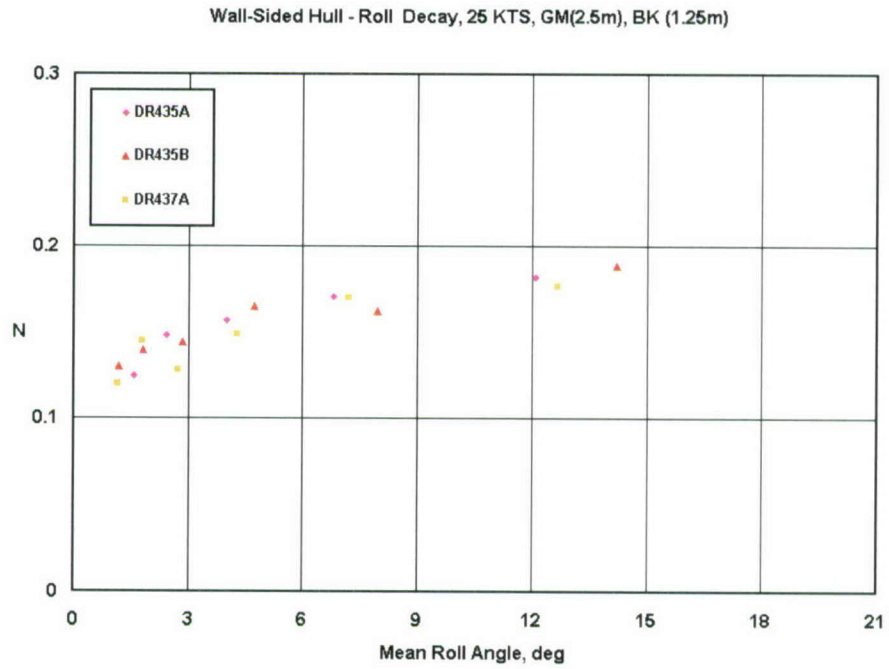


Figure 62. Wall Sided Hull Roll Decay Coefficient at 25 Kts for GM=2.5m and BK=1.25m

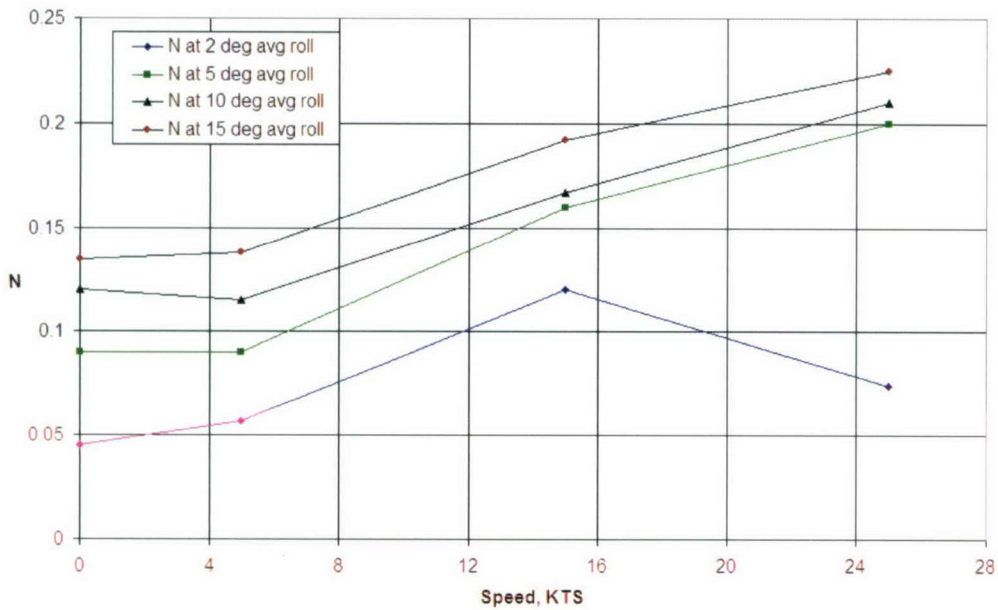


Figure 63. Flared Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.25m.

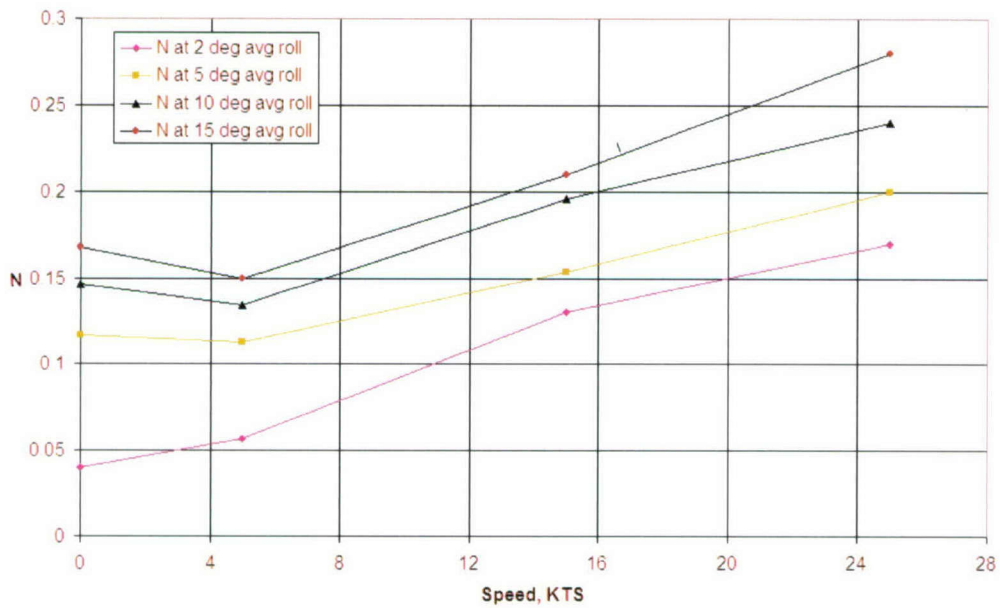


Figure 64. Flared Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.75m.

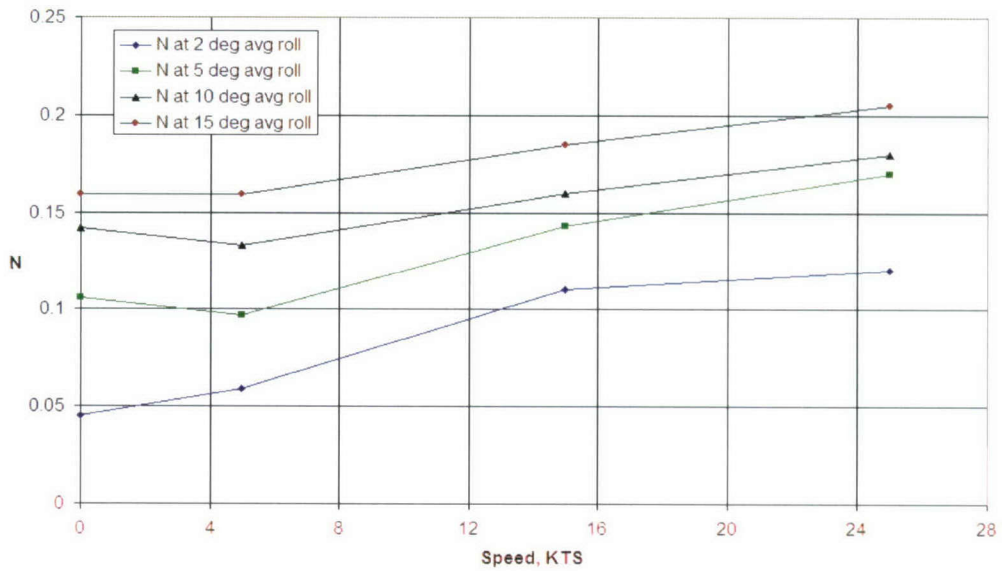


Figure 65. Flared Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.75m.

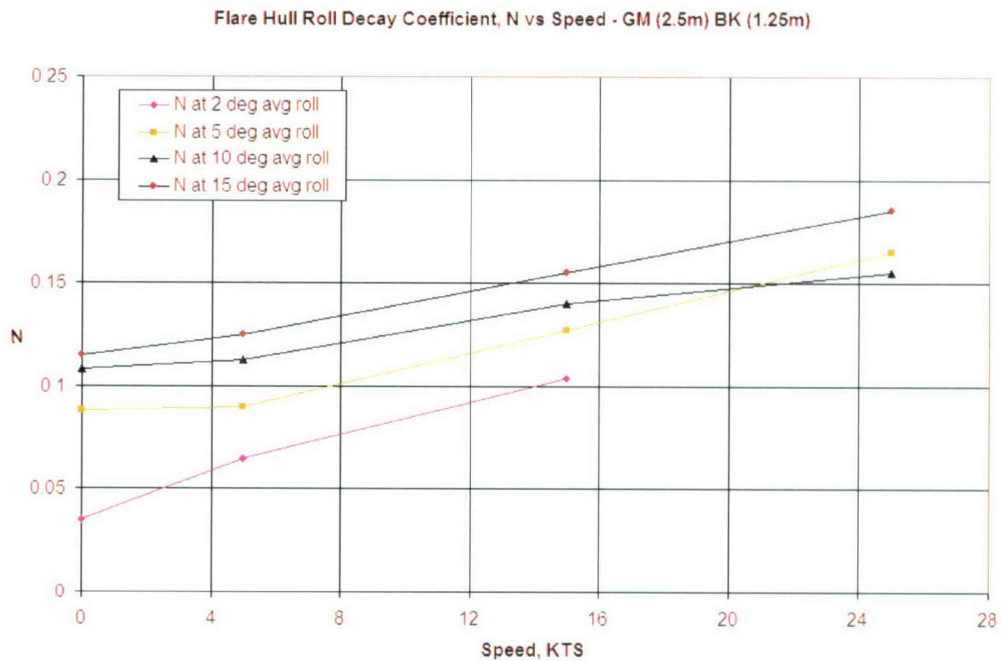


Figure 66. Flared Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.25m.

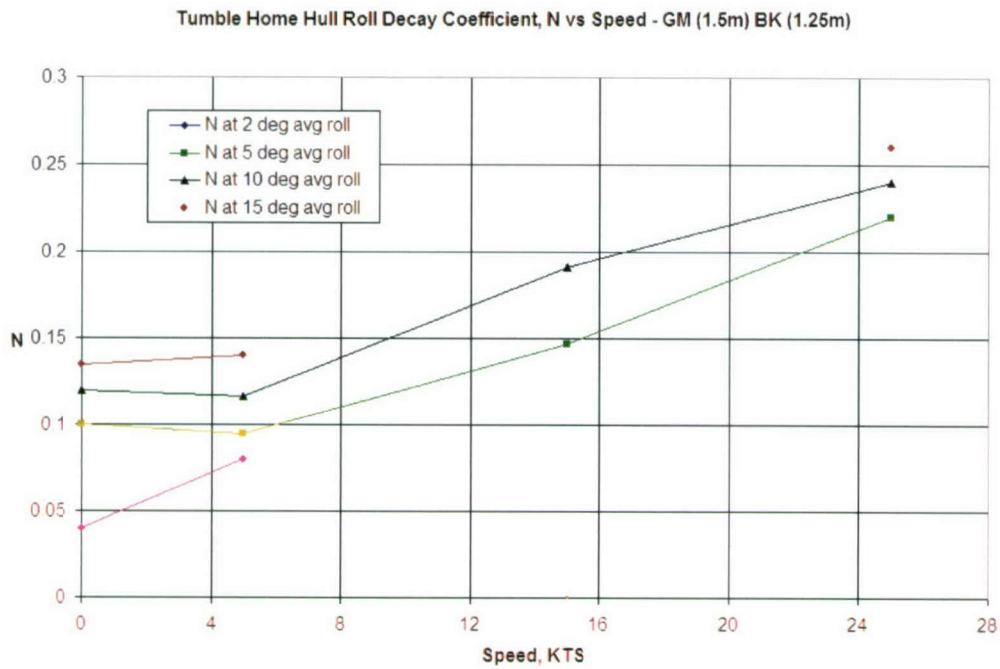


Figure 67. Tumble H Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.25m.

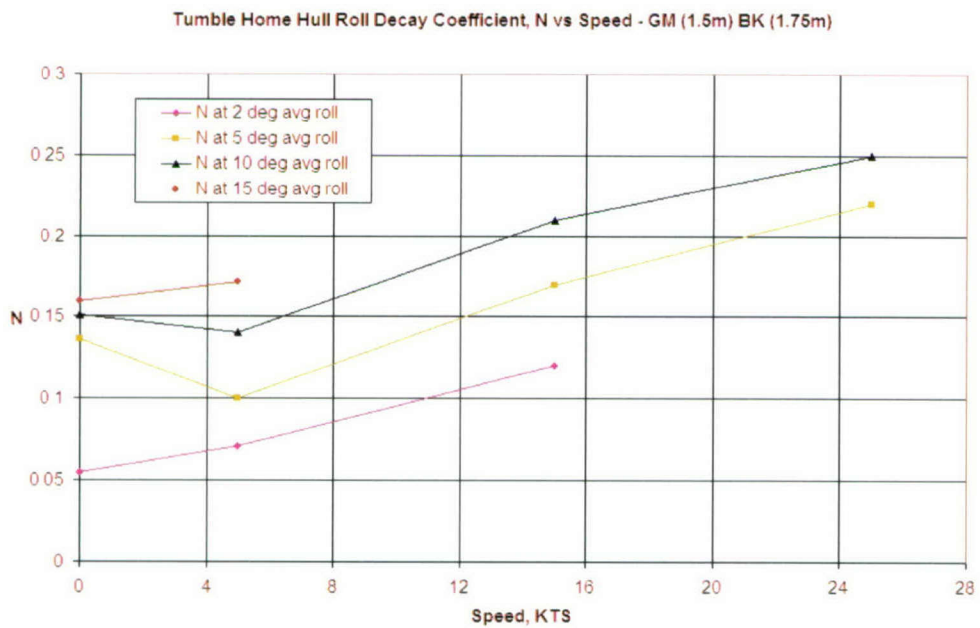


Figure 68. Tumble H Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.75m.

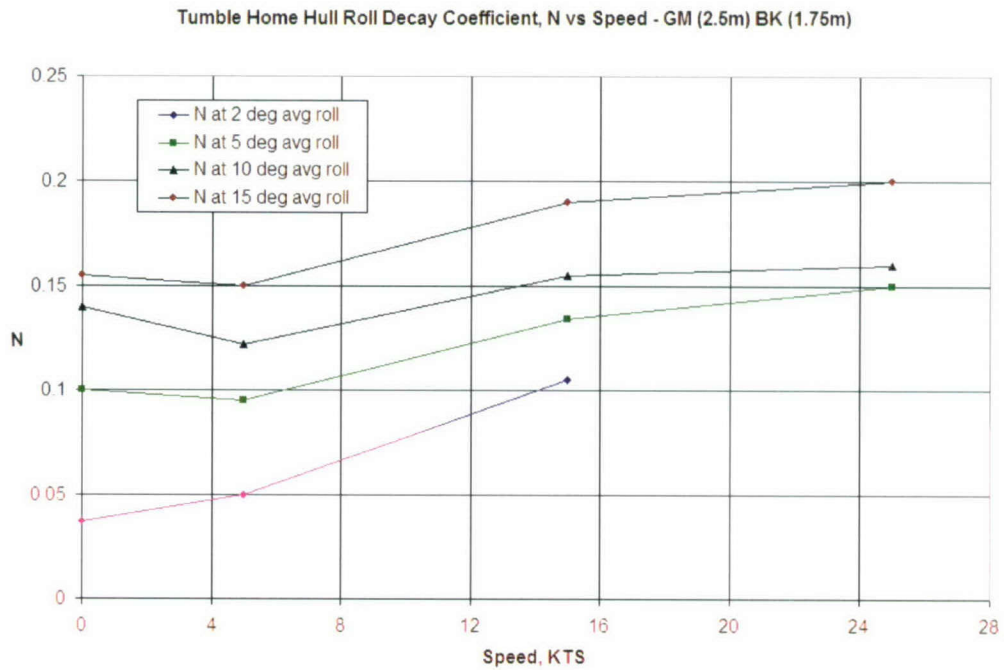


Figure 69. Tumble H Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.75m.

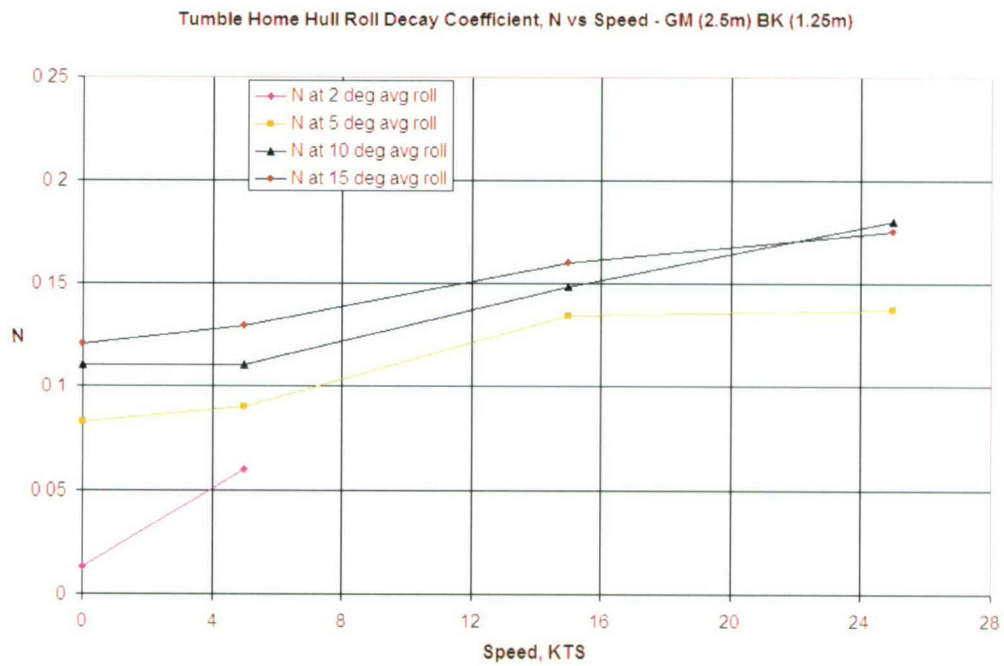


Figure 70. Tumble H Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.25m.

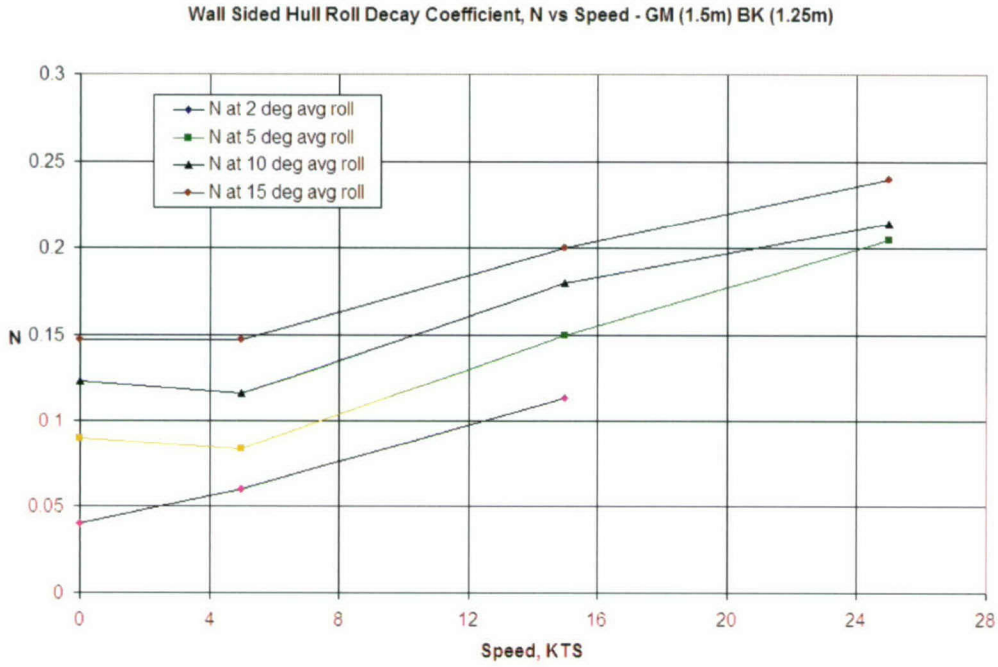


Figure 71. Wall Sided Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.25m.

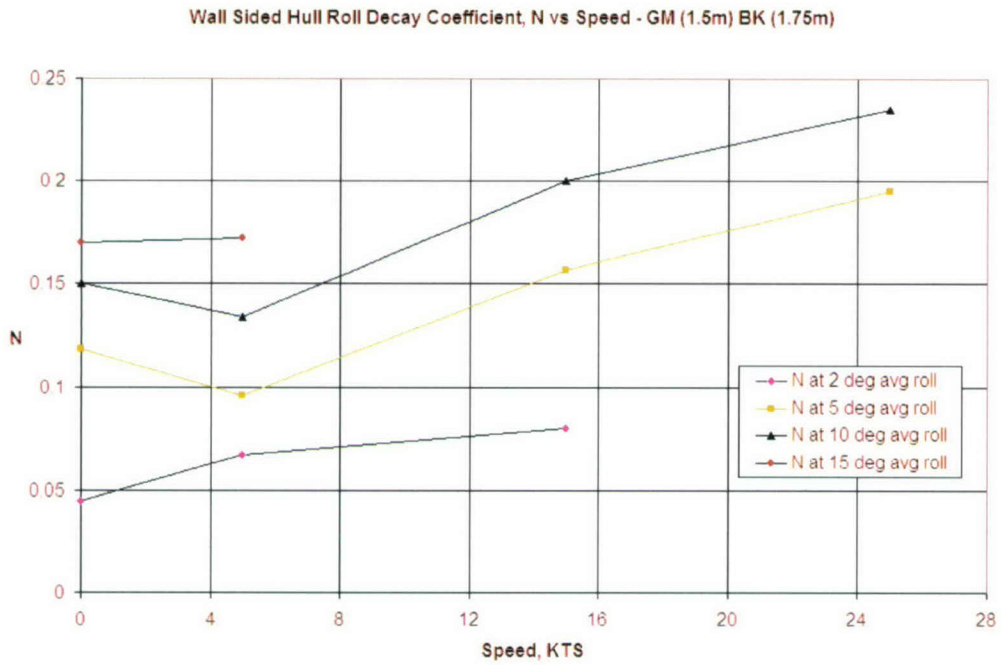


Figure 72. Wall Sided Hull Roll Decay Coefficient versus Speed for GM=1.5m and BK=1.75m.

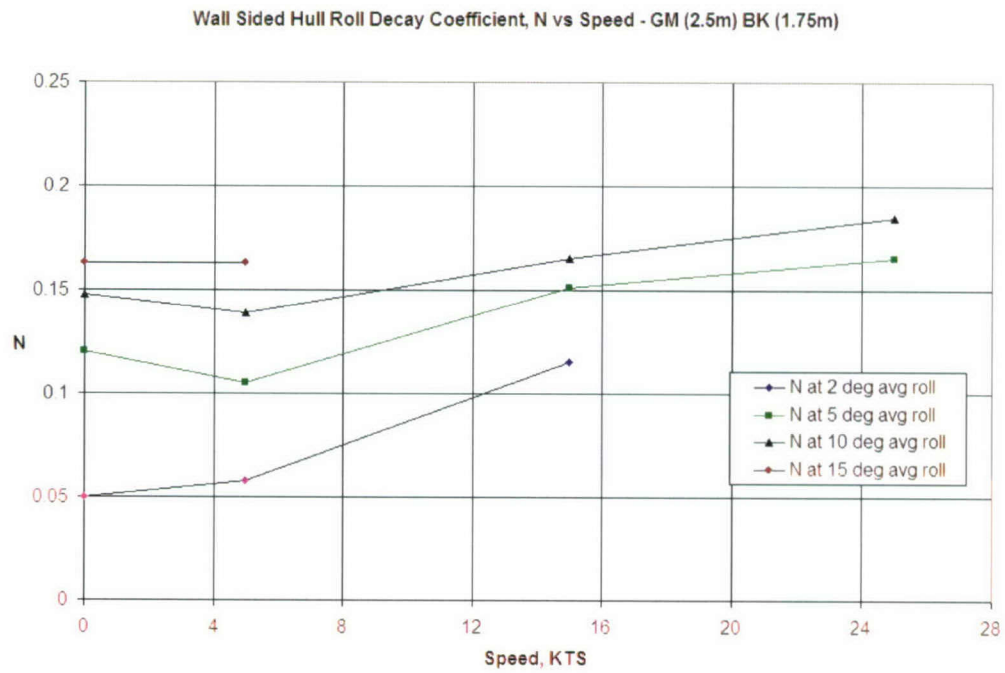


Figure 73. Wall Sided Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.75m.



Figure 74. Wall Sided Hull Roll Decay Coefficient versus Speed for GM=2.5m and BK=1.25m.

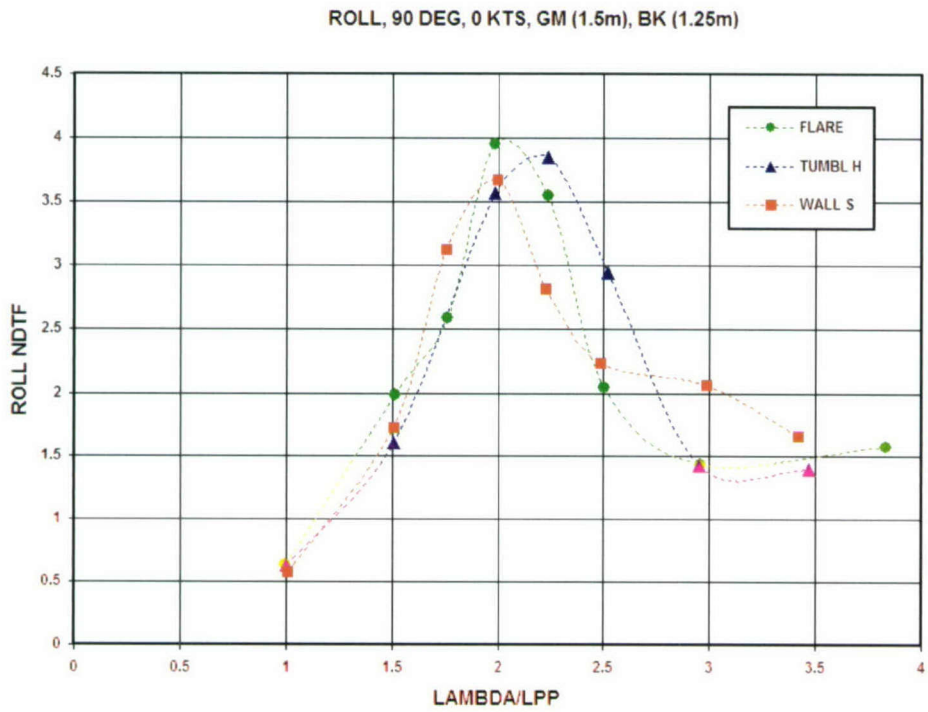


Figure 75. Roll NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=1.5m and BK=1.25m

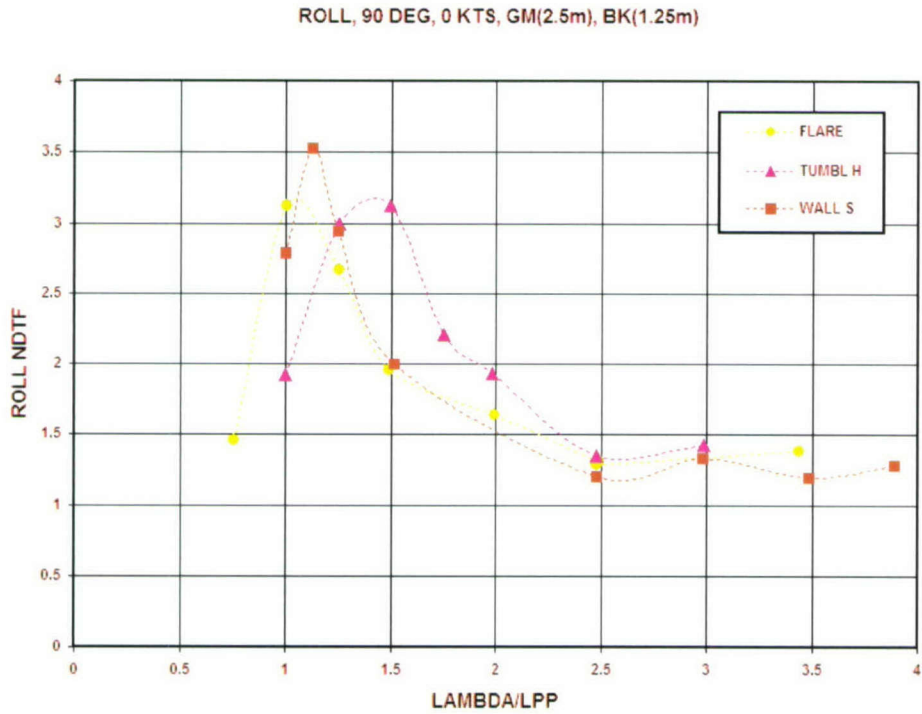


Figure 76. Roll NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=2.5m and BK=1.25m

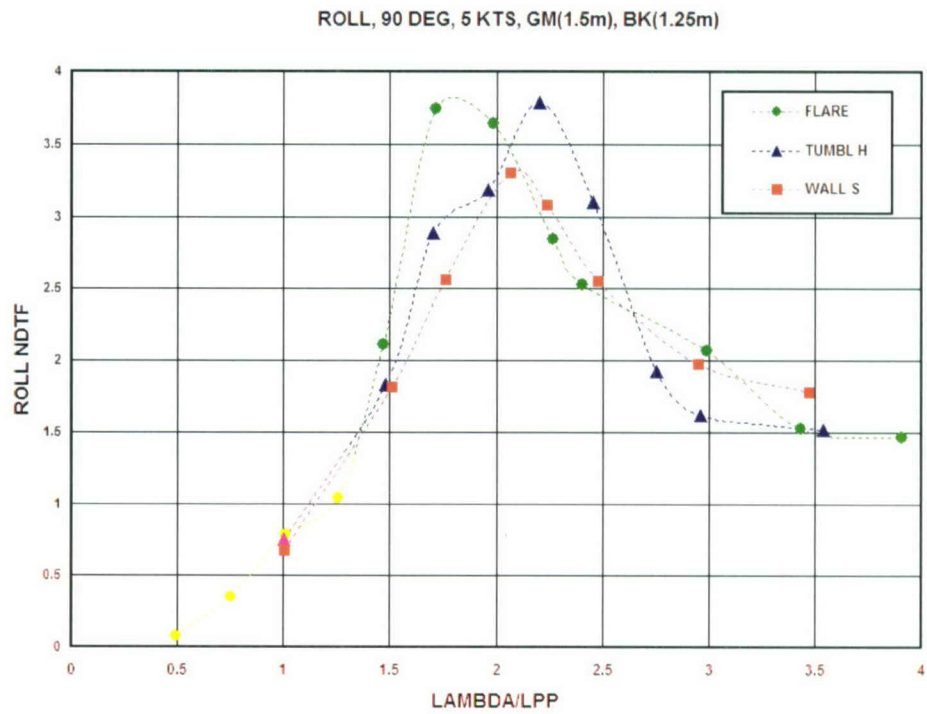


Figure 77. Roll NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=1.5m and BK=1.25m

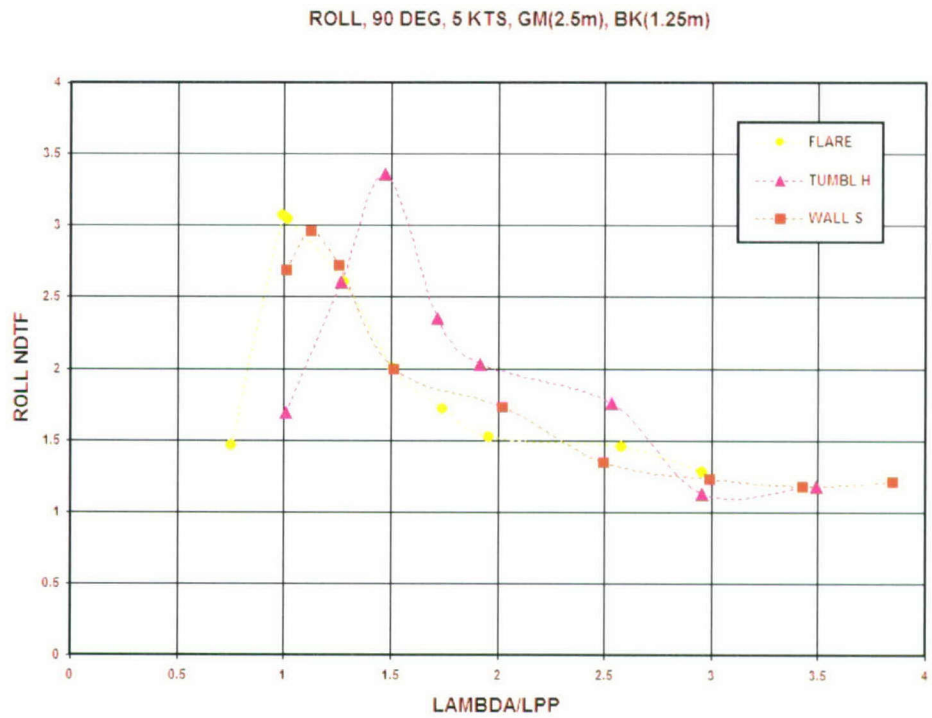


Figure 78. Roll NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=2.5m and BK=1.25m

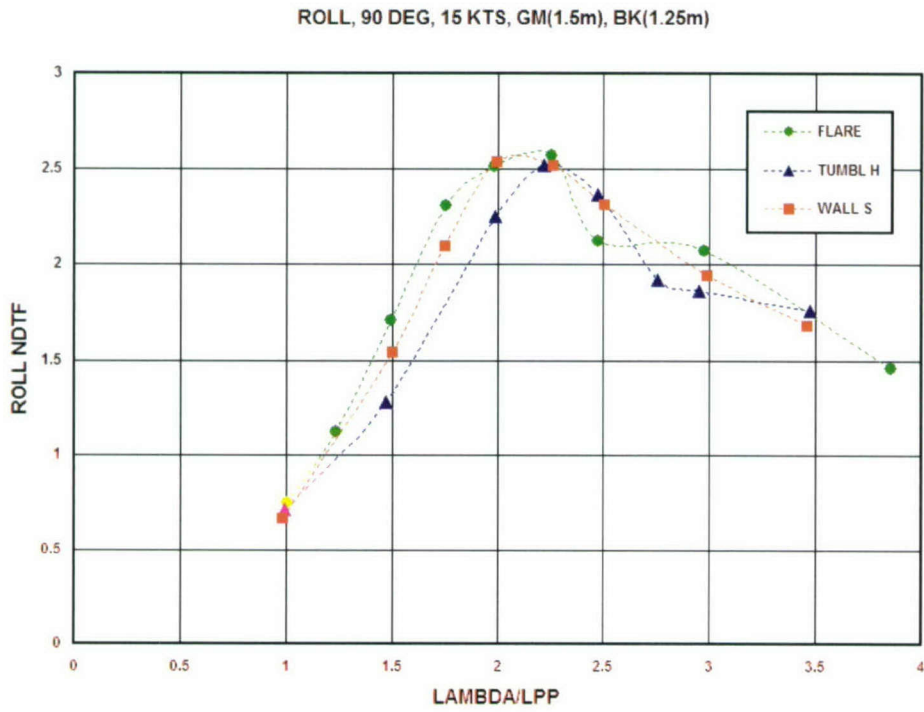


Figure 79. Roll NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=1.5m and BK=1.25m

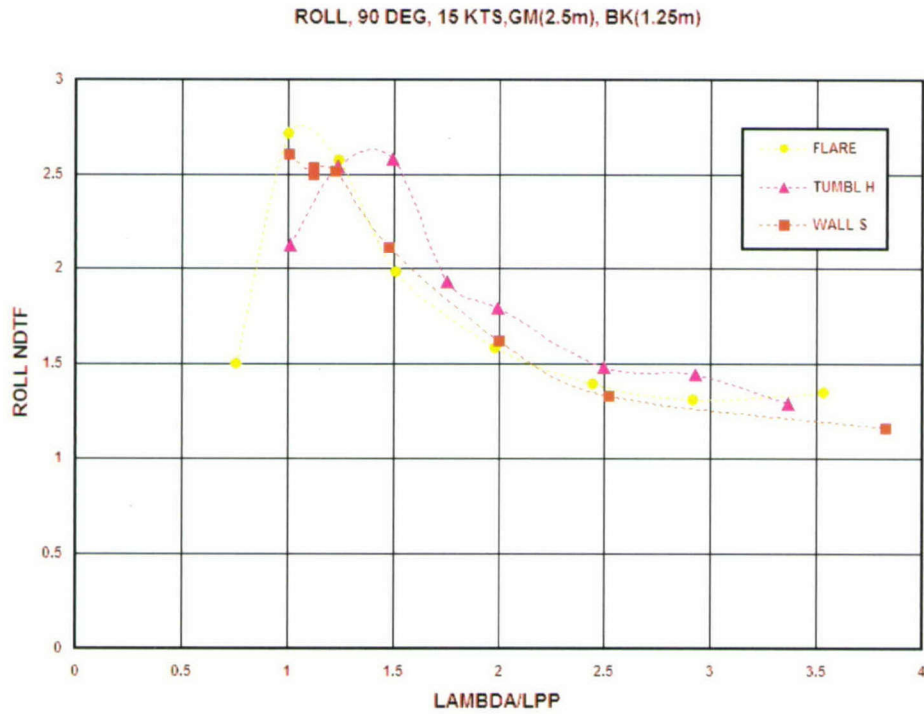


Figure 80. Roll NDTF vs. λ/L_{PP} for Beam Waves at 15Kts for GM=2.5m and BK=1.25m

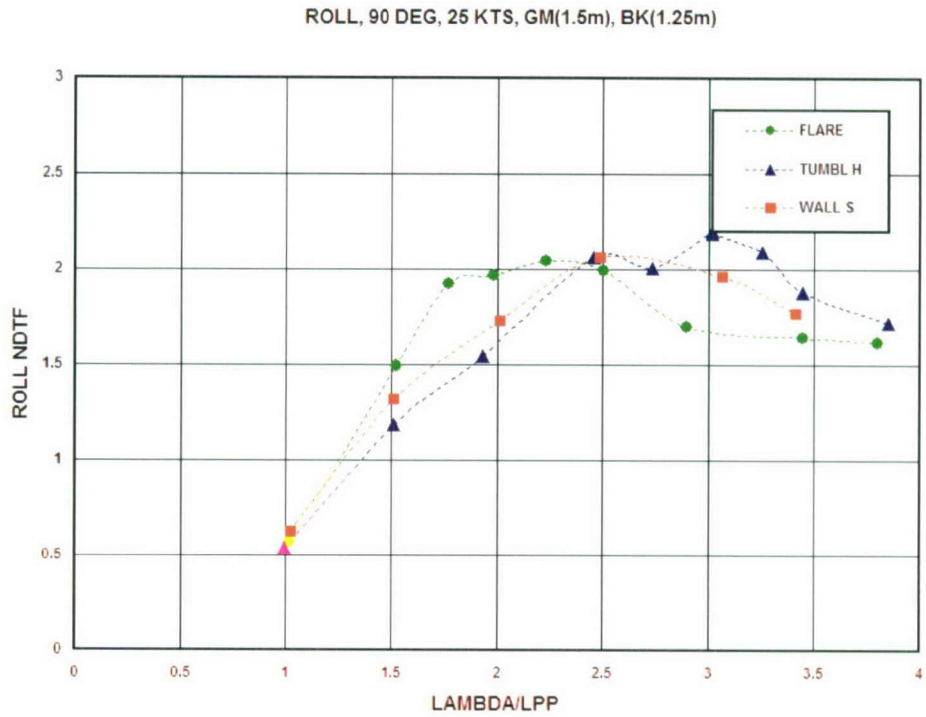


Figure 81. Roll NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=1.5m and BK=1.25m

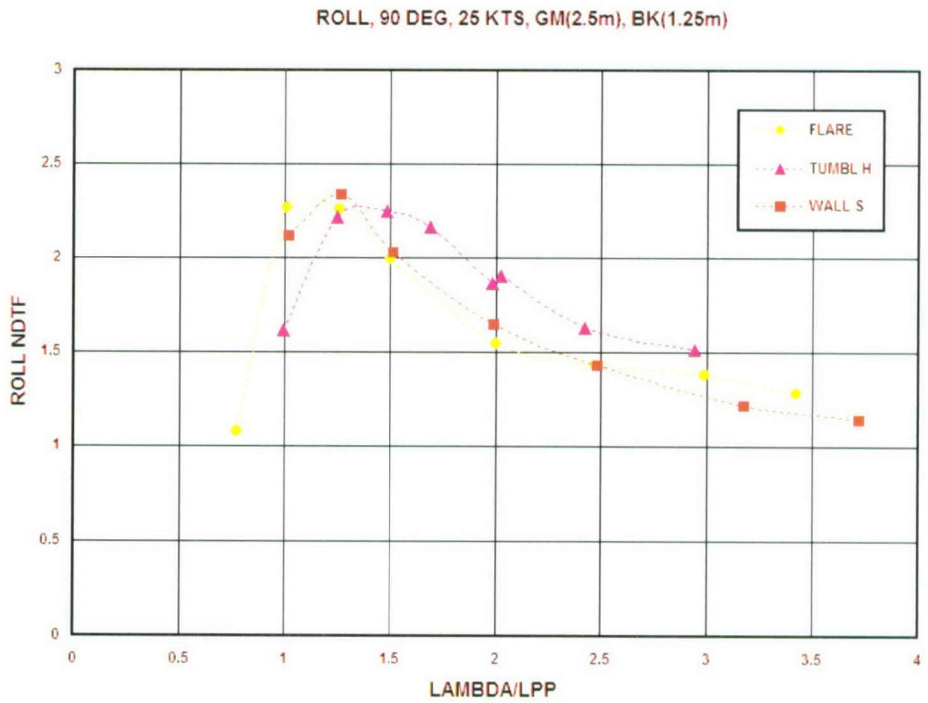


Figure 82. Roll NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=2.5m and BK=1.25m

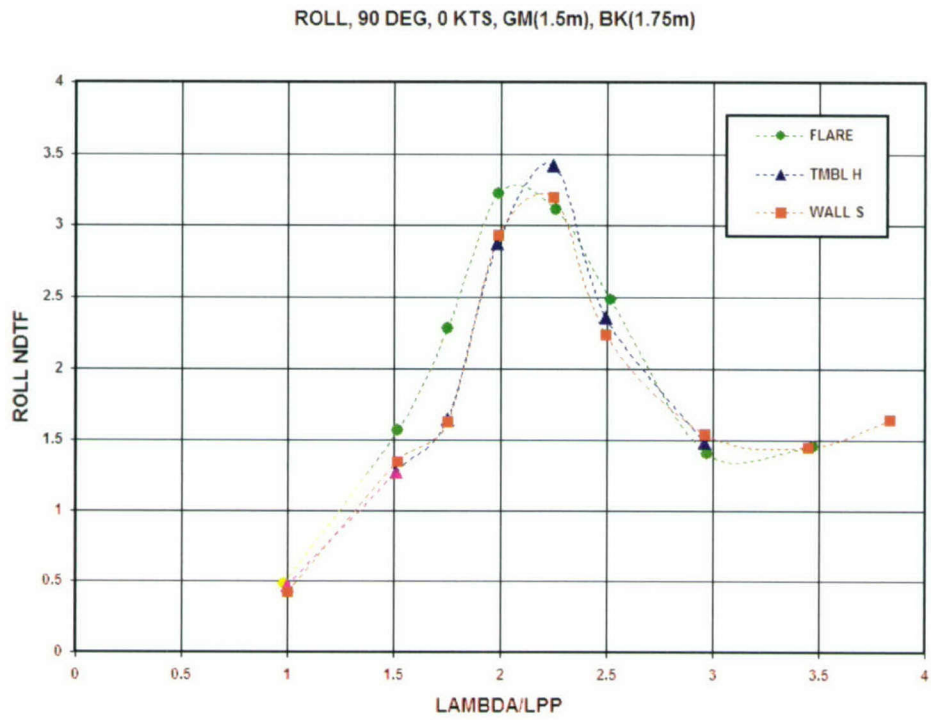


Figure 83. Roll NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=1.5m and BK=1.75m

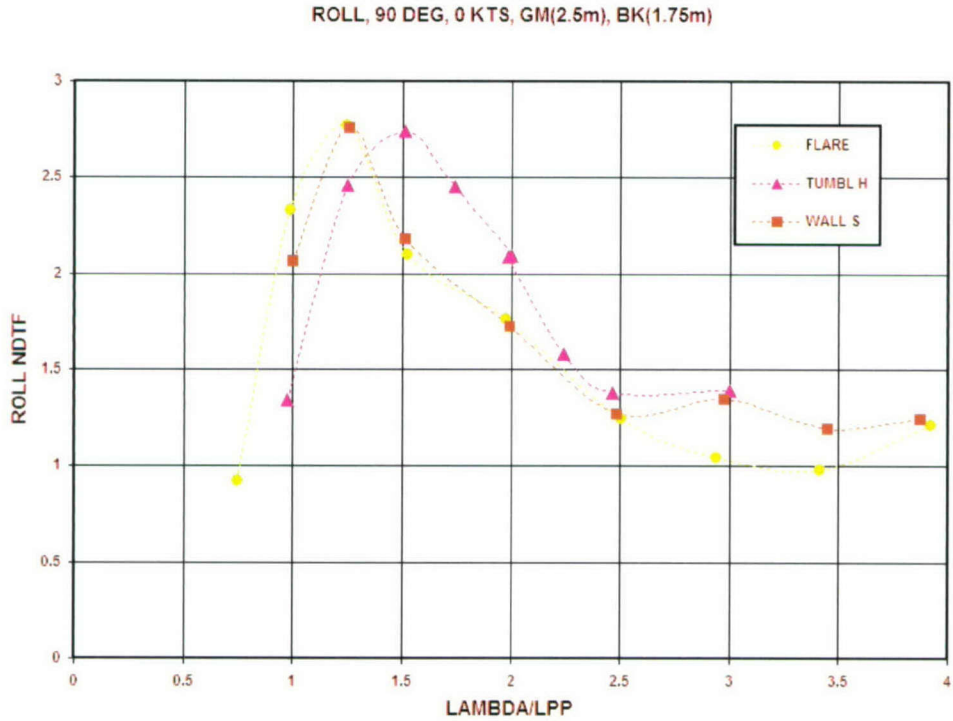


Figure 84. Roll NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=2.5m and BK=1.75m

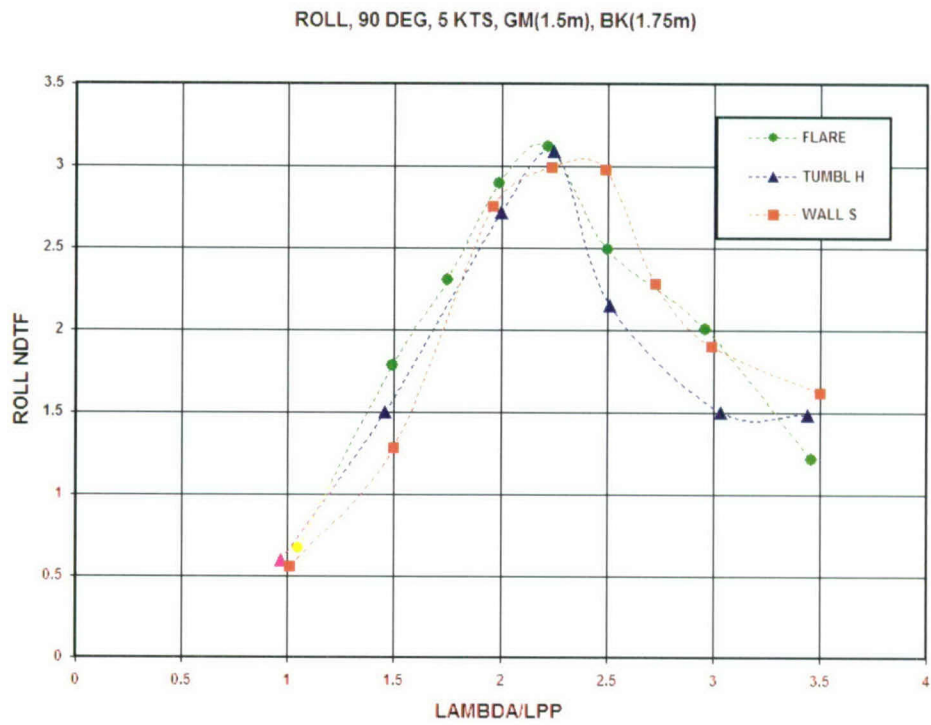


Figure 85. Roll NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=1.5m and BK=1.75m

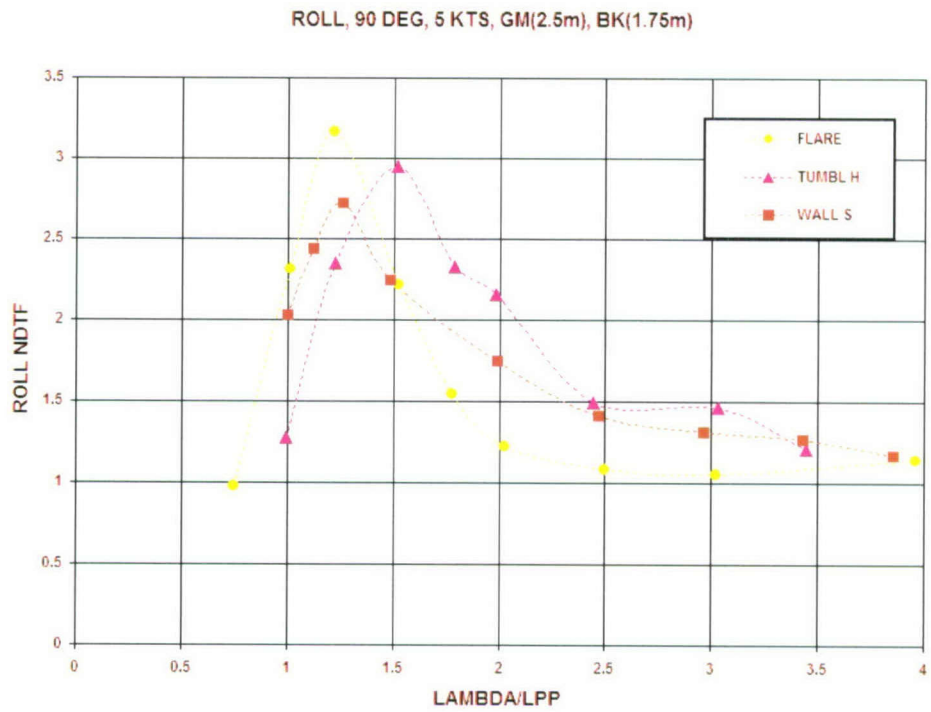


Figure 86. Roll NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=2.5m and BK=1.75m

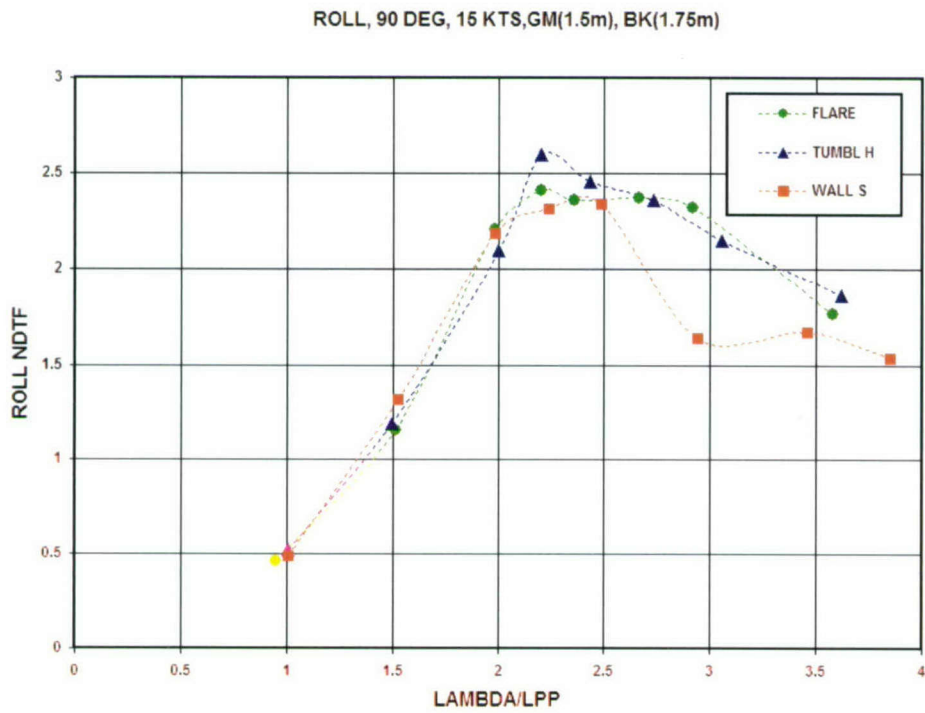


Figure 87. Roll NDTF vs. λ/L_{PP} for Beam waves at 15 Kts for GM=1.5m and BK=1.75m

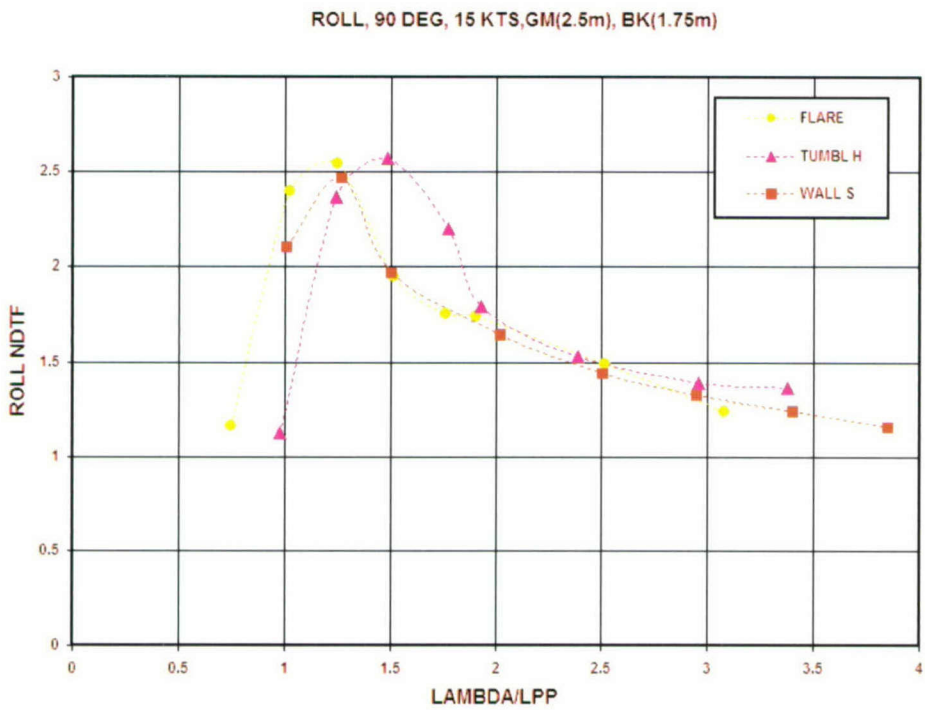


Figure 88. Roll NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=2.5m and BK=1.75m

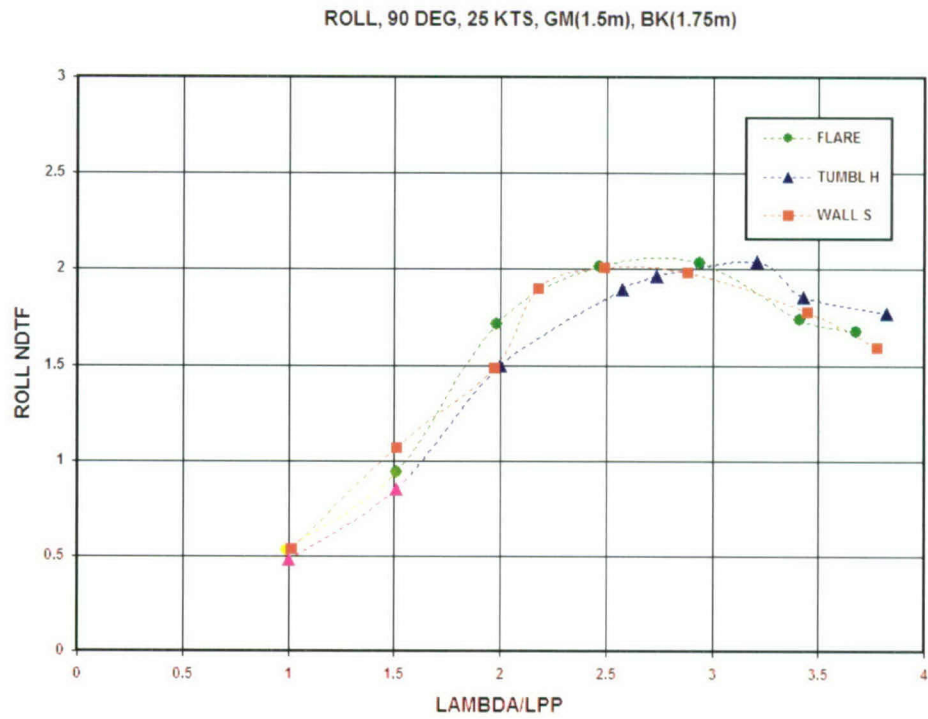


Figure 89. Roll NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=1.5m and BK=1.75m

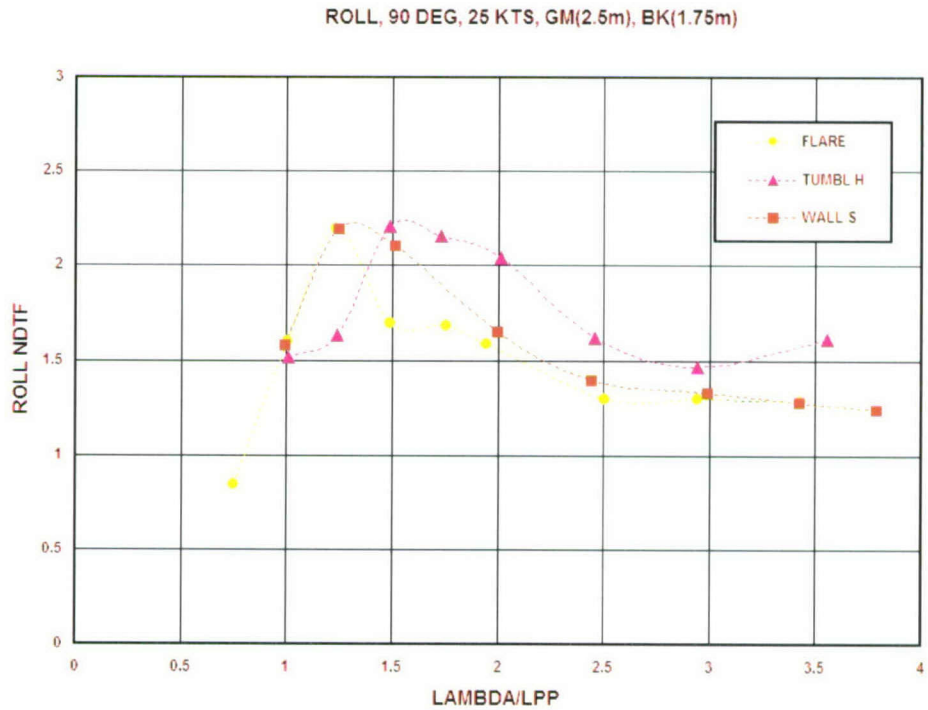


Figure 90. Roll NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=2.5m and BK=1.75m

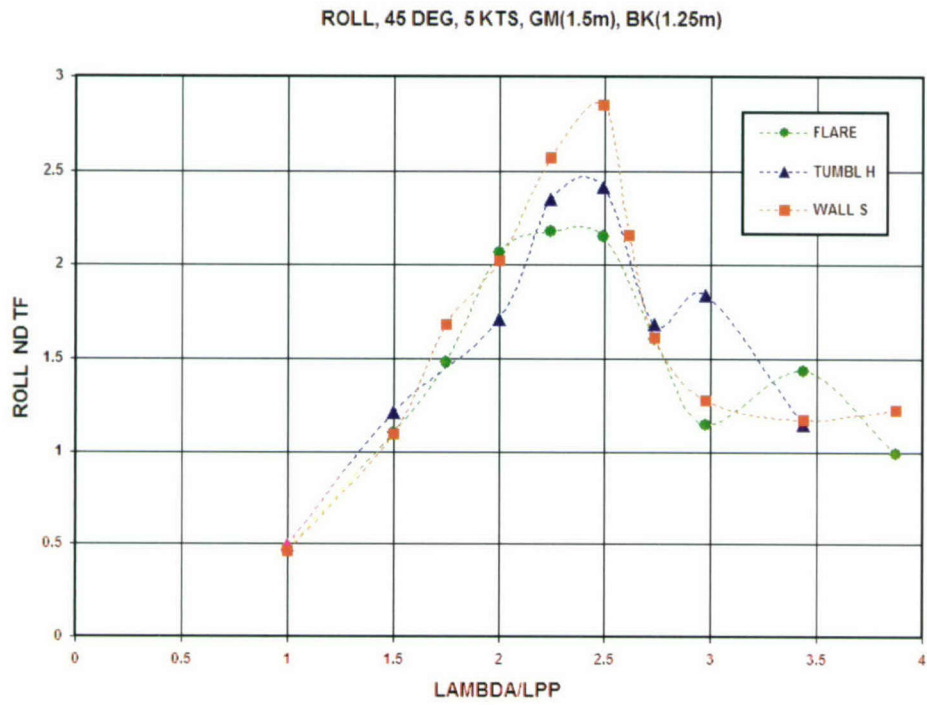


Figure 91. Roll NDTF vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=1.5m and BK=1.25m

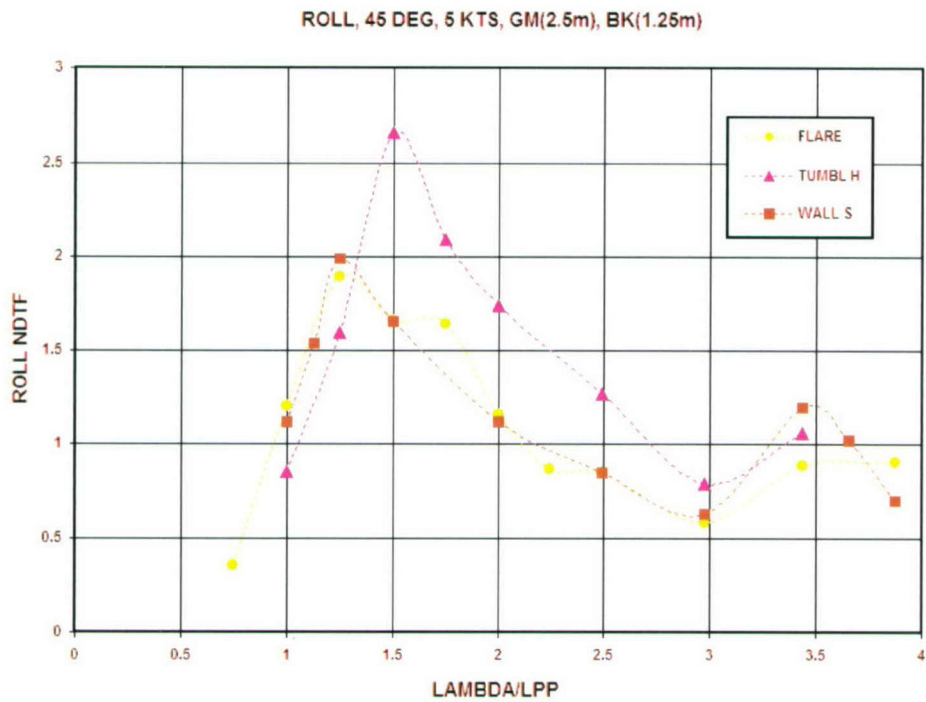


Figure 92. Roll NDTF vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=2.5m and BK=1.25m

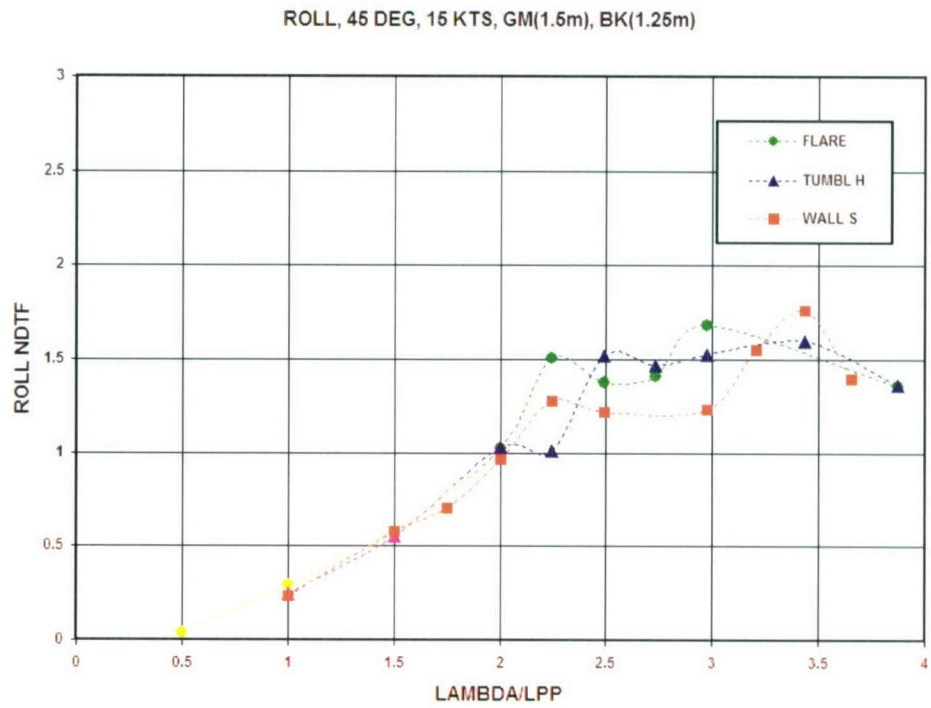


Figure 93. Roll NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=1.5m and BK=1.25m

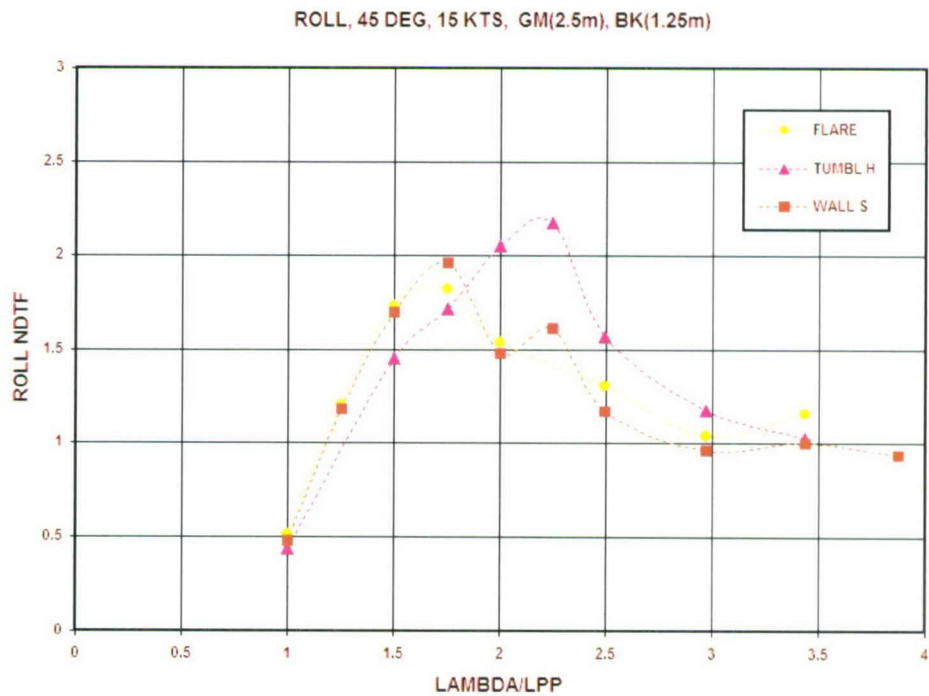


Figure 94. Roll NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=2.5m and BK=1.25m

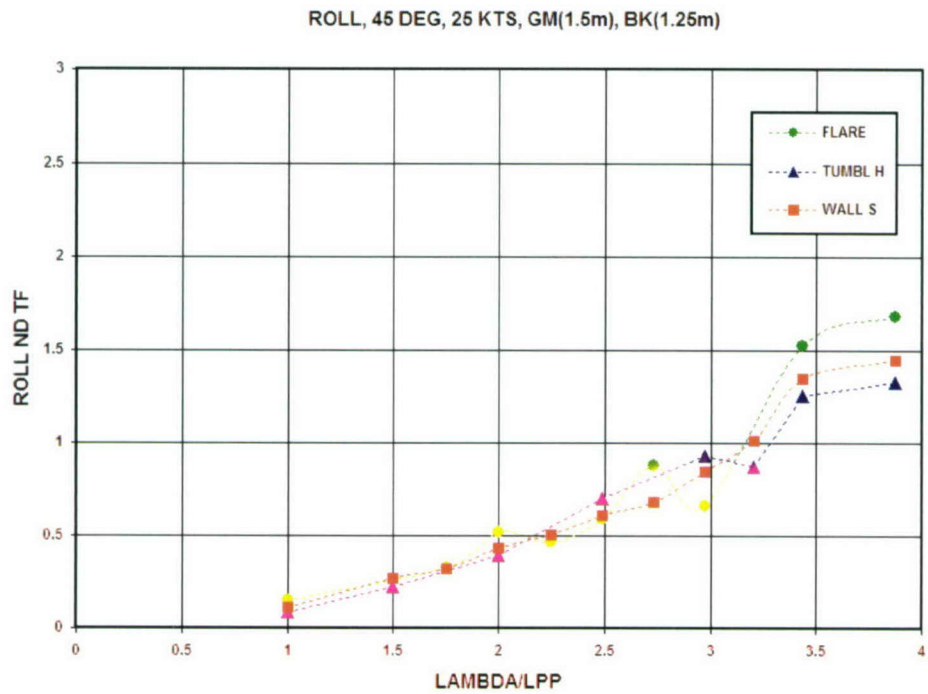


Figure 95. Roll NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=1.5m and BK=1.25m

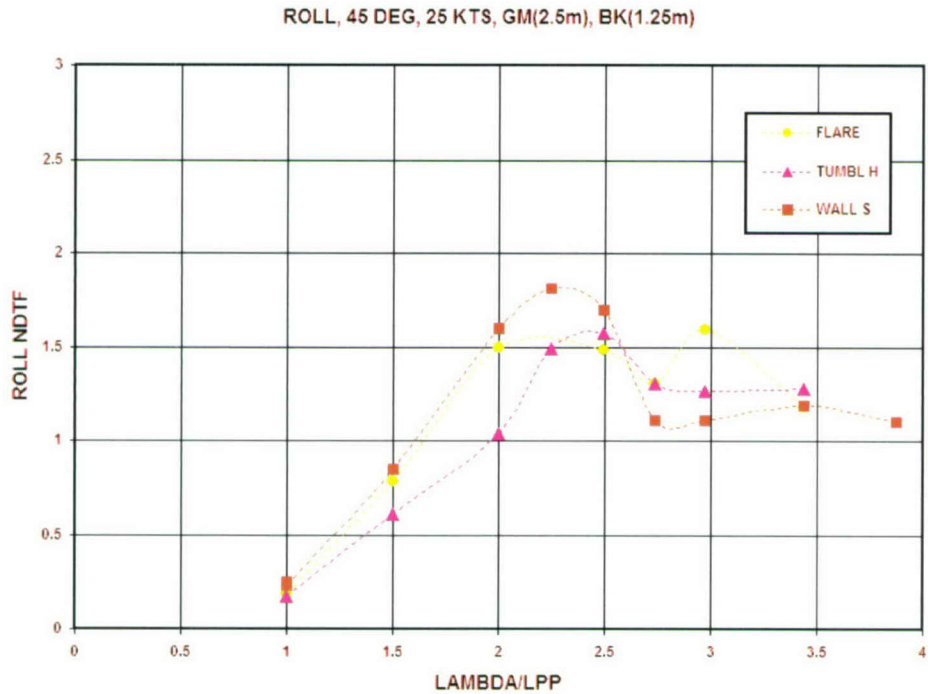


Figure 96. Roll NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=2.5m and BK=1.25m

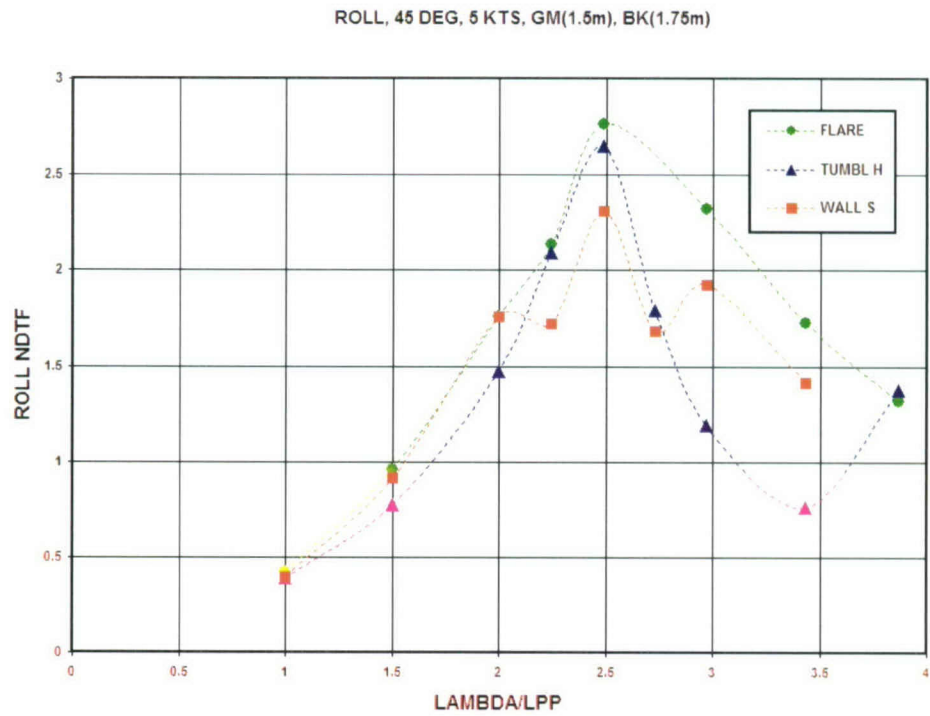


Figure 97. Roll NDTF vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=1.5m and BK=1.75m

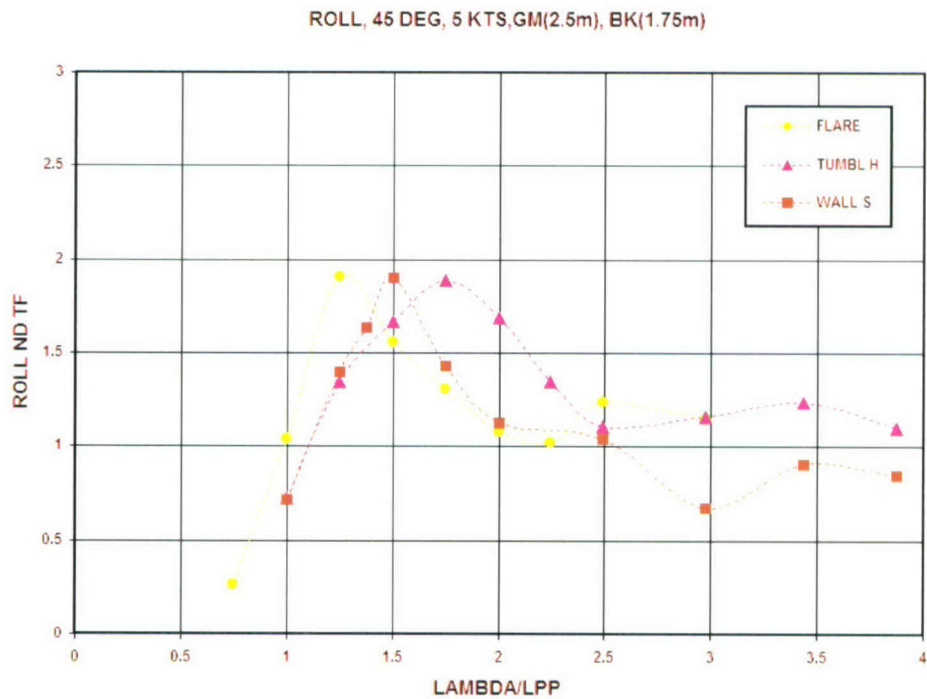


Figure 98. Roll NDTF vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=2.5m and BK=1.75m

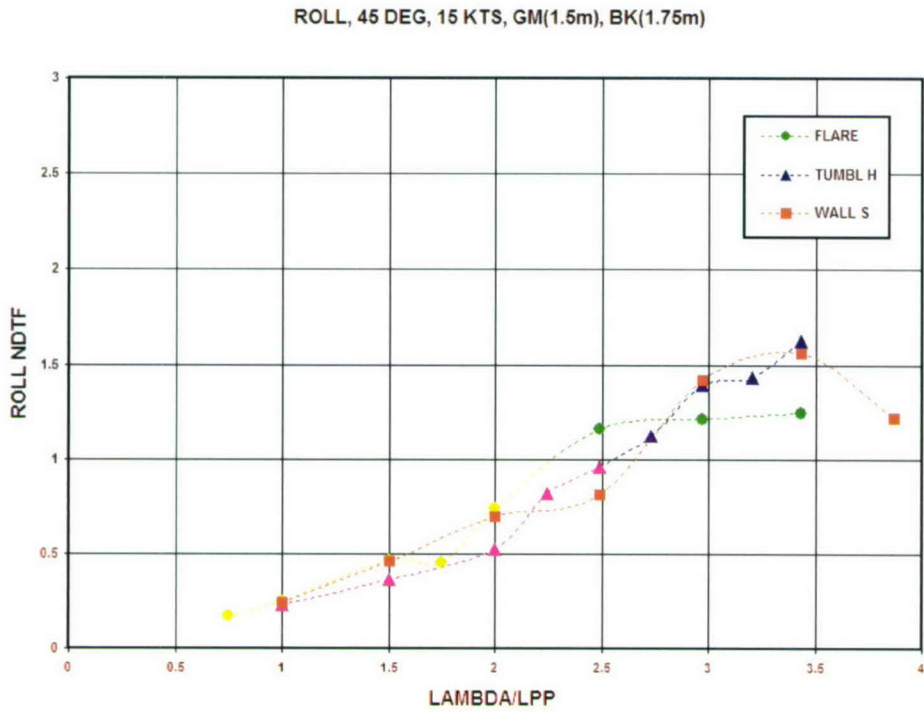


Figure 99. Roll NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=1.5m and BK=1.75m

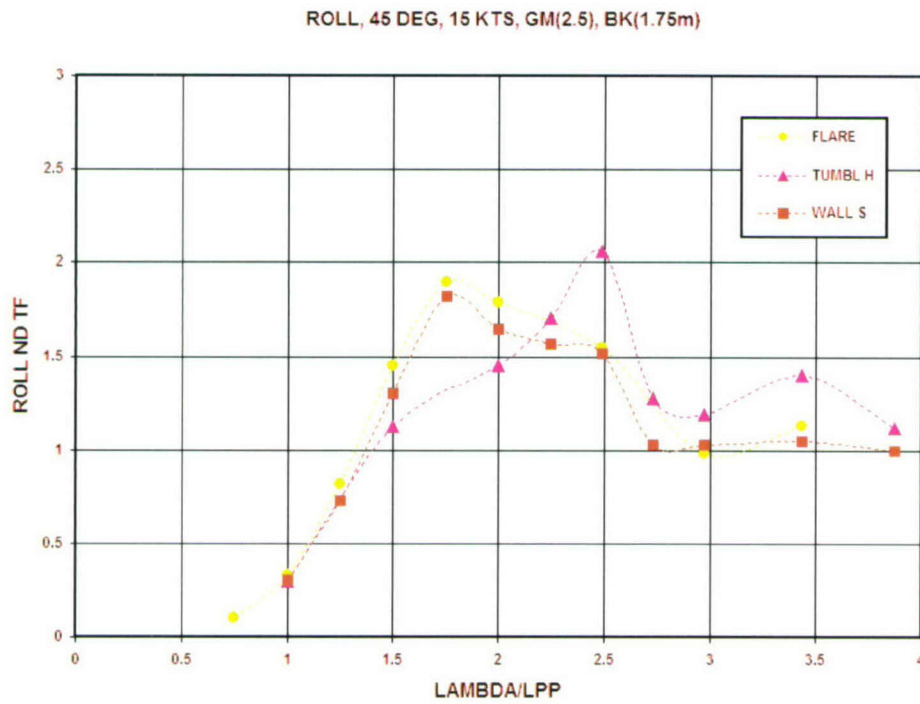


Figure 100. Roll NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=2.5m and BK=1.75m

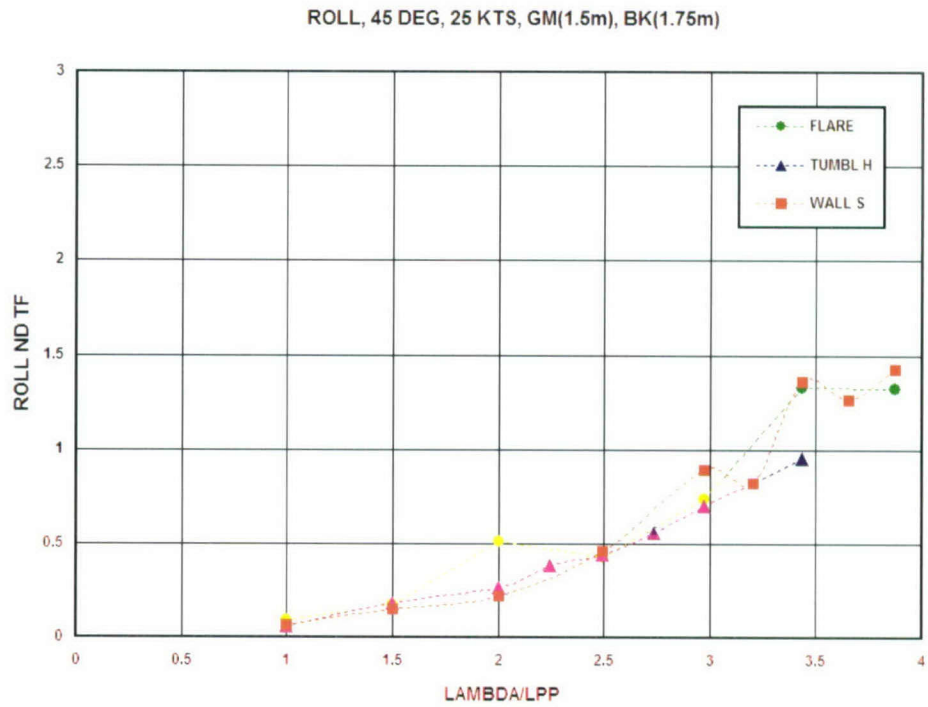


Figure 101. Roll NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=1.5m and BK=1.75m

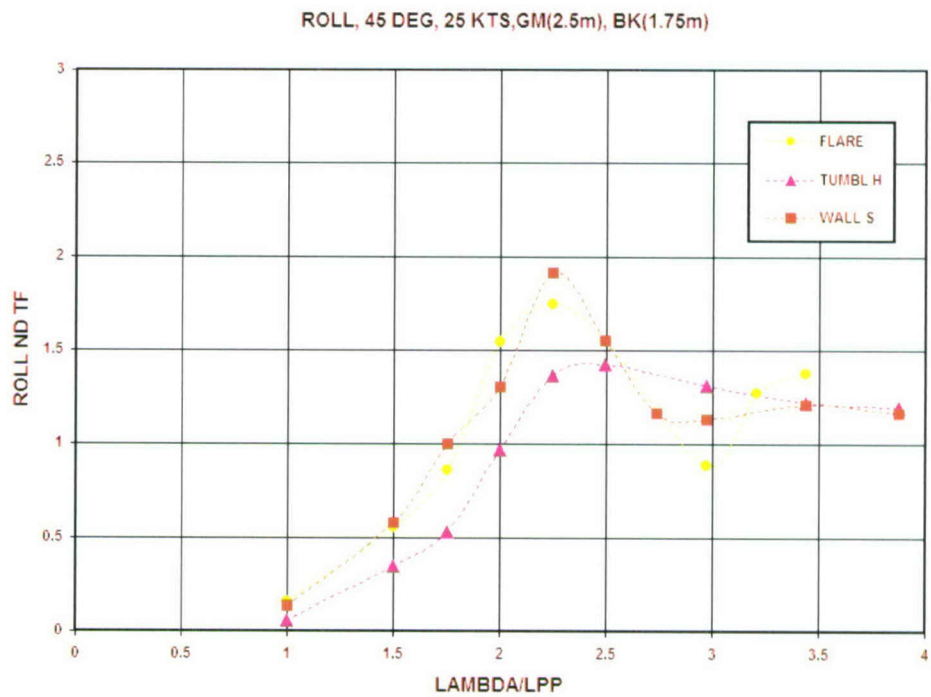


Figure 102. Roll NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=2.5m and BK=1.75m

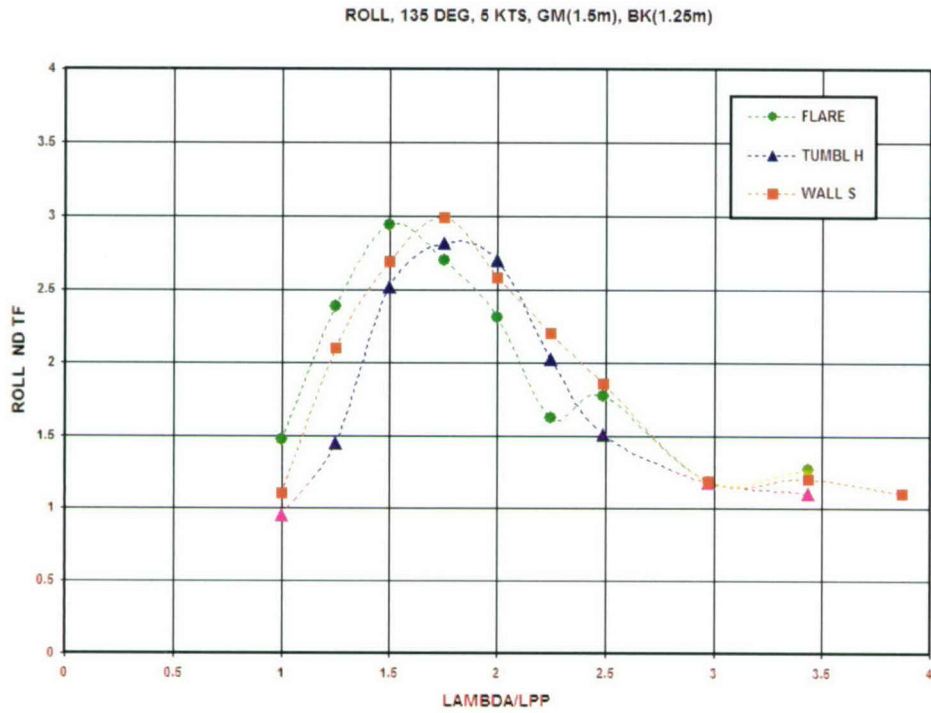


Figure 103. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=1.5m and BK=1.25m

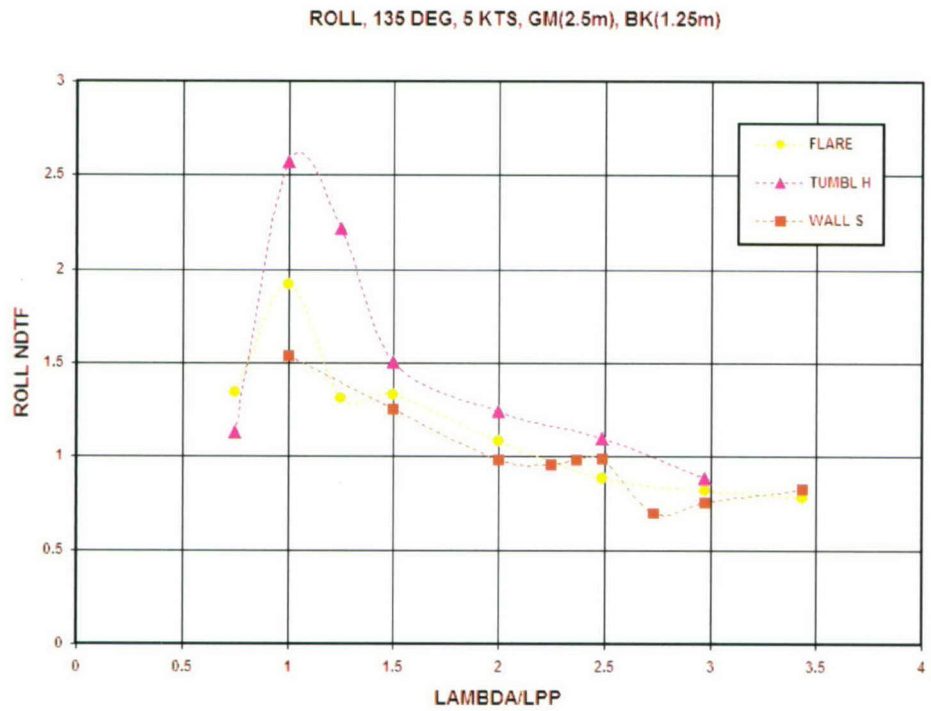


Figure 104. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=2.5m and BK=1.25m

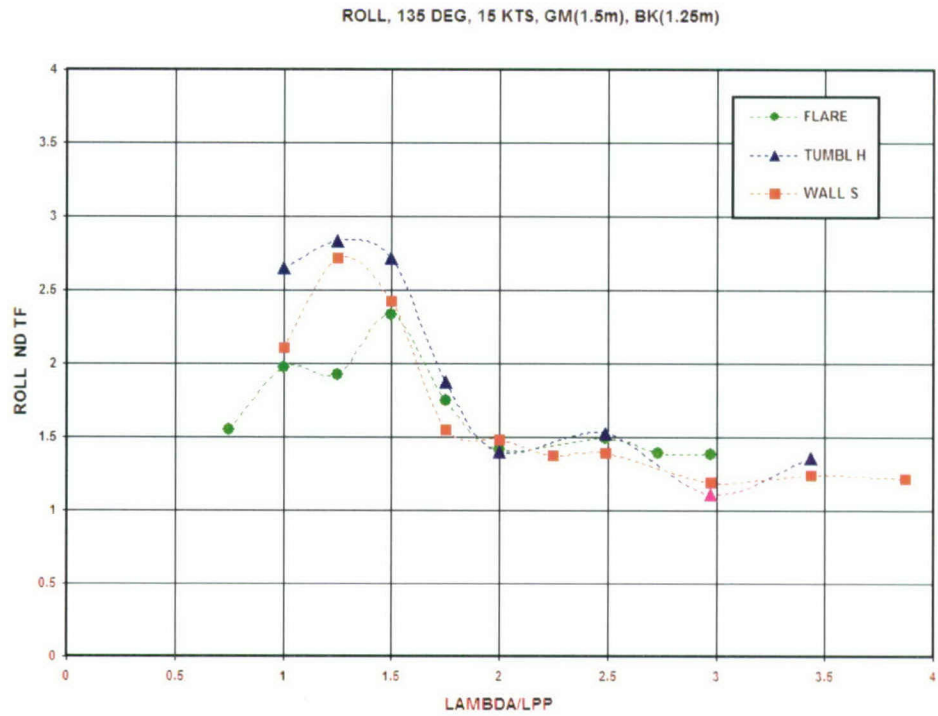


Figure 105. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=1.5m and BK=1.25m

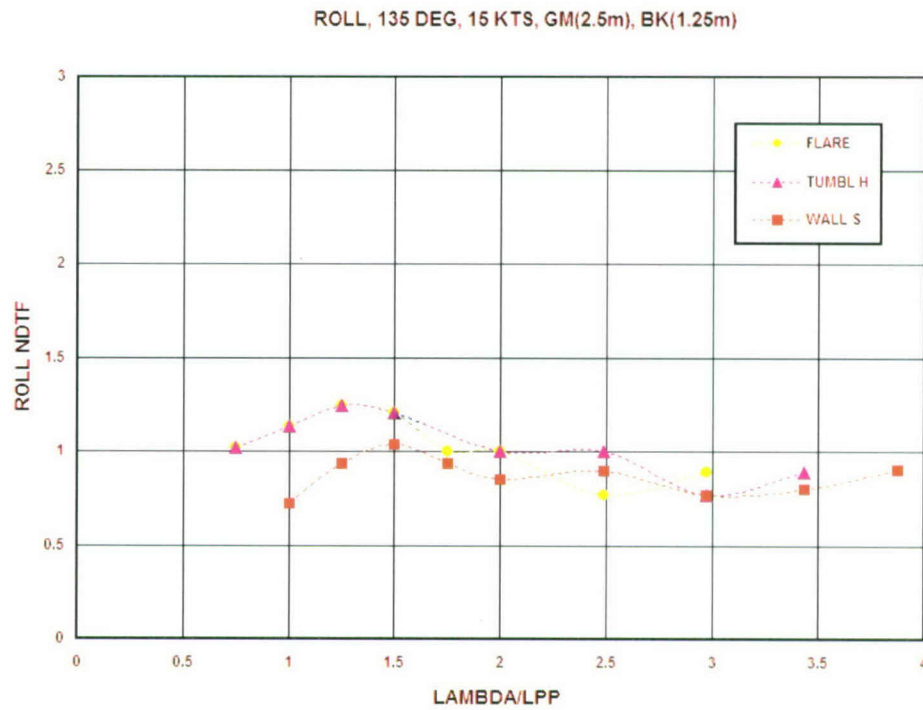


Figure 106. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=2.5m and BK=1.25m

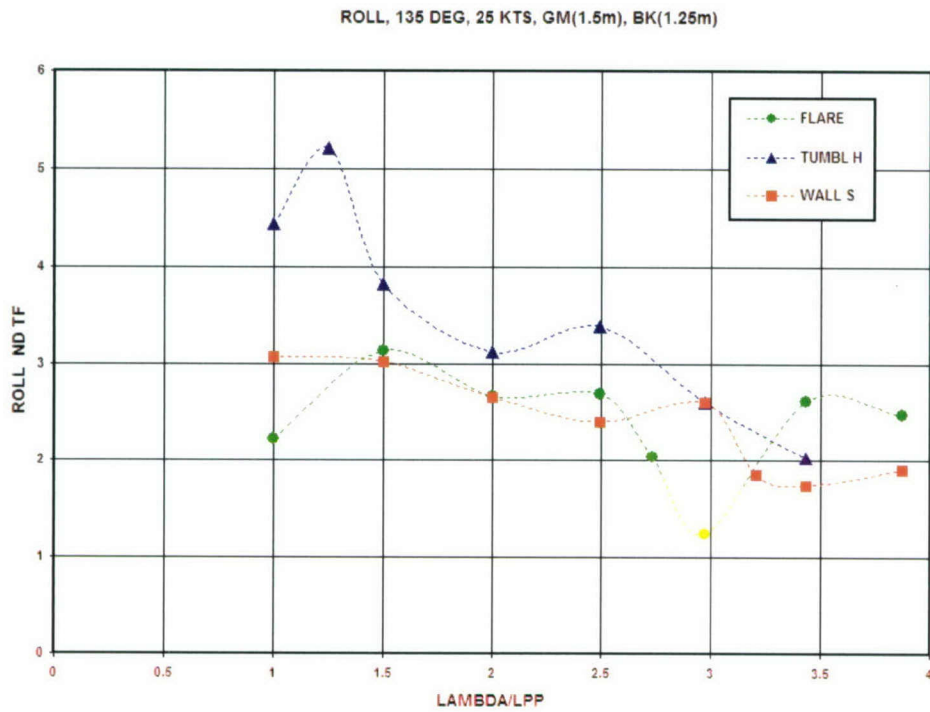


Figure 107. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=1.5m and BK=1.25m

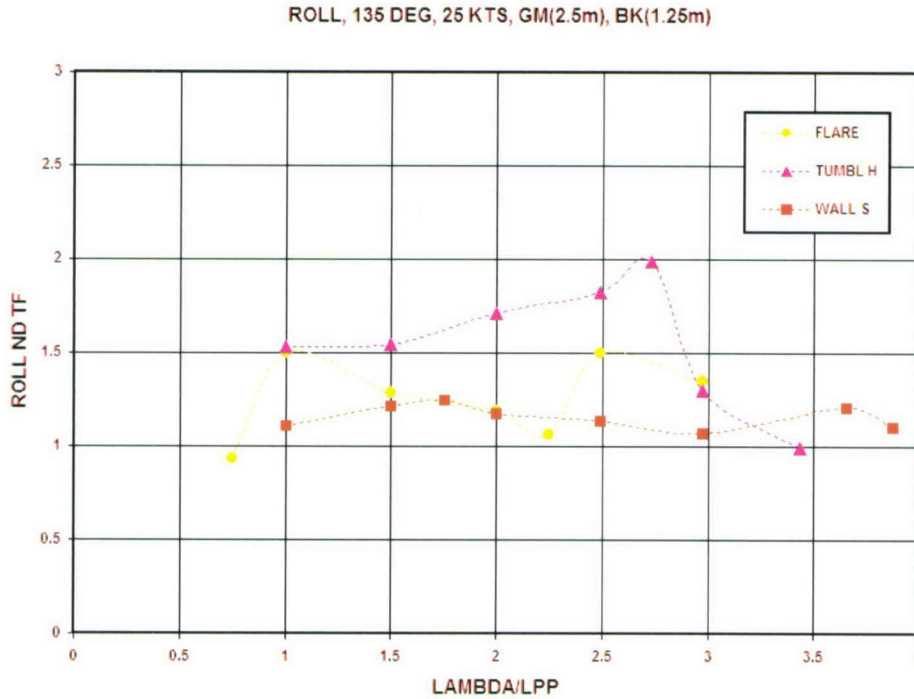


Figure 108. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=2.5m and BK=1.25m

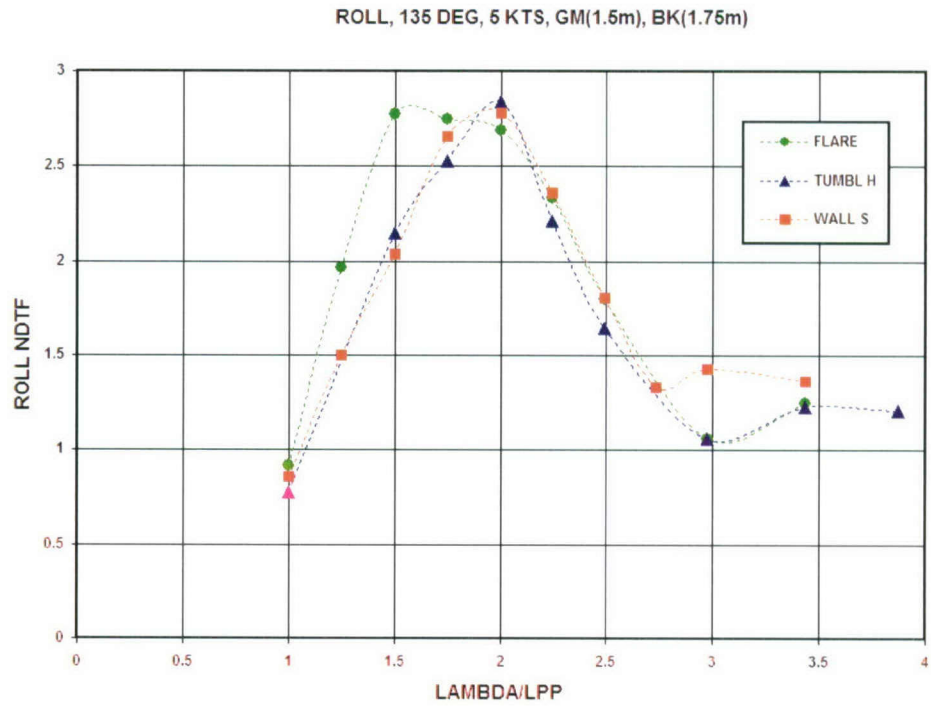


Figure 109. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=1.5m and BK=1.75m

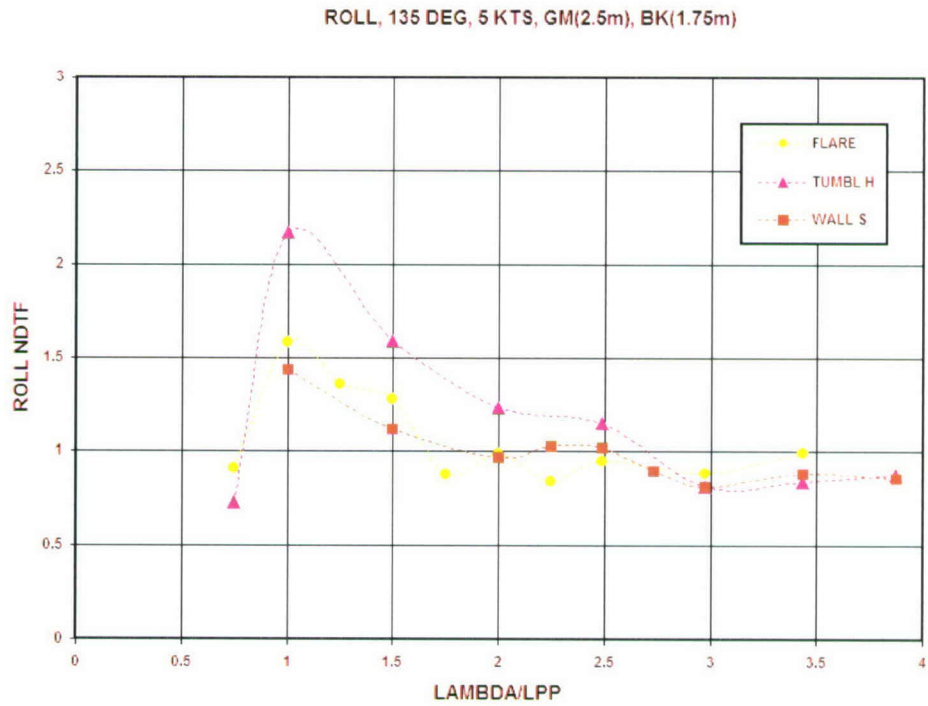


Figure 110. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=2.5m and BK=1.75m

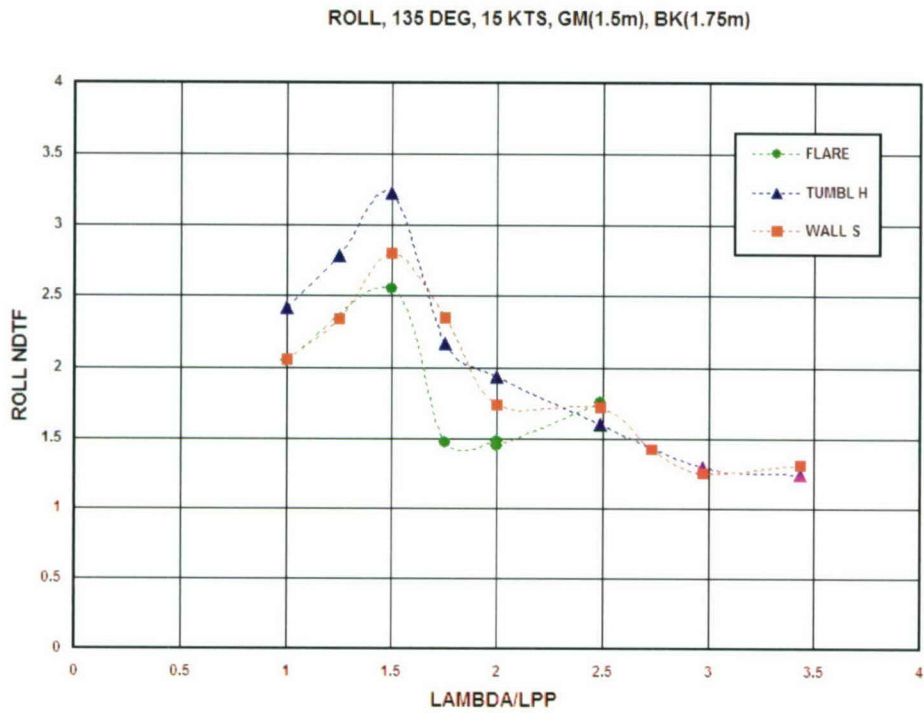


Figure 111. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=1.5m and BK=1.75m

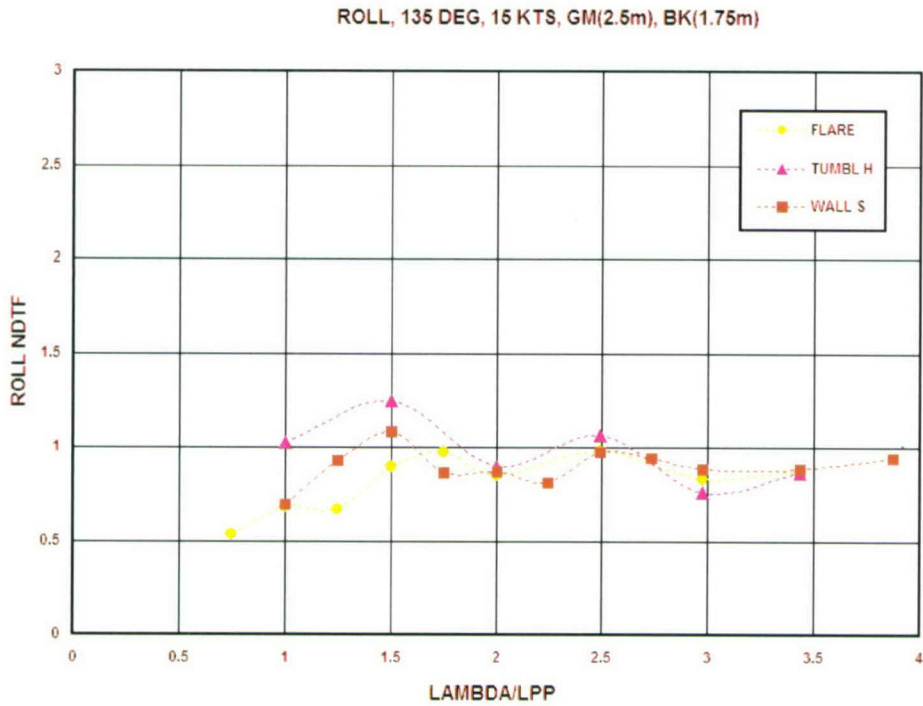


Figure 112. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=2.5m and BK=1.75m

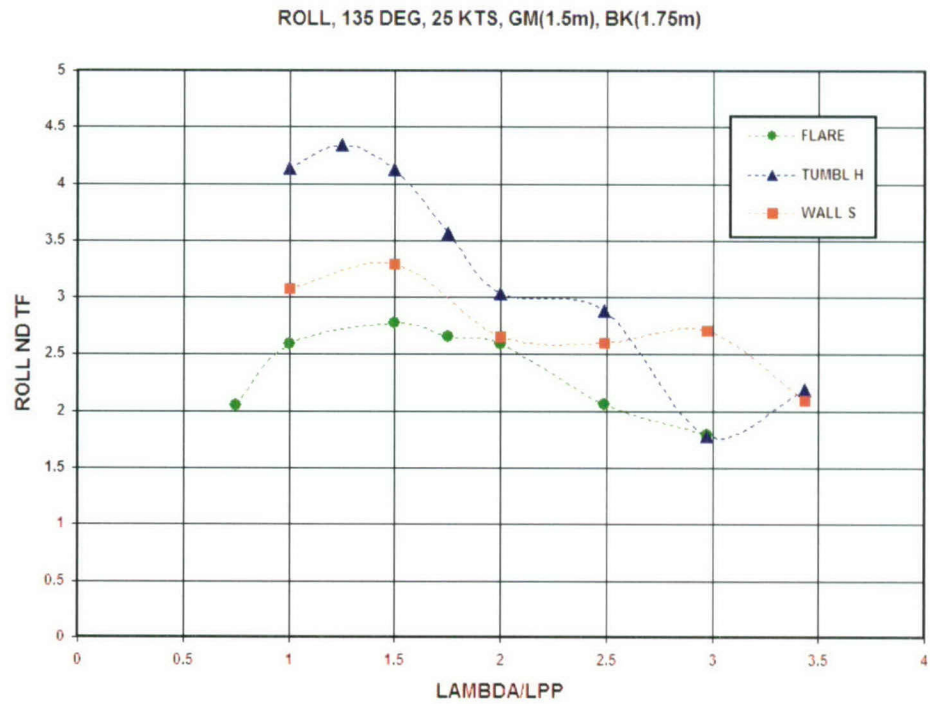


Figure 113. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=1.5m and BK=1.75m

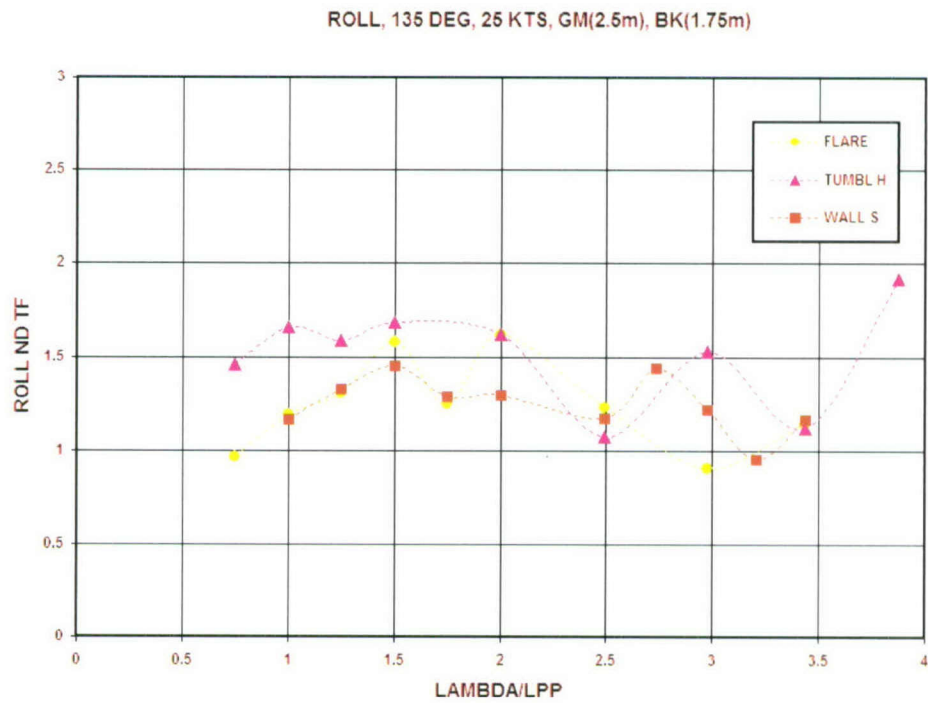


Figure 114. Roll NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=2.5m and BK=1.75m

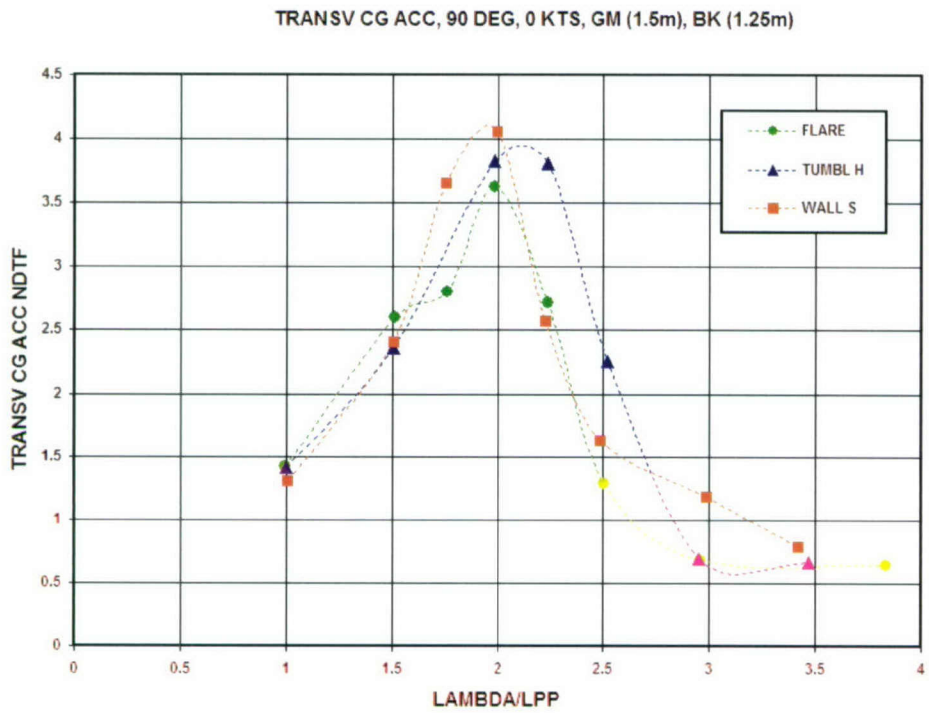


Figure 115. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=1.5m and BK=1.25m

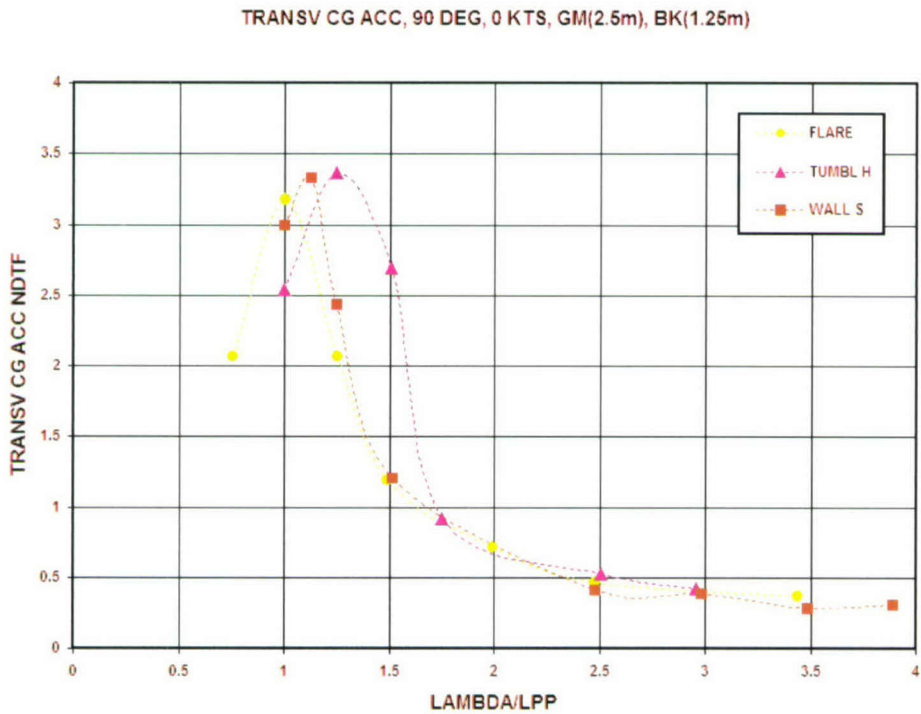


Figure 116. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=2.5m and BK=1.25m

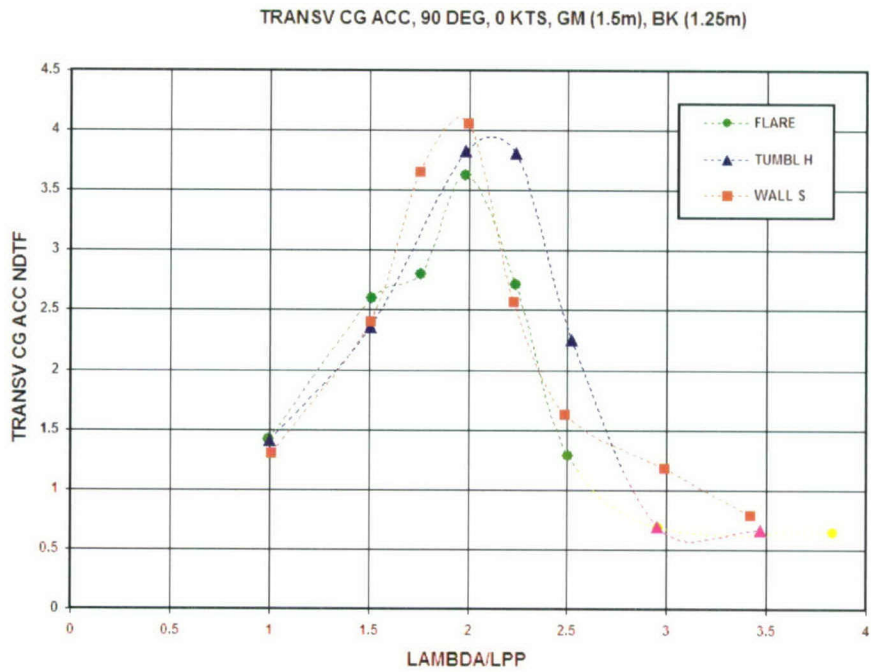


Figure 117. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=1.5m and BK=1.25m

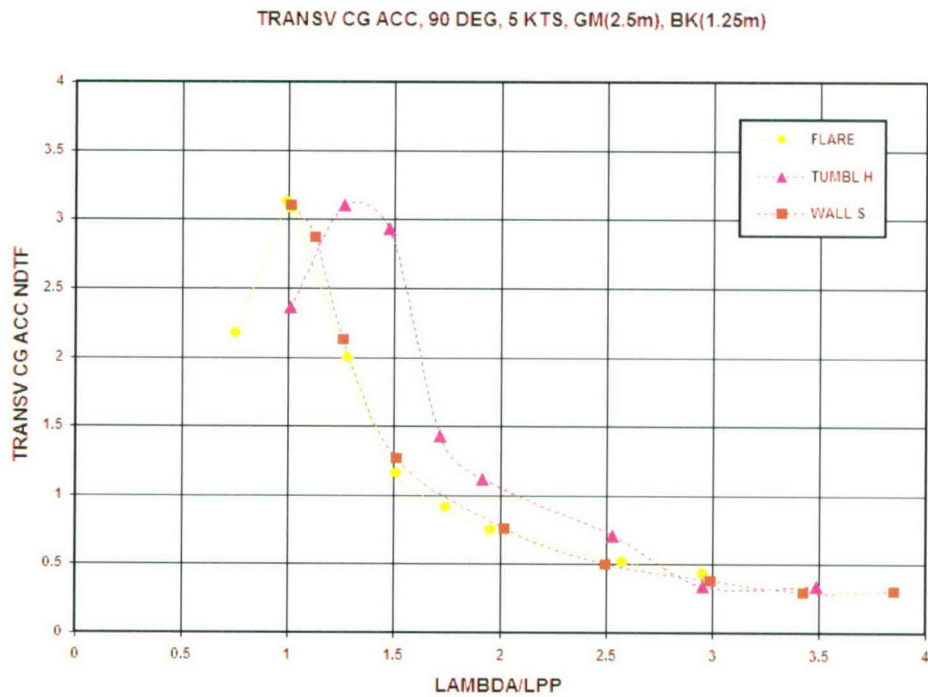


Figure 118. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=2.5m and BK=1.25m

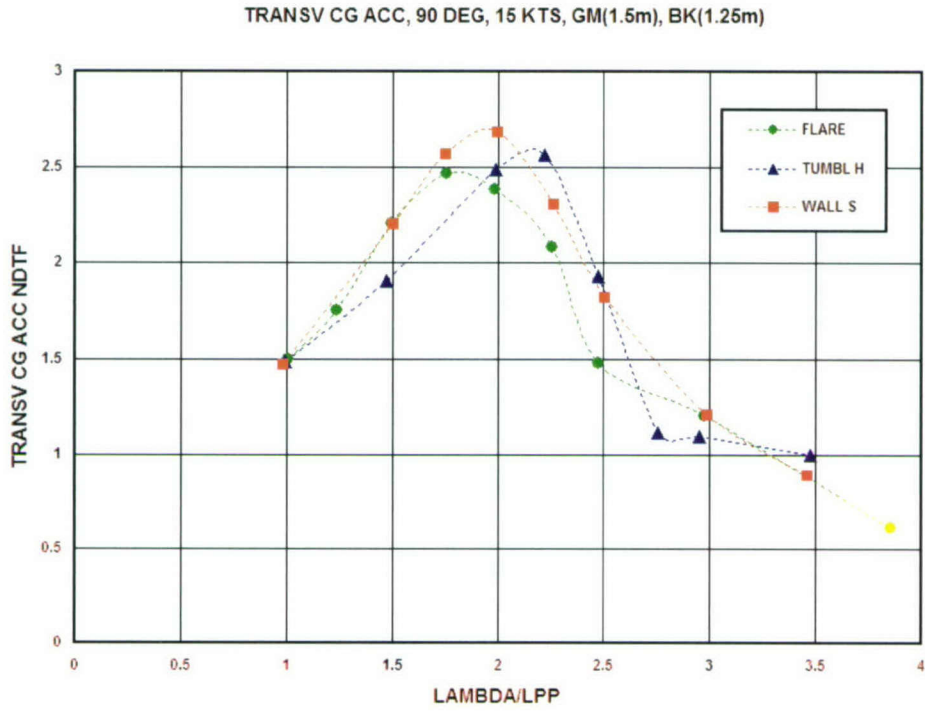


Figure 119. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=1.5m and BK=1.25m

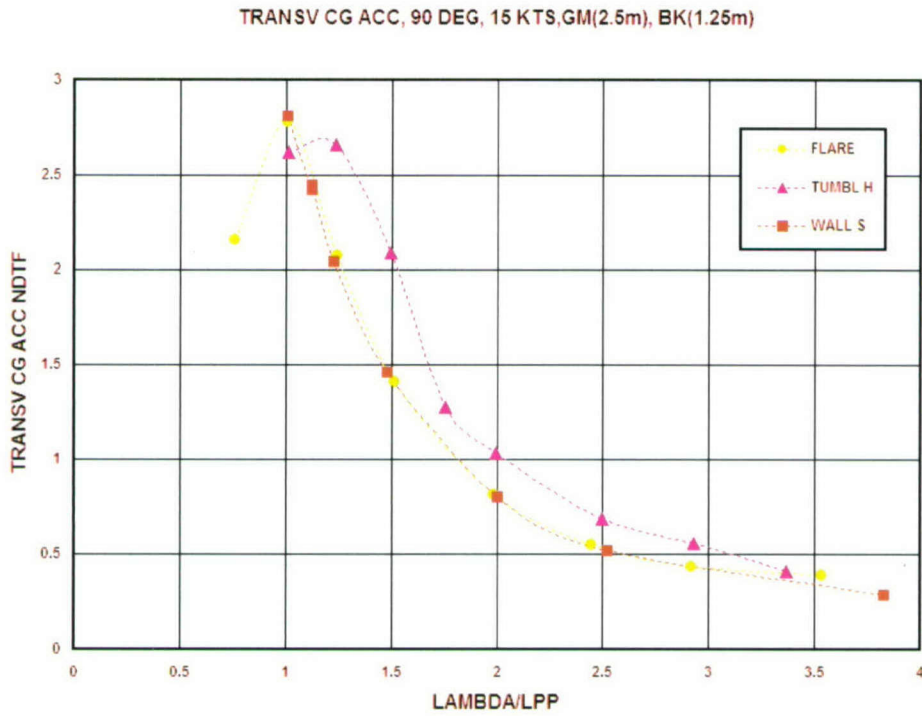


Figure 120. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=2.5m and BK=1.25m

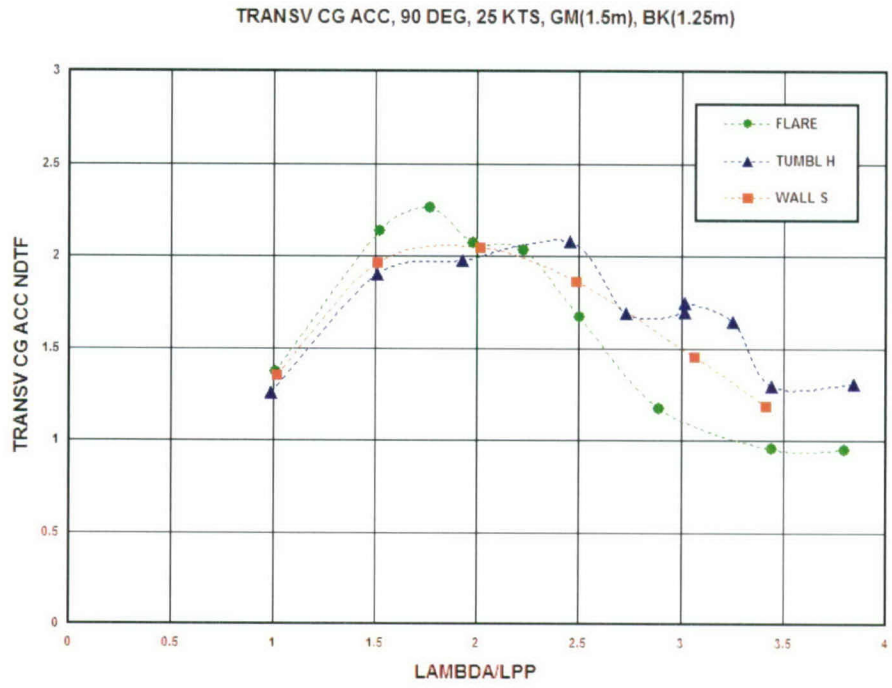


Figure 121. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=1.5m and BK=1.25m

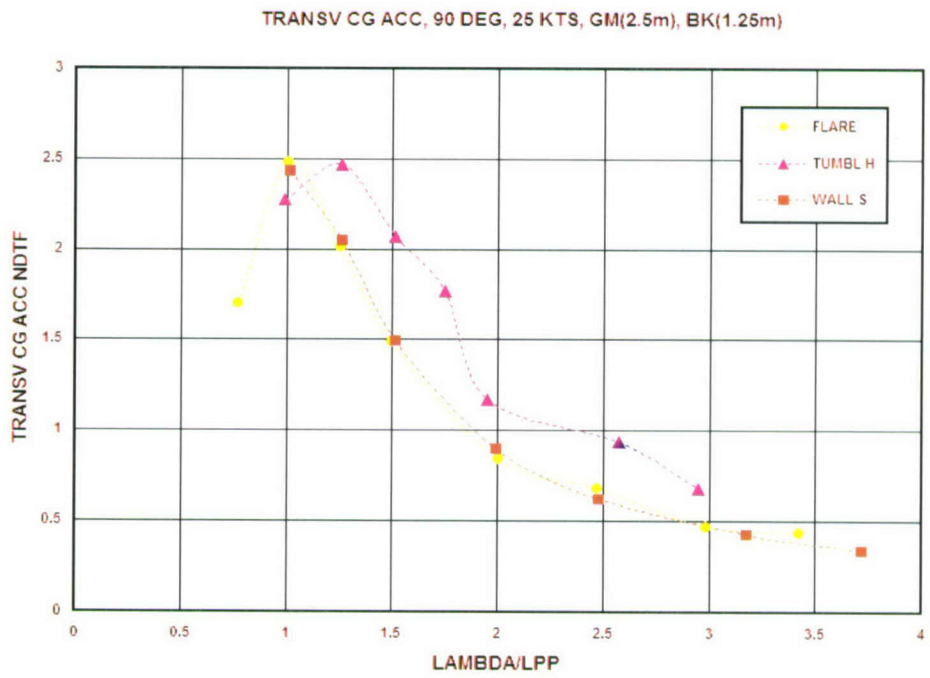


Figure 122. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=2.5m and BK=1.25m

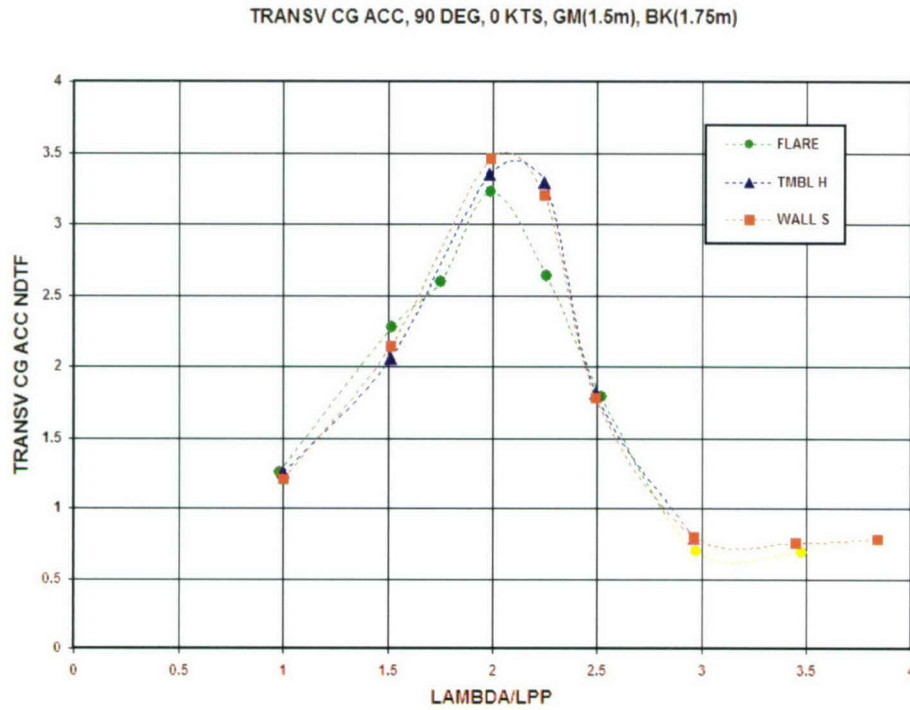


Figure 123. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=1.5m and BK=1.75m

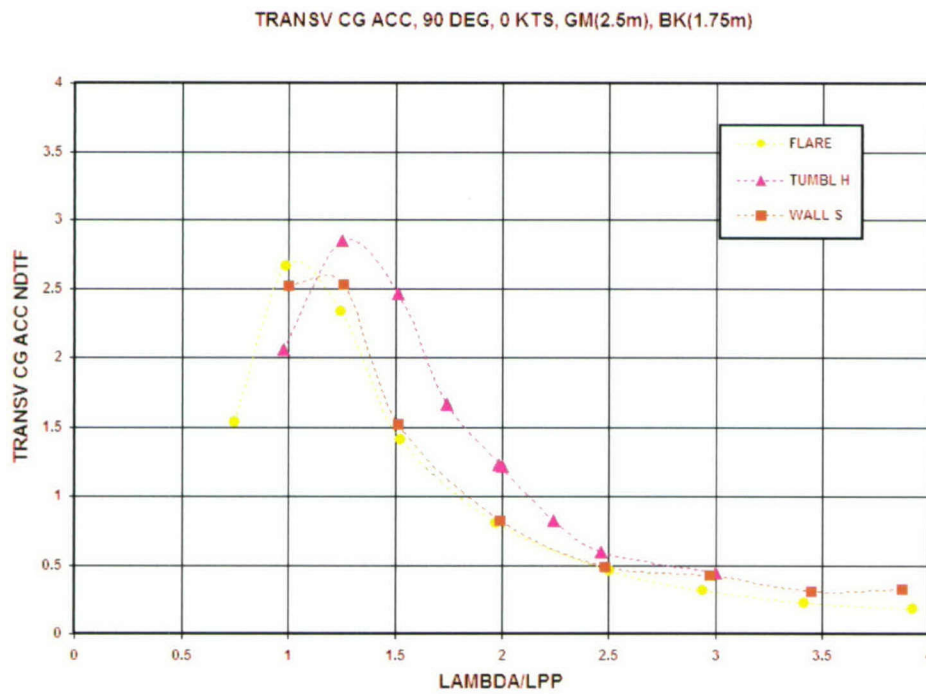


Figure 124. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 0 Kts for GM=2.5m and BK=1.75m

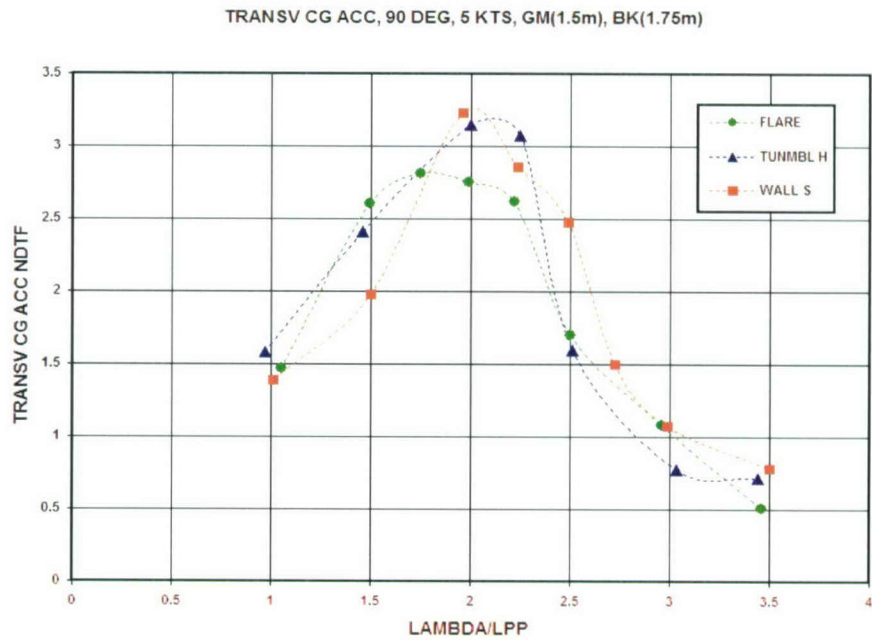


Figure 125. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=1.5m and BK=1.75m

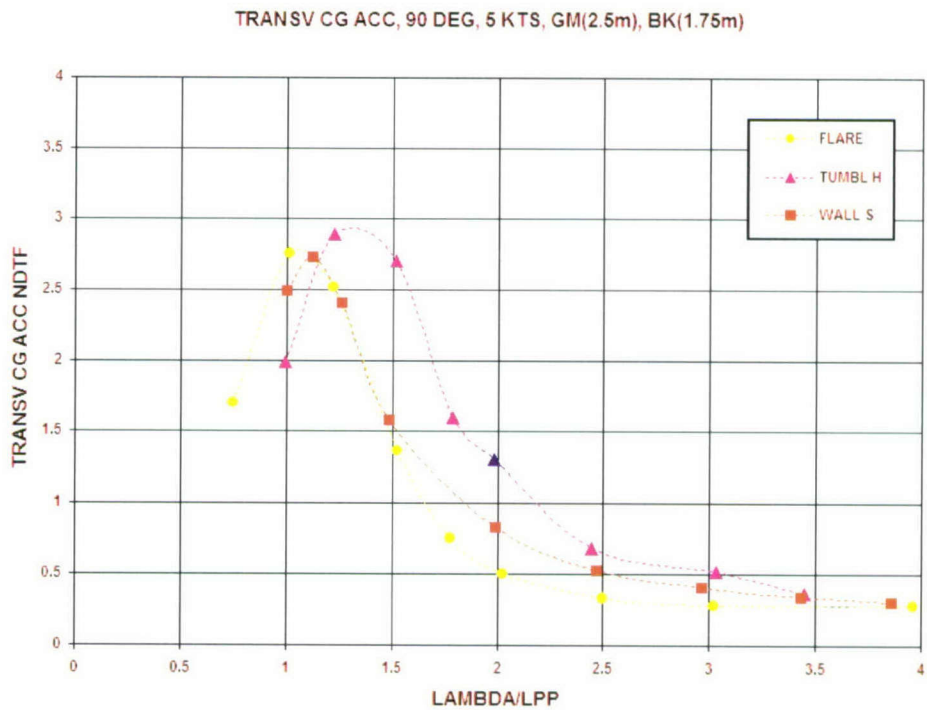


Figure 126. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 5 Kts for GM=2.5m and BK=1.75m

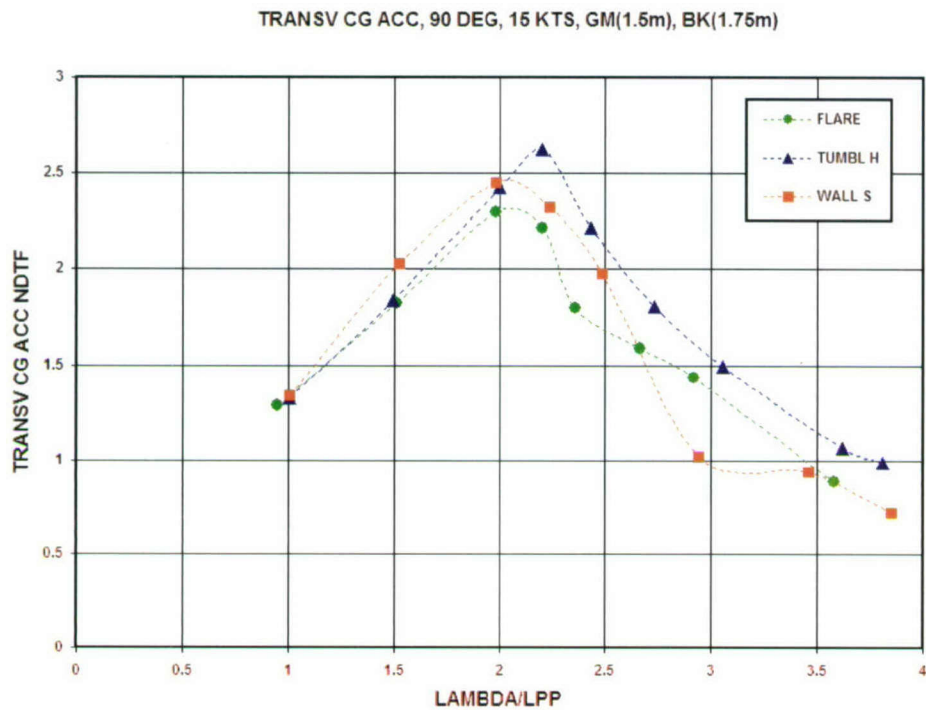


Figure 127. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=1.5m and BK=1.75m

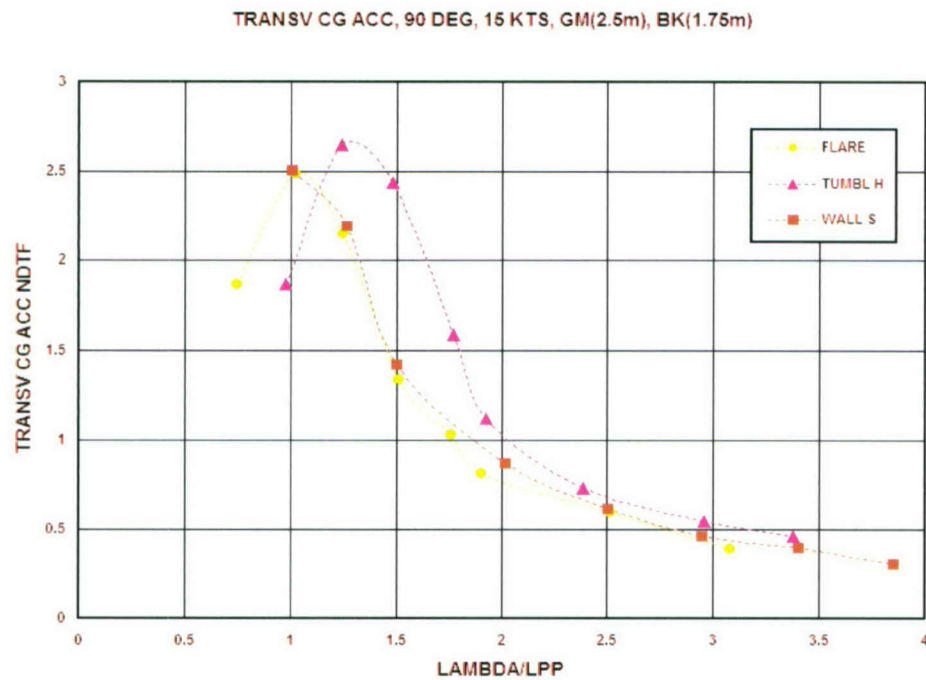


Figure 128. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 15 Kts for GM=2.5m and BK=1.75m

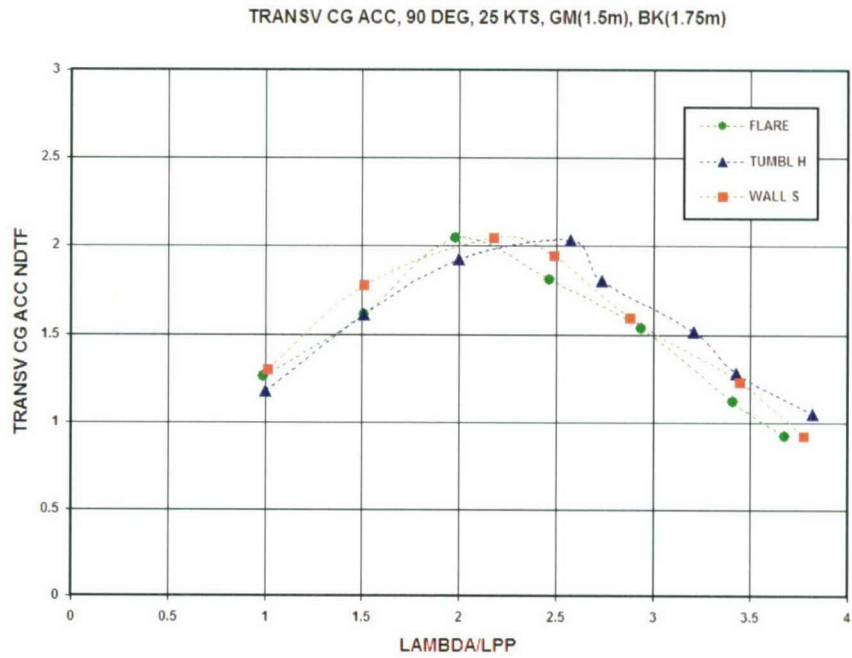


Figure 129. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=1.5m and BK=1.75m

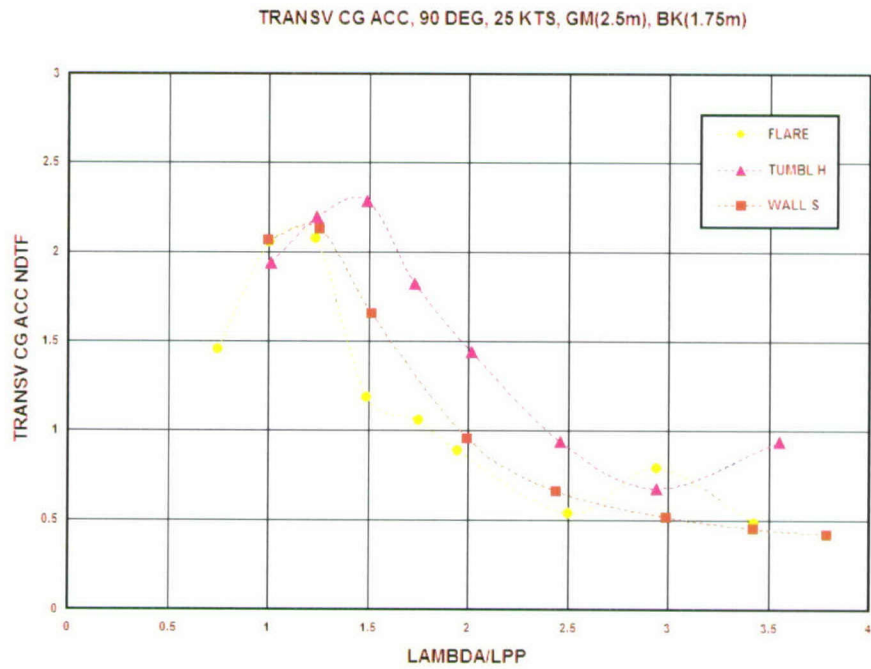


Figure 130. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Beam Waves at 25 Kts for GM=2.5m and BK=1.75m

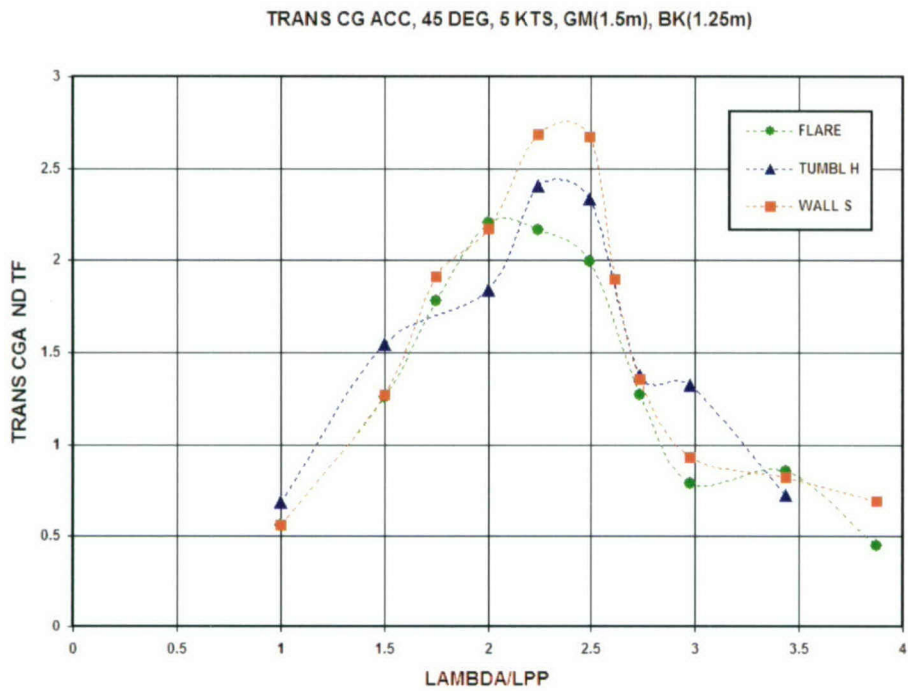
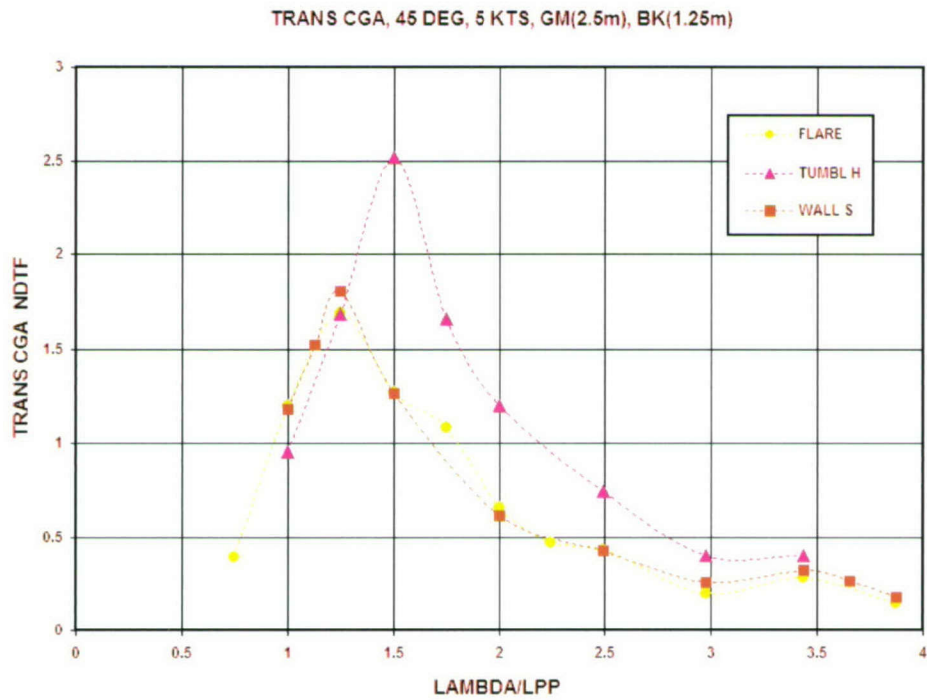


Figure 131. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=1.5m and



BK=1.25m

Figure 132. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=2.5m and BK=1.25m

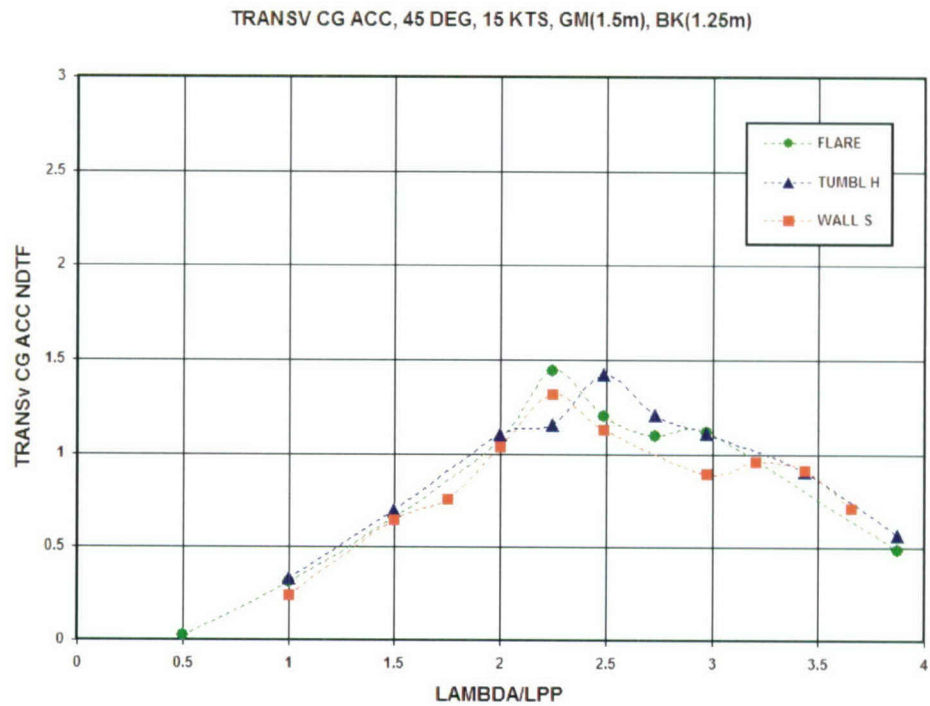


Figure 133. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=1.5m and BK=1.25m

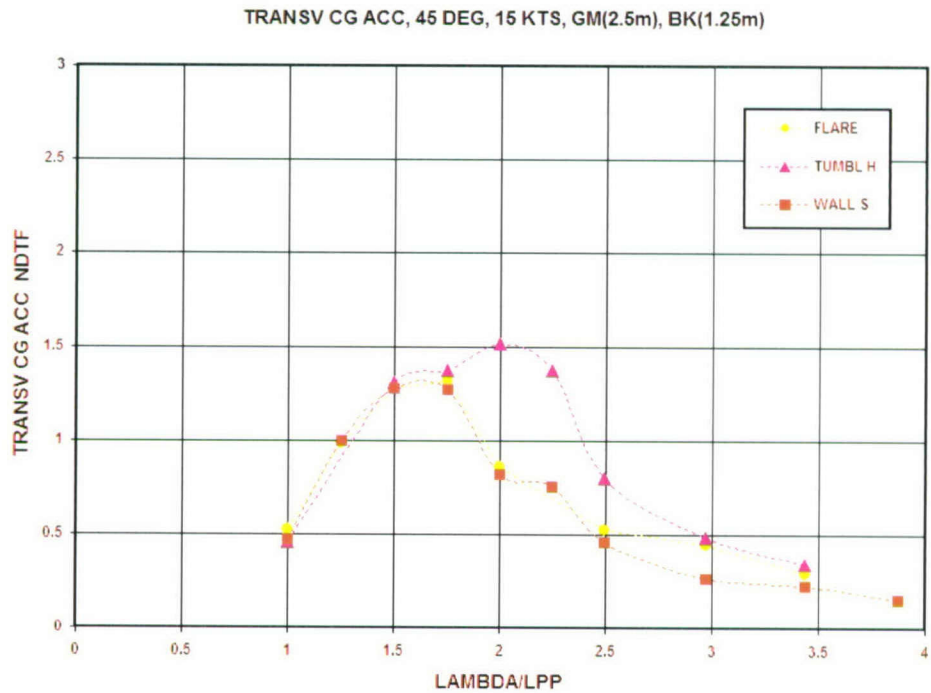


Figure 134. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=2.5m and BK=1.25m

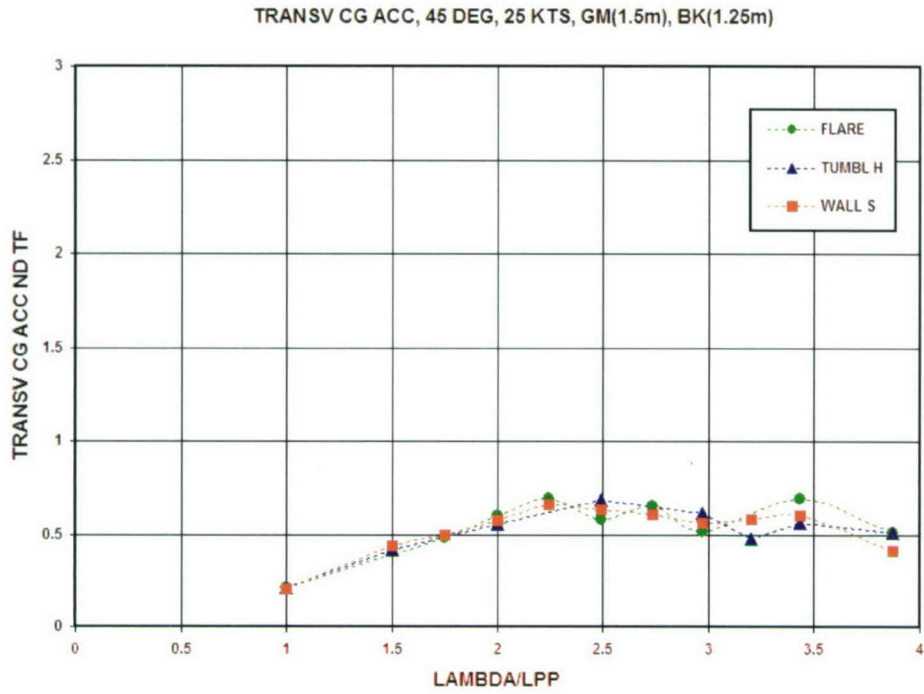


Figure 135. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=1.5m and BK=1.25m

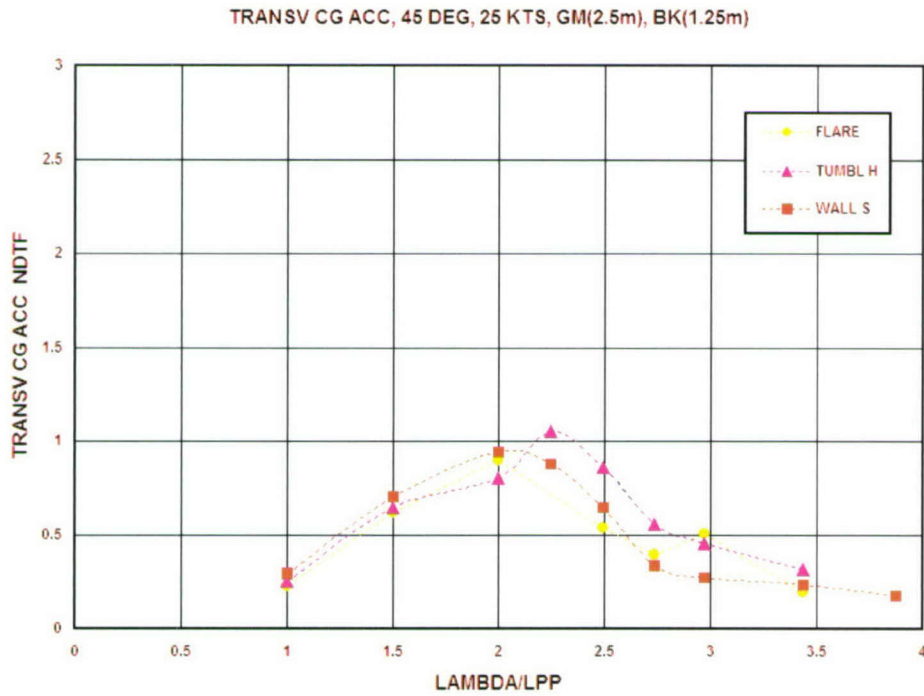


Figure 136. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=2.5m and BK=1.25m

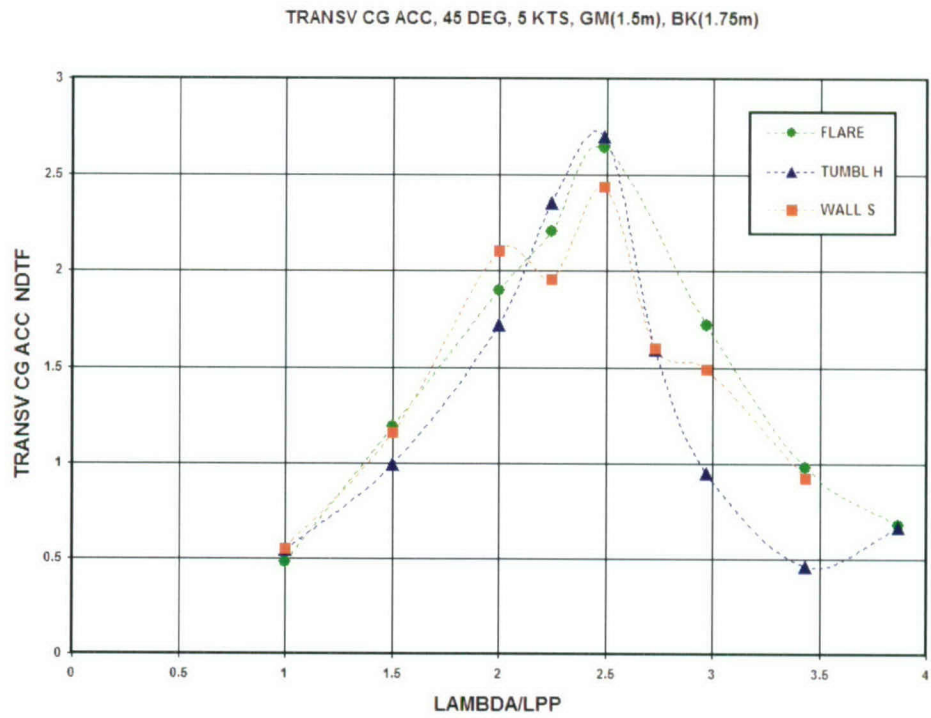


Figure 137. CG Transverse Acceleration vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=1.5m and BK=1.75m

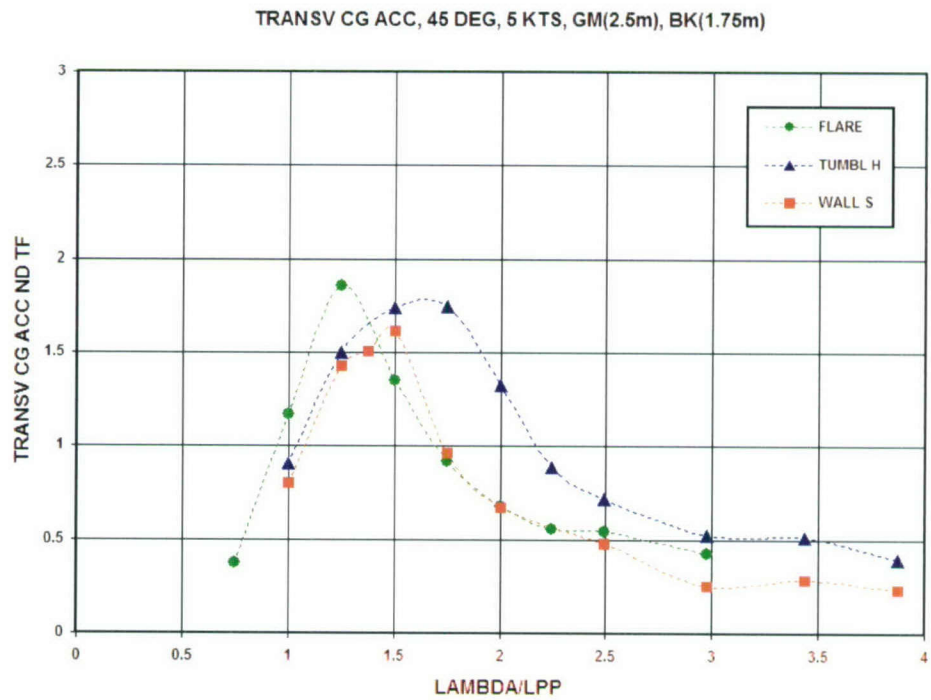


Figure 138. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Bow Waves at 5 Kts for GM=2.5m and BK=1.75m

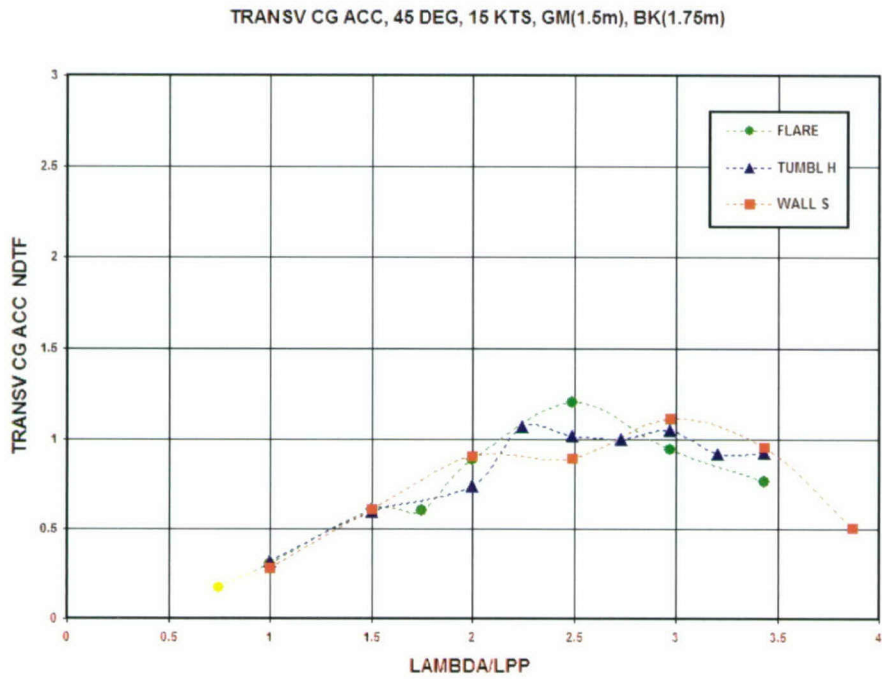


Figure 139. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=1.5m and BK=1.75m

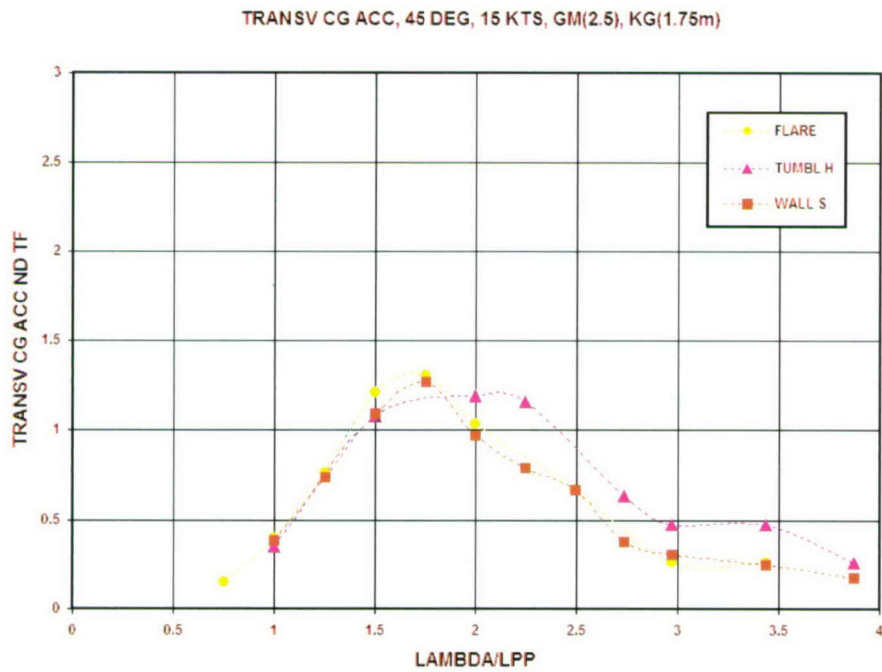


Figure 140. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Bow Waves at 15 Kts for GM=2.5m and BK=1.75m

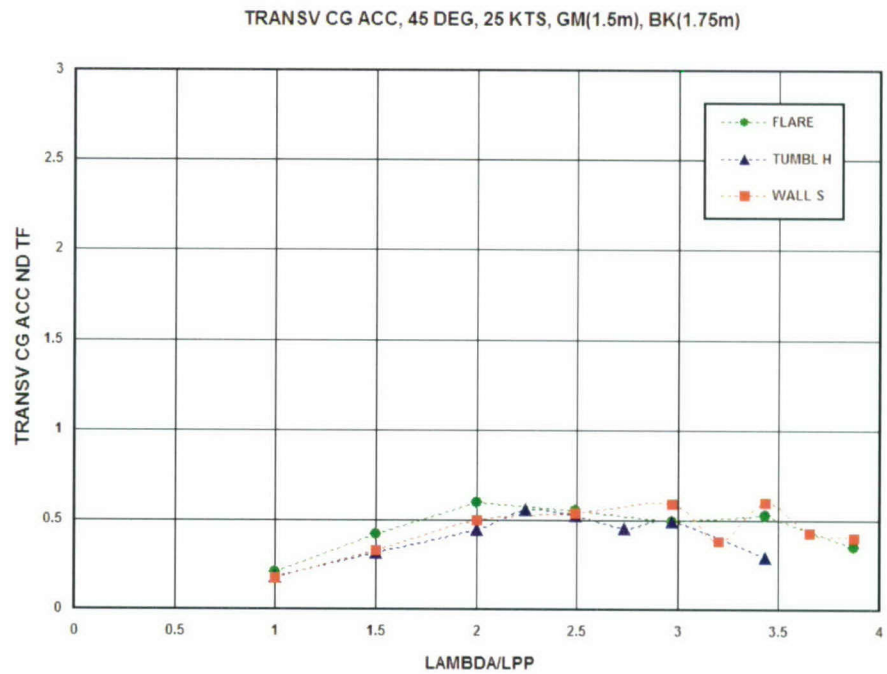


Figure 141. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=1.5m and BK=1.75m

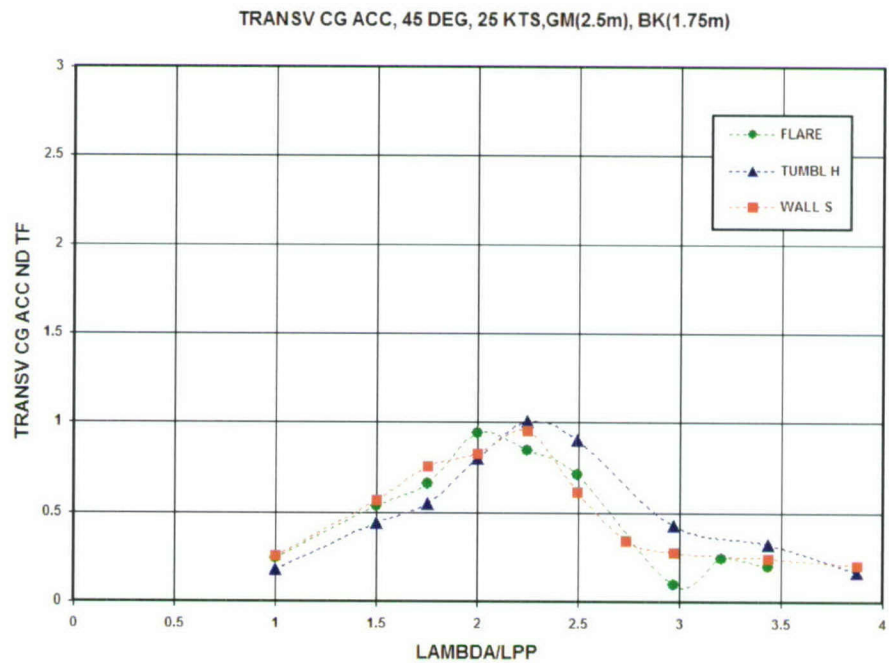


Figure 142. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Bow Waves at 25 Kts for GM=2.5m and BK=1.75m

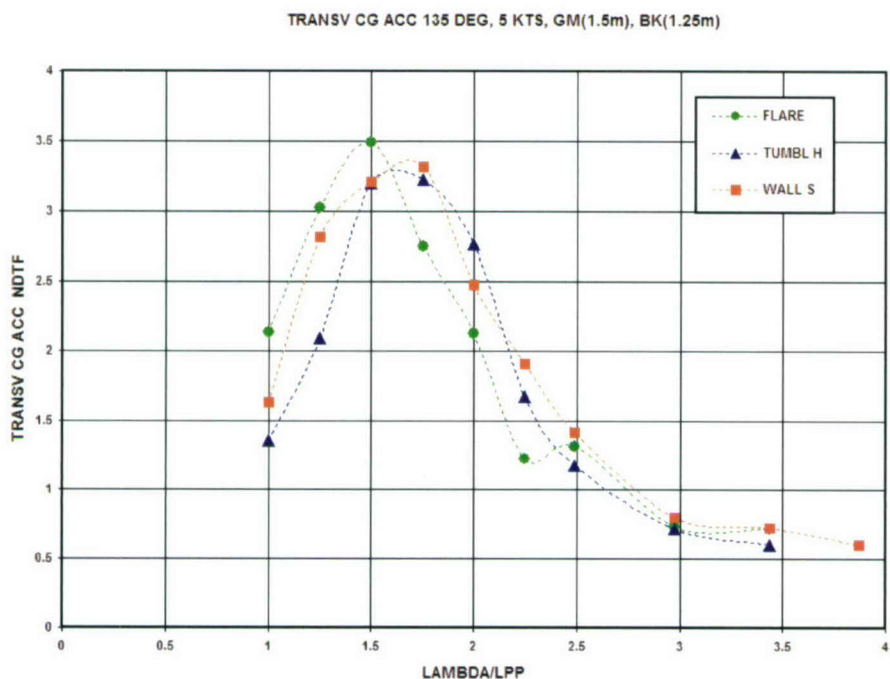


Figure 143. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=1.5m and BK=1.25m

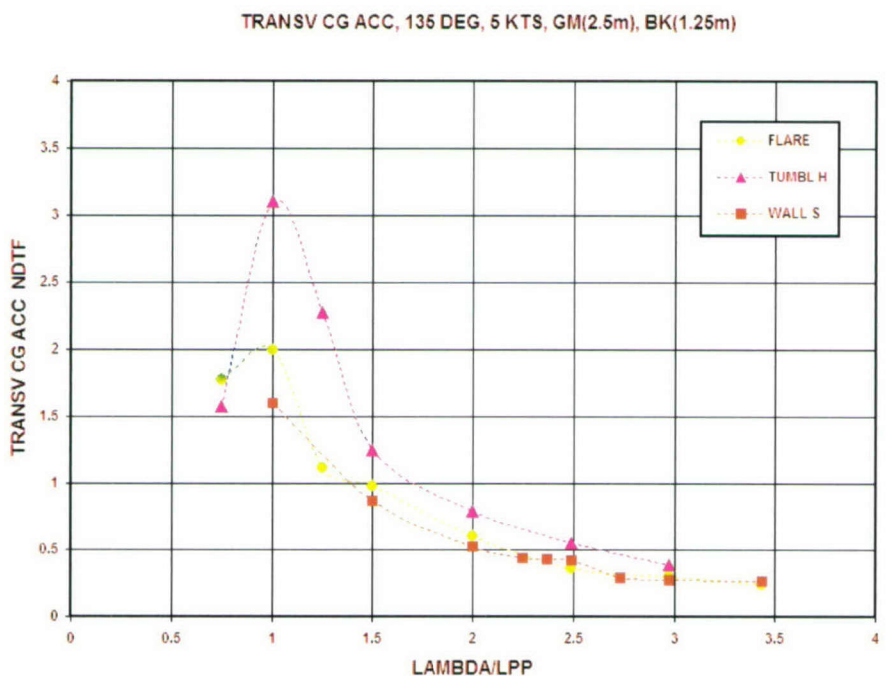


Figure 144. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=2.5m and BK=1.25m

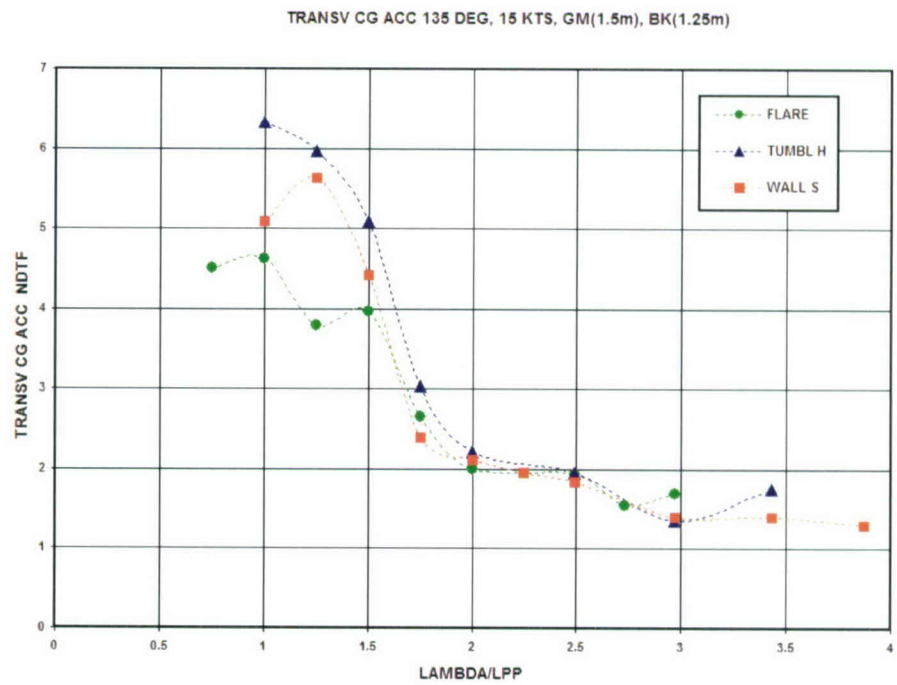


Figure 145. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=1.5m and BK=1.25m

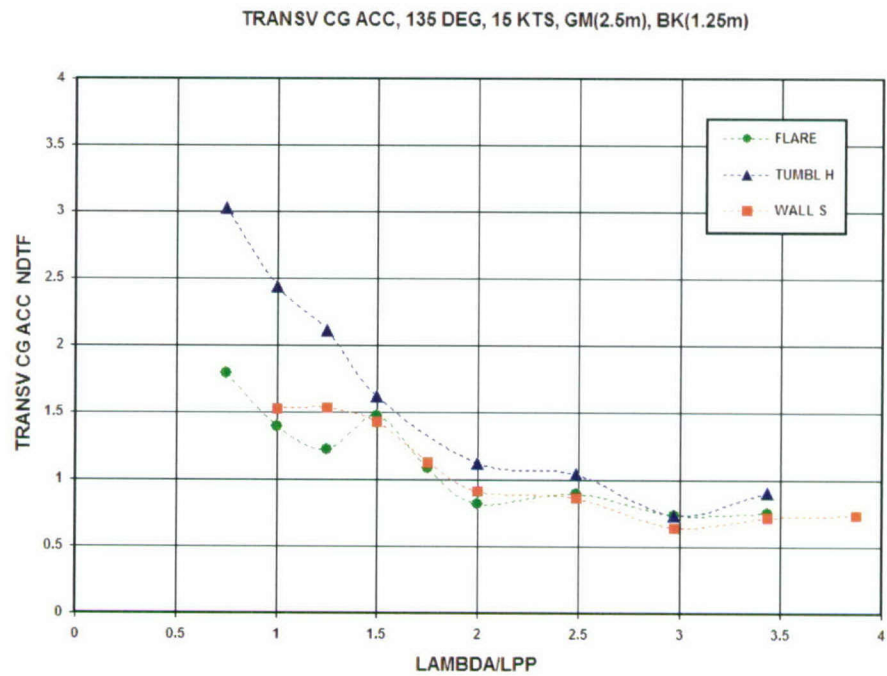


Figure 146. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=2.5m and BK=1.25m

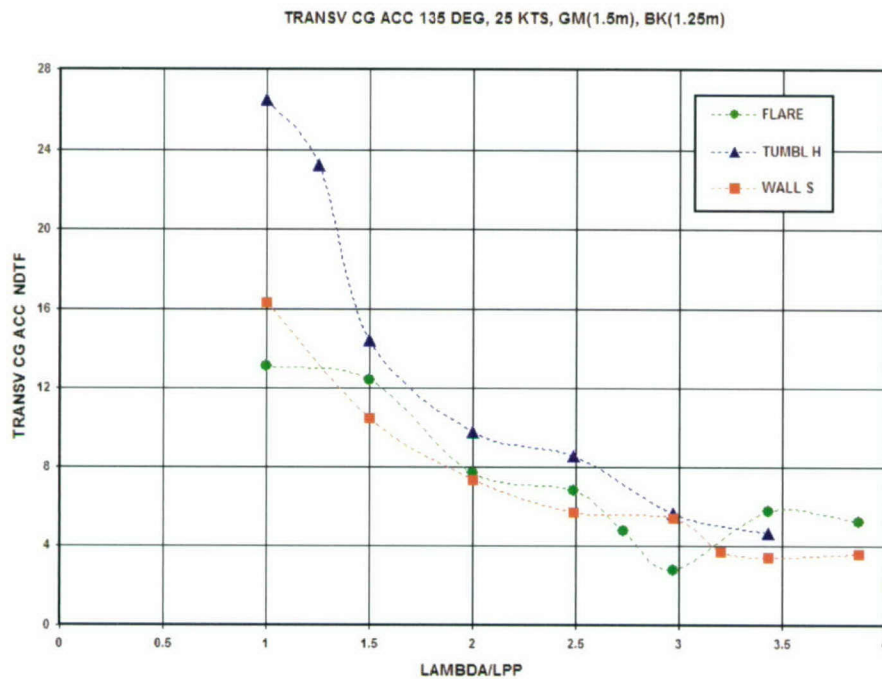


Figure 147. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=1.5m and BK=1.25m

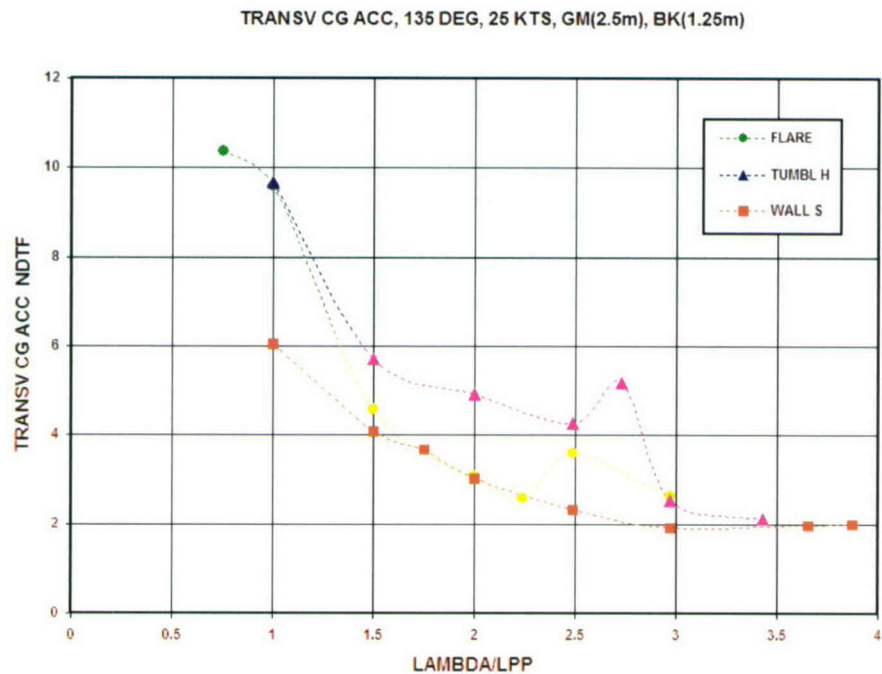


Figure 148. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=2.5m and BK=1.25m

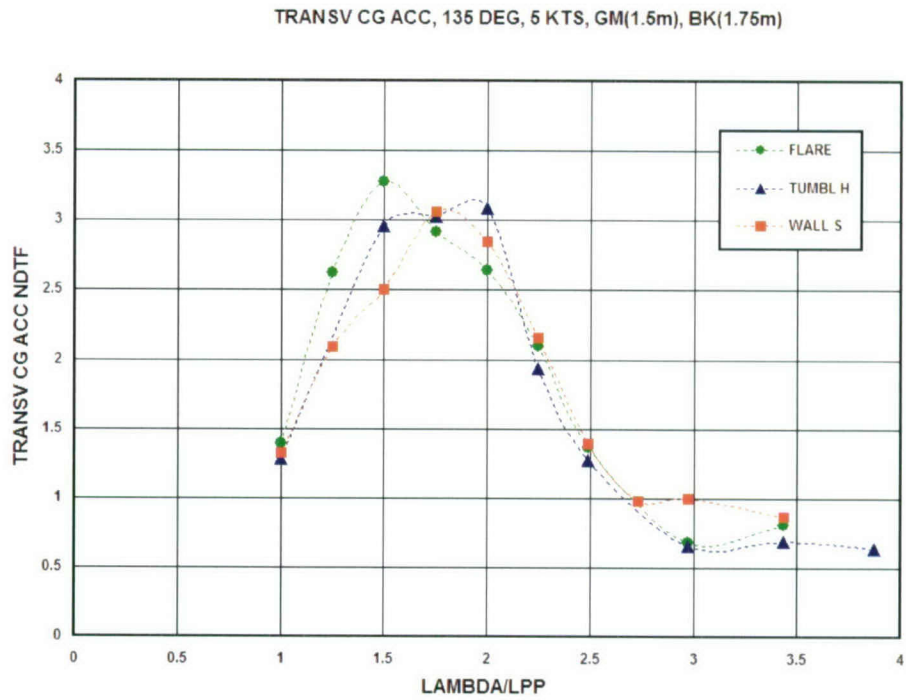


Figure 149. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=1.5m and BK=1.75m

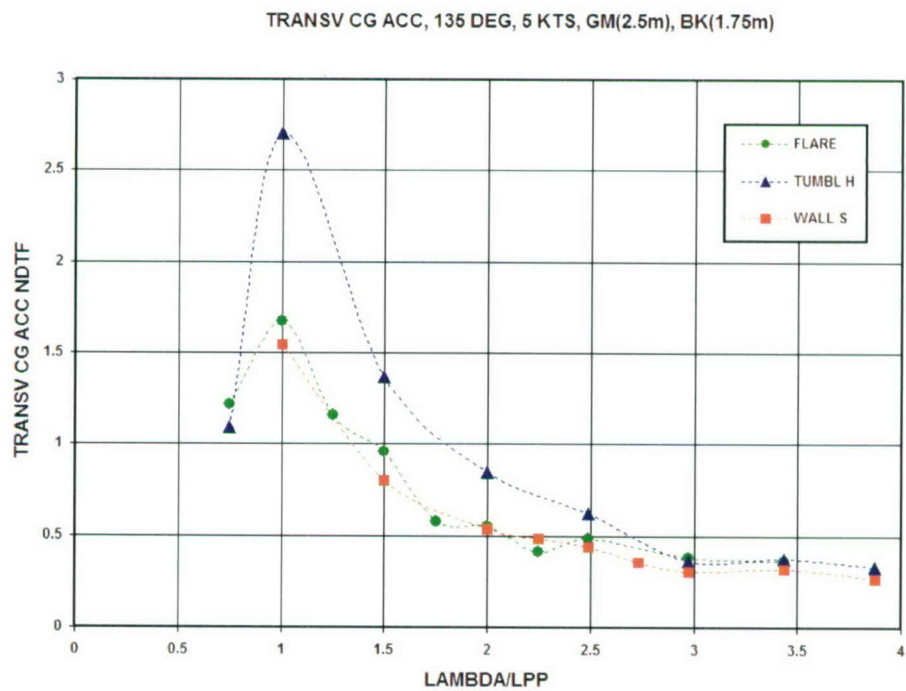


Figure 150. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 5 Kts for GM=2.5m and BK=1.75m

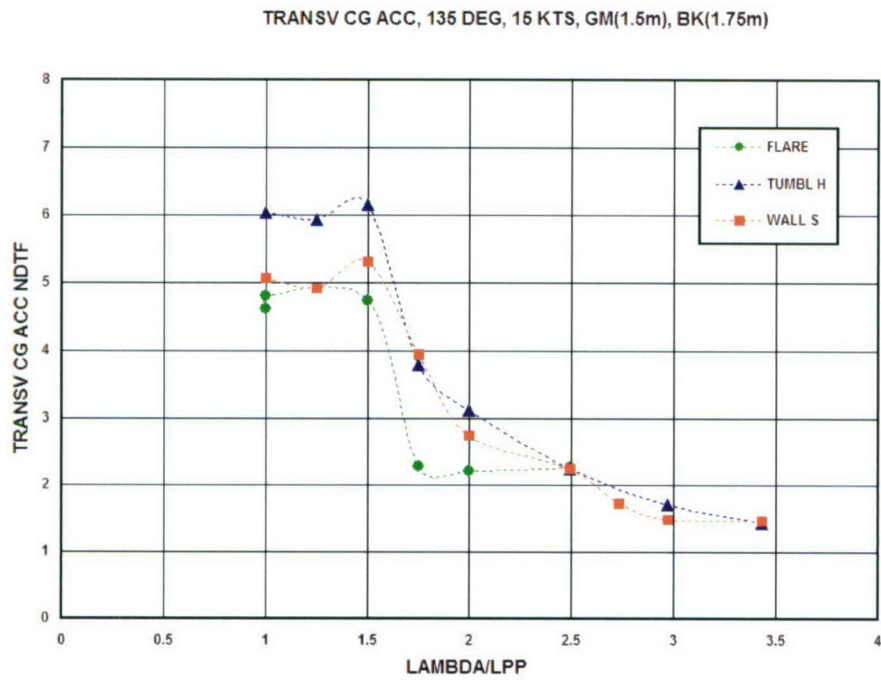


Figure 151. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=1.5m and BK=1.75m

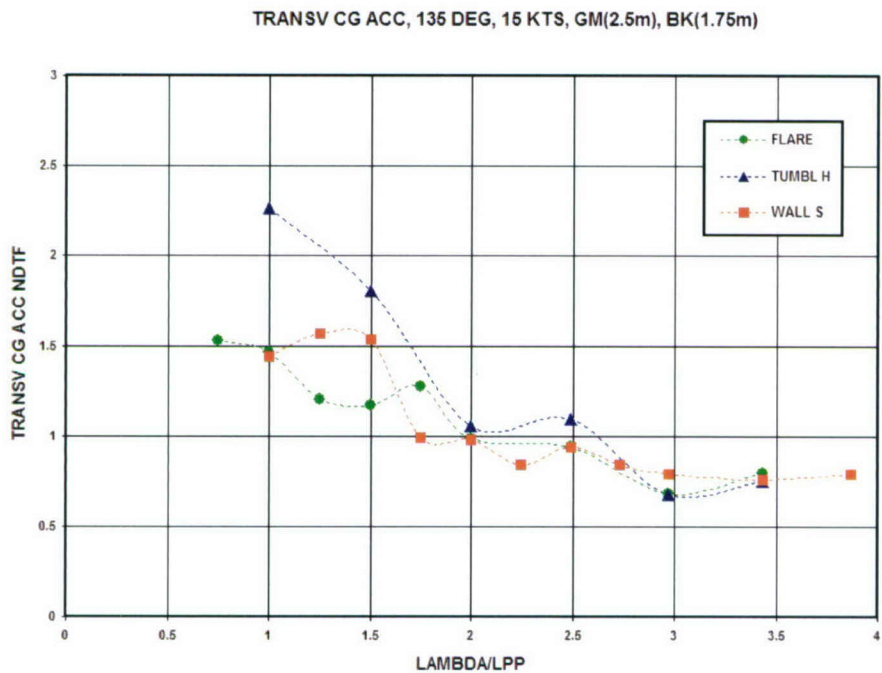


Figure 152. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 15 Kts for GM=2.5m and BK=1.75m

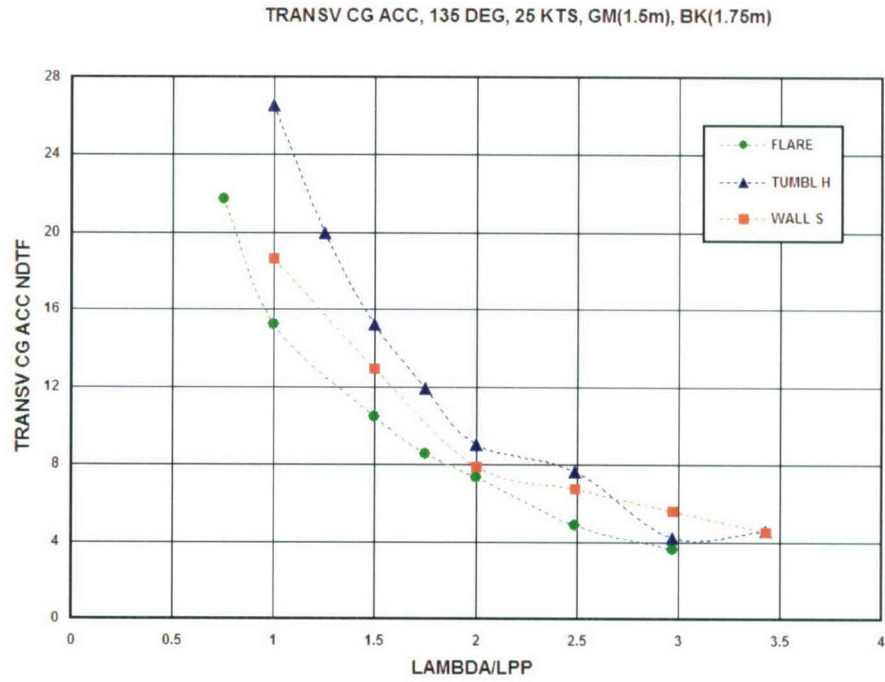


Figure 153. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=1.5m and BK=1.75m

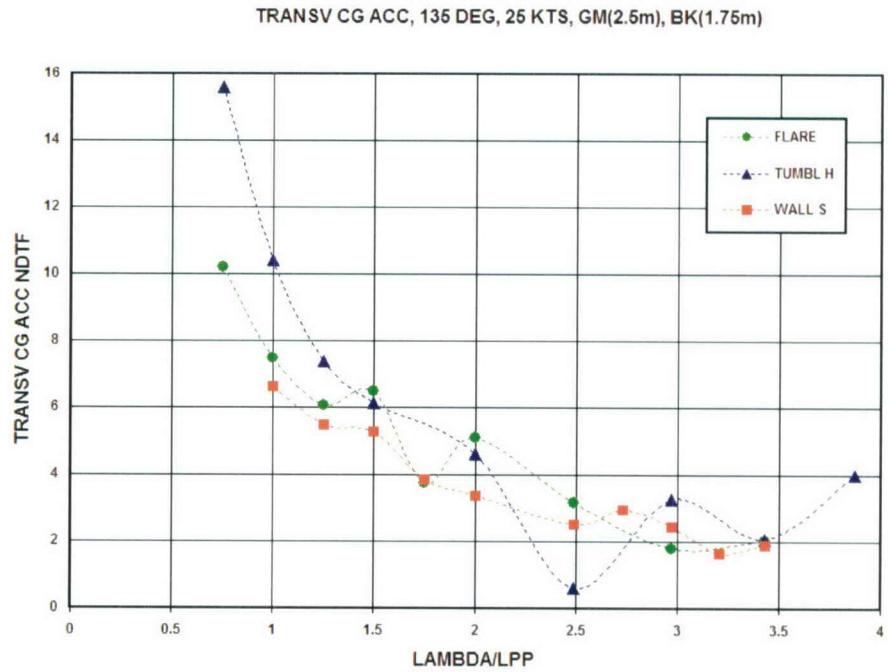


Figure 154. CG Transverse Acceleration NDTF vs. λ/L_{PP} for Stern Qtr Waves at 25 Kts for GM=2.5m and BK=1.75m.

Flared Hull 1 Primary Test Matrix

GM – 1 (1.50m)
(KG = 10.14", model scale)

GM – 2 (2.50m)
(KG = 8.91", model scale)

Bilge Keel – 1
(1.25m span)

Bilge Keel – 2
(1.75m* span)

Box 1	Box 2
Box 4	Box 3

Roll Decays	Box 1	Box 2a <i>(2.5m span)</i>	Box 2b <i>(1.75m span)</i>	Box 3	Box 4
Speed (kts)					
0	12	188	574	349	345-347
5	65-66	189-190	473	350	337
15	67-69	191-192	474	351-352	338-340
25	70-73	195	475	353-355	341-343

Regular Waves

Bow Quart. Seas

Speed

45 deg	5	115-127		513-520	356-366	300-312
$H/\lambda = 1/60$	15	128-137		521-529	367-375	313-320
	25	139-152		564-571	376-386	321-328

Beam Seas

90 deg	5	109-113				
$H/\lambda = 1/30$	15	91-96				
	25	97-101				
	25	102-108				

Beam Seas

90 deg	5	52-62		496-503	426-435	291-298
$H/\lambda = 1/60$	15	18-29		476-85	436-444	263-271
	25	31-39		486-495	445-455	272-281
	25	41-51		504-511	456-467	282-290

Beam Seas

90 deg	5	109-113				
$H/\lambda = 1/90$	15	75-79				
	25	80-84				
	25	86-90				

Stern Quart Seas

135 deg	5	154-162	197-205, 214	532-540	387-397, 410,411	228-235
$H/\lambda = 1/60$	15	164-172	206-213	541-552	399-409, 412	236-245
	25	175-186	216-226	553-563	413-424	247-261

Testing Time Frame

Start:

Finish: Tuesday, June 10, 2003

* Since preliminary results showed that a bilge keel span of 2.5m was excessive, the span of the 2.5m bilge keels were reduced to 1.75m for all tests.

Table 7. Flare Hull Test Matrix

Tumblehome Hull 2 Primary Test Matrix

		Bilge Keel – 1 (1.25m span)		Bilge Keel – 2 (1.75m span)		
GM – 1 (1.50m) (KG = 10.14", model scale)		Box 1		Box 2		
GM – 2 (2.50m) (KG = 8.91", model scale)		Box 4		Box 3		
Roll Decays		Box 1	Box 2a <i>(2.5m span)</i>	Box 2b <i>(1.75m span)</i>	Box 3	Box 4
Speed (kts)						
	0	237		12	544	273
	5	248		5,6	540	313
	15	249,250		7,9,10	541	314,315
	25	251-255		13-15	542,543	316,317,318
Regular Waves						
Bow Quart. Seas	Speed					
45 deg	5	194-198,200-205		67-76	429-440	312,320-328
$H/\lambda = 1/60$	15	182-193		77-87	418-419,421-428	304-312
	25	206-215		89,90,93-101	441-449	329-332,334-338
Beam Seas	0				533-539	
90 deg	5				513-520	
$H/\lambda = 1/30$	15				507-512,528	
	25				521-527	
Beam Seas	0	256-264		55-60,62-65	404-407,409-416	368-376
90 deg	5	227-235		41-45,47,49-54	387-395	283-291
$H/\lambda = 1/60$	15	217-220,222-226		16-20 21-24	379-386	274-282
	25	238-247		25,28-40	396-403	292-297,300-302
Beam Seas	0				529-531	
90 deg	5				492-495,488,489	
$H/\lambda = 1/90$	15				483-491	
	25				500-506	
Stern Quart Seas	5	160-170		103-109,111,112	463-471,481	349-356
135 deg	15	150-159		113-121,124-128	451-456,459-462	340-348
$H/\lambda = 1/60$	25	172-180		129-143,145-148	472-480	358-366

Table 8. Tumblehome Hull Test Matrix

Wall-Sided Hull 3 Primary Test Matrix

GM – 1 (1.50m)
(KG = 10.14", model scale)

GM – 2 (2.50m)
(KG = 8.91", model scale)

Bilge Keel – 1
(1.25m span)

Bilge Keel – 2
(1.75m span)

Box 1	Box 2
Box 4	Box 3

Roll Decays		Box 1	Box 2 <i>(1.75m span)</i>	Box 3	Box 4
0BK KG2	Speed (kts)				
559,560	0	237	5	513	430
561,562	5	271,272	7	512	431,432
563,565	15	273,274	8,9,10	514,515	433,434
566	25	275,276	11-15	516,518	435,437
Regular Waves					
Bow Quart. Seas	Speed				
45 deg	5	281-290,316	64-73	519-532	319-328,330-331
H/λ = 1/60	15	291-303	74-81	533-543	332-342
	25	304-315	82-93	544-556	343-357
Beam Seas	0	226-233			
90 deg	5	201-208			
H/λ = 1/30	15	209-216			
	25	217-225			
Beam Seas	0	151-158	53-62	466-473	419-429
90 deg	5	127-134	22-31,18-20	441-449	393-401
H/λ = 1/60	15	136-143	32-39	450-457	402-411
	25	144-150	40-52	458-465	412-418
Beam Seas	0	189-192,196-200			
90 deg	5	162-170			
H/λ = 1/90	15	171-176,178-180			
	25	181-188			
Stern Quart Seas	5	238-251	94-102,123	477-486	358-368
135 deg	15	252-264	103-113,124	487-499	369-377
H/λ = 1/60	25	265-278,277-278	114-122	500-511	378-392

Testing Time Frame August 2003

Table 9. Wall-sided Hull Test Matrix

Flare Hull	GM(1.5m)	BK(1.25m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
dr52	0.997	69.58	1.357	0.994	1.635	0.108	6.187	0.394	0.485
dr53	1.514	53.36	2.688	0.998	6.71	0.414	20.035	1.246	1.196
dr54	1.759	47.01	3.545	0.996	9.936	0.213	27.306	0.59	1.119
dr56	1.985	60.68	3.099	0.996	11.715	0.15	30.121	0.388	0.974
dr57	2.239	64.91	3.269	0.999	9.85	0.282	23.915	0.683	0.789
dr61	2.504	53.6	4.425	0.997	6.864	0.49	15.607	1.16	0.566
dr62	2.96	56.55	4.958	0.992	4.561	0.457	9.562	1.013	0.223
dr60	3.832	66.2	5.483	0.979	4.275	0.285	7.796	0.511	0.567
	5 kts								
dr18	0.494	46.91	0.998	0.944	0.298	0.066	1.937	0.32	0.374
dr20	0.75	54.56	1.303	0.982	1.153	0.11	5.213	0.423	0.343
dr19	1.01	69.9	1.369	0.994	2.012	0.041	7.367	0.153	0.236
dr21	1.257	63.29	1.882	0.987	2.944	0.145	10.022	0.437	0.741
dr22	1.471	51.83	2.689	0.983	7.33	0.16	21.968	0.558	0.753
dr28	1.715	62.41	2.604	0.981	10.803	0.177	29	0.347	1.126
dr23	1.985	63.28	2.972	0.997	10.368	0.404	26.958	0.967	1.468
dr29	2.265	61.7	3.478	0.996	8.295	0.233	20.276	0.53	0.407
dr24	2.402	52.66	4.321	0.977	8.636	0.438	20.13	1.052	0.862
dr25	2.988	54.34	5.208	0.994	6.844	0.257	14.235	0.583	0.51
dr26	3.429	57.44	5.656	0.985	4.778	0.204	9.204	0.396	0.369
dr27	3.906	54.95	6.734	0.986	4.807	0.307	8.609	0.567	0.37
	15 kts								
dr31	1.01	69.25	1.382	0.952	1.946	0.063	7.273	0.235	0.286
dr32	1.239	63.3	1.855	0.989	3.206	0.061	10.804	0.218	0.404
dr33	1.499	52.21	2.72	0.995	5.899	0.048	17.961	0.183	0.531
dr39	1.753	50.2	3.307	0.987	8.285	0.111	23.196	0.323	0.621
dr34	1.985	56.52	3.328	0.996	8.008	0.021	21.024	0.074	0.64
dr35	2.256	59.48	3.594	0.996	7.783	0.075	19.219	0.189	0.506
dr36	2.476	55.2	4.25	0.99	6.924	0.145	16.023	0.365	0.355
dr37	2.976	59.68	4.724	0.99	6.243	0.103	13.276	0.26	0.325
dr38	3.856	63.92	5.715	0.969	4.114	0.014	7.582	0.032	0.257
	25 kts								
dr41	1.015	66.67	1.442	0.802	1.538	0.007	5.784	0.07	0.269
dr42	1.522	58.52	2.464	0.984	4.588	0.009	13.797	0.164	0.276
dr43	1.771	52.36	3.205	0.979	6.602	0.069	17.743	0.186	0.389
dr44	1.985	56.98	3.301	0.978	6.224	0.18	15.56	0.427	0.439
dr45	2.231	56.44	3.745	0.974	6.528	0.091	16.452	0.302	0.332
dr46	2.504	59.02	4.019	0.952	6.086	0.12	14.705	0.325	0.233
dr48	2.895	53.27	5.148	0.958	5.735	0.069	12.707	0.173	0.022
dr51	3.445	61.75	5.286	0.962	4.788	0.096	9.356	0.155	0.232
dr50	3.799	58.4	6.163	0.973	4.982	0.197	9.274	0.374	0.242

Table 10. Motion Amplitudes for Flared Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Flare Hull	GM(1.5m)	BK(1.25m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG	λ/L	λ/H	AMP1 inch	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's
RUN									
	0 kts								
dr52	0.997	69.58	1.357	0.047	0.064	0.05	NA	0.043	0.057
dr53	1.514	53.36	2.688	0.057	0.153	0.061	NA	0.055	0.139
dr54	1.759	47.01	3.545	0.056	0.187	0.055	NA	0.059	0.174
dr56	1.985	60.68	3.099	0.067	0.187	0.068	NA	0.069	0.174
dr57	2.239	64.91	3.269	0.06	0.131	0.059	NA	0.063	0.122
dr61	2.504	53.6	4.425	0.048	0.075	0.051	NA	0.048	0.071
dr62	2.96	56.55	4.958	0.047	0.038	0.053	NA	0.04	0.037
dr60	3.832	66.2	5.483	0.044	0.03	0.042	NA	0.047	0.025
	5 kts								
dr18	0.494	46.91	0.998	0.075	0.047	0.08	0.052	0.069	0.041
dr20	0.75	54.56	1.303	0.067	0.065	0.07	0.066	0.063	0.06
dr19	1.01	69.9	1.369	0.047	0.07	0.047	0.067	0.047	0.066
dr21	1.257	63.29	1.882	0.048	0.088	0.051	0.088	0.044	0.08
dr22	1.471	51.83	2.689	0.075	0.167	0.075	0.159	0.073	0.157
dr28	1.715	62.41	2.604	0.073	0.198	0.073	0.188	0.071	0.187
dr23	1.985	63.28	2.972	0.061	0.172	0.059	0.167	0.063	0.157
dr29	2.265	61.7	3.478	0.061	0.109	0.065	0.102	0.056	0.103
dr24	2.402	52.66	4.321	0.058	0.102	0.058	0.096	0.057	0.095
dr25	2.988	54.34	5.208	0.067	0.061	0.07	0.056	0.063	0.059
dr26	3.429	57.44	5.656	0.057	0.035	0.056	0.033	0.057	0.033
dr27	3.906	54.95	6.734	0.052	0.032	0.053	0.029	0.05	0.03
	15 kts								
dr31	1.01	69.25	1.382	0.048	0.068	0.05	NA	0.045	0.063
dr32	1.239	63.3	1.855	0.047	0.087	0.048	NA	0.046	0.081
dr33	1.499	52.21	2.72	0.06	0.133	0.062	NA	0.059	0.126
dr39	1.753	50.2	3.307	0.065	0.154	0.067	NA	0.064	0.147
dr34	1.985	56.52	3.328	0.06	0.132	0.063	NA	0.059	0.125
dr35	2.256	59.48	3.594	0.059	0.11	0.061	NA	0.059	0.103
dr36	2.476	55.2	4.25	0.055	0.084	0.057	NA	0.054	0.081
dr37	2.976	59.68	4.724	0.052	0.063	0.052	NA	0.053	0.059
dr38	3.856	63.92	5.715	0.05	0.029	0.05	NA	0.05	0.027
	25 kts								
dr41	1.015	66.67	1.442	0.052	0.064	0.054	NA	0.051	0.06
dr42	1.522	58.52	2.464	0.06	0.114	0.064	NA	0.057	0.11
dr43	1.771	52.36	3.205	0.065	0.136	0.066	NA	0.065	0.13
dr44	1.985	56.98	3.301	0.054	0.114	0.056	NA	0.053	0.111
dr45	2.231	56.44	3.745	0.053	0.113	0.054	NA	0.054	0.109
dr46	2.504	59.02	4.019	0.056	0.089	0.056	NA	0.057	0.085
dr48	2.895	53.27	5.148	0.059	0.069	0.06	NA	0.058	0.066
dr51	3.445	61.75	5.286	0.049	0.048	0.049	NA	0.05	0.046
dr50	3.799	58.4	6.163	0.048	0.05	0.049	NA	0.047	0.05

Table 11. Acceleration Amp. for Flared Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Flare Hull	GM(1.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
dr496	0.982	57.25	1.625	0.969	1.532	0.099	5.783	0.374	0.419
dr497	1.516	59.69	2.407	0.986	4.724	0.231	14.218	0.691	0.812
dr501	1.753	62	2.678	0.997	6.6	0.182	18.182	0.528	0.616
dr498	1.993	63.52	2.973	0.999	9.139	0.072	23.771	0.195	0.723
dr502	2.259	62.87	3.404	0.997	8.925	0.302	22.164	0.784	0.545
dr499	2.522	56.59	4.222	0.989	7.881	0.354	18.078	0.842	0.484
dr500	2.972	57.37	4.908	0.969	4.411	0.307	9.168	0.735	0.174
dr503	3.473	70.95	4.638	0.986	3.697	0.276	7.127	0.552	0.347
	5 kts								
dr476	1.051	73.81	1.349	0.97	1.641	0.204	5.832	0.642	0.505
dr477	1.49	61.6	2.292	0.997	5.215	0.044	15.758	0.153	0.407
dr484	1.753	63.44	2.617	0.999	6.548	0.318	18.475	0.87	1.009
dr482	1.993	55.43	3.407	0.991	9.404	0.297	24.25	0.837	0.466
dr481	2.221	60.75	3.463	0.995	9.252	0.163	22.807	0.442	0.55
dr479	2.5	57.52	4.118	0.996	7.799	0.239	17.937	0.59	0.541
dr480	2.964	60.95	4.608	0.995	5.92	0.36	12.329	0.851	0.638
dr485	3.461	62.82	5.22	0.987	3.479	0.301	6.664	0.669	0.265
	15 kts								
dr486	0.951	61.48	1.465	0.761	1.34	0.083	5.615	0.307	0.57
dr487	1.511	55.49	2.579	0.936	3.751	0.092	11.623	0.291	0.645
dr488	1.985	61.49	3.059	0.995	6.465	0.022	17.079	0.058	0.589
dr491	2.203	61.14	3.414	0.997	7.106	0.154	17.592	0.311	0.786
dr489	2.359	61.06	3.66	0.991	6.959	0.211	15.988	0.263	0.706
dr492	2.667	66.78	3.783	0.987	6.388	0.1	14.198	0.166	0.536
dr490	2.918	74.83	3.694	0.992	5.586	0.117	11.971	0.283	0.506
dr495	3.581	71.93	4.717	0.983	4.421	0.239	8.49	0.362	0.331
	25 kts								
dr504	0.993	62.27	1.511	0.479	1.536	0.1	5.475	0.258	0.092
dr505	1.508	61.14	2.336	0.93	2.765	0.068	9.004	0.104	0.392
dr506	1.985	55.84	3.368	0.979	5.518	0.047	14.819	0.243	0.24
dr507	2.467	61.03	3.829	0.959	5.937	0.178	13.161	0.112	0.361
dr509	2.941	67.04	4.157	0.987	5.454	0.159	11.709	0.147	0.239
dr510	3.413	71.05	4.552	0.975	4.41	0.099	8.744	0.024	0.227
dr511	3.678	62.59	5.567	0.986	4.811	0.158	9.177	0.064	0.342

Table 12. Motion Amplitude for Flared Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Flare Hull	GM(1.5m)	BK(2.5m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr496	0.982	57.25	1.625	0.055	0.069	0.057	0.069	0.052	0.062
dr497	1.516	59.69	2.407	0.05	0.12	0.053	0.118	0.047	0.109
dr501	1.753	62	2.678	0.04	0.132	0.038	0.124	0.043	0.124
dr498	1.993	63.52	2.973	0.06	0.16	0.063	0.151	0.06	0.15
dr502	2.259	62.87	3.404	0.055	0.132	0.057	0.121	0.056	0.126
dr499	2.522	56.59	4.222	0.051	0.099	0.054	0.09	0.05	0.095
dr500	2.972	57.37	4.908	0.042	0.038	0.048	0.032	0.037	0.038
dr503	3.473	70.95	4.638	0.04	0.03	0.039	0.028	0.041	0.027
	5 kts								
dr476	1.051	73.81	1.349	0.048	0.063	0.055	0.063	0.041	0.057
dr477	1.49	61.6	2.292	0.063	0.133	0.065	0.126	0.062	0.126
dr484	1.753	63.44	2.617	0.04	0.139	0.036	0.134	0.045	0.13
dr482	1.993	55.43	3.407	0.06	0.156	0.062	0.143	0.059	0.151
dr481	2.221	60.75	3.463	0.06	0.135	0.063	0.125	0.058	0.13
dr479	2.5	57.52	4.118	0.058	0.093	0.06	0.084	0.057	0.089
dr480	2.964	60.95	4.608	0.055	0.055	0.058	0.05	0.052	0.053
dr485	3.461	62.82	5.22	0.041	0.025	0.045	0.02	0.037	0.026
	15 kts								
dr486	0.951	61.48	1.465	0.057	0.066	0.059	0.066	0.056	0.06
dr487	1.511	55.49	2.579	0.055	0.103	0.056	0.101	0.054	0.097
dr488	1.985	61.49	3.059	0.051	0.117	0.053	0.111	0.05	0.111
dr491	2.203	61.14	3.414	0.051	0.114	0.051	0.108	0.052	0.108
dr489	2.359	61.06	3.66	0.055	0.092	0.055	0.087	0.056	0.087
dr492	2.667	66.78	3.783	0.056	0.074	0.056	0.069	0.057	0.07
dr490	2.918	74.83	3.694	0.052	0.06	0.051	0.056	0.053	0.056
dr495	3.581	71.93	4.717	0.046	0.038	0.046	0.034	0.045	0.036
	25 kts								
dr504	0.993	62.27	1.511	0.05	0.064	0.053	0.062	0.048	0.06
dr505	1.508	61.14	2.336	0.054	0.083	0.056	0.081	0.053	0.078
dr506	1.985	55.84	3.368	0.055	0.115	0.055	0.109	0.056	0.111
dr507	2.467	61.03	3.829	0.054	0.093	0.056	0.088	0.053	0.09
dr509	2.941	67.04	4.157	0.048	0.071	0.048	0.067	0.048	0.069
dr510	3.413	71.05	4.552	0.044	0.048	0.045	0.046	0.044	0.047
dr511	3.678	62.59	5.567	0.054	0.045	0.055	0.043	0.053	0.043

Table 13. Acceleration Amp. for Flared Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Flare Hull	GM(2.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	Λ/L	Λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
dr426	0.746	54.22	1.303	0.982	3.084	0.06	13.068	0.274	0.556
dr427	0.988	60.28	1.554	0.991	6.969	0.11	25.291	0.39	0.75
dr435	1.244	63.42	1.858	0.998	7.862	0.206	25.487	0.753	0.973
dr428	1.522	59.63	2.419	0.983	6.326	0.145	18.556	0.439	0.739
dr429	1.977	64.83	2.889	0.994	4.903	0.115	12.579	0.298	0.301
dr430	2.507	54.15	4.386	0.981	4.144	0.346	9.464	0.828	0.469
dr431	2.941	56.84	4.902	0.969	3.321	0.288	6.962	0.682	0.525
dr432	3.413	73.94	4.373	0.979	2.397	0.322	4.612	0.674	0.441
dr434	3.921	71.49	5.196	0.868	3.065	0.509	5.451	0.987	0.584
	5 kts								
dr436	0.747	58.67	1.207	0.987	3	0.135	12.914	0.571	0.92
dr437	1.012	58.89	1.628	0.999	7.067	0.424	25.917	1.502	1.897
dr438	1.223	77.21	1.5	0.988	7.379	0.154	23.083	0.468	0.817
dr439	1.525	60.25	2.398	0.981	6.617	0.245	19.385	0.741	0.707
dr440	1.781	55.58	3.036	0.984	5.011	0.27	13.466	0.711	0.469
dr441	2.025	52.03	3.688	0.983	4.224	0.23	10.673	0.603	0.24
dr442	2.5	49.99	4.738	0.957	3.884	0.313	8.811	0.742	0.22
dr443	3.019	59.98	4.768	0.968	3.149	0.231	6.427	0.425	0.257
dr444	3.957	56.64	6.618	0.72	3.622	0.21	6.476	0.357	0.204
	15 kts								
dr445	0.748	56.24	1.26	0.948	3.723	0.065	15.893	0.271	0.702
dr446	1.022	63.24	1.531	0.992	6.833	0.149	24.324	0.473	0.71
dr447	1.249	67.49	1.753	0.995	6.788	0.105	22.079	0.087	0.846
dr449	1.513	57.83	2.479	0.985	6.07	0.056	17.899	0.157	0.626
dr451	1.762	61.38	2.72	0.98	5.139	0.155	14.128	0.405	0.408
dr455	1.906	61.64	2.93	0.971	5.091	0.234	13.347	0.57	0.607
dr453	2.515	61.28	3.889	0.986	4.37	0.088	9.993	0.166	0.294
dr454	3.081	61.71	4.73	0.994	3.616	0.406	7.353	0.634	0.565
	25 kts								
dr456	0.751	55.28	1.286	0.85	2.741	0.108	11.85	0.459	0.311
dr458	1.005	60.59	1.571	0.981	4.746	0.056	18.201	0.138	0.576
dr461	1.233	63.76	1.832	0.985	6.191	0.08	20.587	0.25	0.528
dr462	1.49	57.61	2.451	0.901	5.307	0.149	15.405	0.495	0.276
dr463	1.753	78.09	2.126	0.982	3.877	0.053	10.635	0.045	0.048
dr464	1.946	55.81	3.302	0.973	5.12	0.172	13.395	0.104	0.268
dr465	2.504	60.16	3.942	0.927	3.889	0.237	9.065	0.442	0.244
dr466	2.941	68.71	4.055	0.882	3.402	0.13	7.201	0.212	0.959
dr467	3.429	75.98	4.276	0.967	3.05	0.218	5.905	0.198	0.252

Table 14. Motion Amplitude for Flared Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Flare Hull	GM(2.5m),	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr426	0.746	54.22	1.303	0.052	0.089	0.053	0.084	0.05	0.078
dr427	0.988	60.28	1.554	0.049	0.139	0.048	0.128	0.048	0.125
dr435	1.244	63.42	1.858	0.052	0.116	0.055	0.108	0.048	0.101
dr428	1.522	59.63	2.419	0.048	0.075	0.047	0.067	0.05	0.067
dr429	1.977	64.83	2.889	0.059	0.039	0.061	0.034	0.056	0.035
dr430	2.507	54.15	4.386	0.053	0.027	0.052	0.025	0.054	0.022
dr431	2.941	56.84	4.902	0.044	0.018	0.039	0.018	0.048	0.014
dr432	3.413	73.94	4.373	0.035	0.009	0.034	0.009	0.037	0.008
dr434	3.921	71.49	5.196	0.046	0.008	0.05	0.005	0.042	0.01
	5 kts								
dr436	0.747	58.67	1.207	0.057	0.091	0.061	0.09	0.054	0.077
dr437	1.012	58.89	1.628	0.054	0.147	0.053	0.145	0.059	0.125
dr438	1.223	77.21	1.5	0.051	0.102	0.054	0.091	0.049	0.093
dr439	1.525	60.25	2.398	0.059	0.071	0.061	0.061	0.057	0.066
dr440	1.781	55.58	3.036	0.053	0.042	0.057	0.034	0.049	0.041
dr441	2.025	52.03	3.688	0.049	0.031	0.055	0.023	0.044	0.03
dr442	2.5	49.99	4.738	0.053	0.021	0.059	0.014	0.047	0.021
dr443	3.019	59.98	4.768	0.044	0.014	0.047	0.01	0.041	0.015
dr444	3.957	56.64	6.618	0.051	0.015	0.053	0.011	0.048	0.015
	15 kts								
dr445	0.748	56.24	1.26	0.063	0.104	0.069	0.1	0.058	0.091
dr446	1.022	63.24	1.531	0.049	0.124	0.052	0.111	0.049	0.113
dr447	1.249	67.49	1.753	0.051	0.1	0.053	0.091	0.051	0.089
dr449	1.513	57.83	2.479	0.053	0.072	0.053	0.066	0.053	0.065
dr451	1.762	61.38	2.72	0.052	0.053	0.054	0.048	0.051	0.046
dr455	1.906	61.64	2.93	0.061	0.042	0.062	0.036	0.061	0.039
dr453	2.515	61.28	3.889	0.055	0.03	0.055	0.027	0.055	0.027
dr454	3.081	61.71	4.73	0.049	0.019	0.053	0.016	0.047	0.02
	25 kts								
dr456	0.751	55.28	1.286	0.056	0.083	0.06	0.076	0.054	0.077
dr458	1.005	60.59	1.571	0.057	0.107	0.058	0.099	0.057	0.097
dr461	1.233	63.76	1.832	0.054	0.102	0.054	0.093	0.054	0.093
dr462	1.49	57.61	2.451	0.05	0.065	0.052	0.055	0.049	0.062
dr463	1.753	78.09	2.126	0.042	0.043	0.044	0.037	0.041	0.04
dr464	1.946	55.81	3.302	0.057	0.05	0.057	0.045	0.057	0.046
dr465	2.504	60.16	3.942	0.05	0.028	0.049	0.024	0.051	0.027
dr466	2.941	68.71	4.055	0.043	0.036	0.043	0.032	0.044	0.037
dr467	3.429	75.98	4.276	0.04	0.02	0.04	0.018	0.04	0.019

Table 15. Acceleration Amp. for Flared Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Flare Hull	GM(2.5m),	BK(1.25m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	Λ/L	Λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
dr295	0.759	65.33	1.232	0.999	4.023	0.015	16.906	0.115	0.745
dr291	1.003	60.83	1.515	0.996	9.249	0.109	33.547	0.466	1.4
dr294	1.252	61.29	1.959	0.999	7.834	0.344	25.336	1.204	1.076
dr292	1.492	55.86	2.555	0.998	6.305	0.159	18.598	0.486	0.817
dr293	1.992	58.85	2.929	0.996	5.011	0.085	12.797	0.236	0.349
DR296	2.489	52.92	4.419	0.98	4.432	0.315	10.001	0.783	0.535
dr297	2.478	54.39	4.457	0.981	4.253	0.362	9.859	0.874	0.508
dr298	3.437	64.05	6.01	0.957	3.872	0.319	7.636	0.629	0.522
	5 kts								
dr268	0.754	67.44	1.191	0.993	3.911	0.069	16.666	0.305	0.984
dr263	0.993	65.01	1.352	0.996	8.507	0.143	31.129	0.485	1.046
dr271	1.015	61.39	1.49	0.997	8.933	0.146	32.395	0.548	1.115
dr269	1.278	61.61	1.765	0.996	7.608	0.211	24.857	0.616	0.629
dr264	1.511	64.95	2.487	0.997	5.538	0.262	16.341	0.81	0.247
dr270	1.743	62.44	3.419	0.995	4.953	0.293	13.667	0.816	0.414
dr265	1.959	65.15	3.846	0.99	4.216	0.723	11.058	1.826	1.161
dr266	2.577	58.2	4.539	0.971	4.494	0.516	10.236	1.182	0.907
dr267	2.953	61.22	4.727	0.862	3.757	0.252	7.93	0.584	0.688
	15 kts								
dr278	0.758	66.64	1.084	0.997	4.038	0.099	17.27	0.49	0.755
dr272	1.005	63.92	1.55	0.999	7.663	0.107	28.094	0.384	0.959
dr279	1.246	67.37	1.829	0.996	6.891	0.089	22.656	0.414	0.873
dr274	1.511	56.89	2.354	0.985	6.272	0.137	18.636	0.397	0.414
dr275	1.985	60.05	3.057	0.984	4.739	0.029	12.316	0.04	0.392
dr276	2.445	56.88	4.128	0.954	4.384	0.059	9.793	0.147	0.144
dr277	2.918	70.38	4.427	0.99	3.338	0.115	7.025	0.305	0.271
dr281	3.533	67.97	5.481	0.952	3.555	0.18	7.055	0.337	0.086
	25 kts								
dr287	0.771	63.09	1.245	0.93	3.069	0.159	14.03	0.64	0.415
dr282	1.01	64.31	1.538	0.997	6.359	0.154	23.324	0.477	0.335
dr285	1.259	64.56	1.824	0.969	6.301	0.075	20.696	0.14	0.537
dr283	1.499	58.15	2.466	0.987	6.179	0.126	18.496	0.353	0.483
dr284	2.005	57.33	3.035	0.983	4.858	0.263	12.253	0.279	0.432
dr288	2.474	55.2	4.239	0.978	4.653	0.102	10.854	0.016	0.274
dr289	2.988	65.16	4.276	0.981	3.815	0.128	8.227	0.368	0.34
dr290	3.425	63.39	5.441	0.935	3.638	0.08	7.125	0.13	0.109

Table 16. Motion Amplitude for Flared Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Flare Hull	GM(2.5m)	BK(1.25m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr295	0.759	65.33	1.232	0.045	0.1	0.045	0.094	0.045	0.086
dr291	1.003	60.83	1.515	0.049	0.164	0.047	0.155	0.05	0.142
dr294	1.252	61.29	1.959	0.052	0.106	0.056	0.1	0.047	0.09
dr292	1.492	55.86	2.555	0.052	0.067	0.049	0.061	0.055	0.058
dr293	1.992	58.85	2.929	0.06	0.038	0.061	0.034	0.058	0.033
DR296	2.489	52.92	4.419	0.058	0.027	0.057	0.026	0.059	0.022
dr297	2.478	54.39	4.457	0.053	0.027	0.053	0.026	0.054	0.022
dr298	3.437	64.05	6.01	0.052	0.018	0.049	0.017	0.054	0.015
	5 kts								
dr268	0.754	67.44	1.191	0.05	0.101	0.052	0.099	0.049	0.086
dr263	0.993	65.01	1.352	0.05	0.151	0.051	0.138	0.049	0.135
dr271	1.015	61.39	1.49	0.052	0.158	0.053	0.146	0.048	0.14
dr269	1.278	61.61	1.765	0.055	0.102	0.059	0.09	0.05	0.093
dr264	1.511	64.95	2.487	0.052	0.056	0.056	0.048	0.047	0.051
dr270	1.743	62.44	3.419	0.049	0.046	0.051	0.041	0.047	0.04
dr265	1.959	65.15	3.846	0.048	0.036	0.047	0.039	0.053	0.027
dr266	2.577	58.2	4.539	0.056	0.028	0.057	0.025	0.056	0.026
dr267	2.953	61.22	4.727	0.04	0.022	0.037	0.021	0.044	0.018
	15 kts								
dr278	0.758	66.64	1.084	0.05	0.102	0.052	0.097	0.048	0.088
dr272	1.005	63.92	1.55	0.052	0.137	0.051	0.125	0.051	0.123
dr279	1.246	67.37	1.829	0.051	0.097	0.051	0.089	0.049	0.085
dr274	1.511	56.89	2.354	0.055	0.078	0.055	0.07	0.055	0.07
dr275	1.985	60.05	3.057	0.054	0.042	0.054	0.037	0.053	0.039
dr276	2.445	56.88	4.128	0.056	0.03	0.057	0.027	0.055	0.028
dr277	2.918	70.38	4.427	0.042	0.019	0.041	0.017	0.043	0.018
dr281	3.533	67.97	5.481	0.049	0.018	0.052	0.015	0.046	0.016
	25 kts								
dr287	0.771	63.09	1.245	0.054	0.085	0.048	0.077	0.059	0.078
dr282	1.01	64.31	1.538	0.049	0.121	0.048	0.107	0.05	0.115
dr285	1.259	64.56	1.824	0.05	0.098	0.048	0.089	0.05	0.091
dr283	1.499	58.15	2.466	0.057	0.08	0.057	0.073	0.056	0.074
dr284	2.005	57.33	3.035	0.054	0.046	0.055	0.04	0.053	0.044
dr288	2.474	55.2	4.239	0.056	0.039	0.055	0.035	0.057	0.037
dr289	2.988	65.16	4.276	0.053	0.022	0.055	0.019	0.051	0.022
dr290	3.425	63.39	5.441	0.051	0.021	0.053	0.018	0.05	0.021

Table 17. Acceleration Amp. for Flared Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Tumbl Hull	GM(1.5m)	BK(1.25m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
90 DEG RUN	λ/L	λ/H							
	0 kts								
dr256	1	67.74	1.399	0.998	1.665	0.076	6.259	0.258	0.484
dr259	1.509	59.84	2.389	0.996	4.822	0.181	14.445	0.551	0.847
dr260	1.985	66.74	2.818	0.968	9.616	0.154	24.127	0.387	0.818
dr263	2.237	59.62	3.555	0.988	11.612	0.28	28.064	0.716	0.91
dr261	2.518	56.66	4.211	0.995	9.352	0.391	21.469	0.926	0.622
dr262	2.953	58.77	4.76	0.995	4.35	0.464	9.189	1.048	0.172
dr264	3.471	60.78	5.41	0.987	4.125	0.443	7.999	0.886	0.572
	5 kts								
dr227	1.005	65.13	1.461	0.993	2.08	0.134	7.714	0.444	0.407
dr228	1.482	62.67	2.24	0.995	5.258	0.178	15.902	0.538	0.577
dr234	1.706	71.05	2.275	0.986	7.307	0.09	20.039	0.247	0.696
dr229	1.965	59.37	3.136	0.99	9.655	0.133	24.505	0.362	0.838
dr233	2.203	58.88	3.545	0.991	11.592	0.053	27.615	0.06	0.947
dr230	2.454	59.14	3.931	0.99	9.43	0.376	22.039	0.928	0.901
dr235	2.757	56.18	4.65	0.991	6.15	0.271	13.403	0.601	0.479
dr231	2.964	52.41	5.358	0.997	5.542	0.417	11.639	0.85	0.449
dr232	3.541	55.38	6.058	0.982	4.913	0.201	9.329	0.432	0.285
	15 kts								
dr217	0.993	64.68	1.455	0.955	1.982	0.071	7.316	0.205	0.391
dr218	1.476	55.17	2.534	0.991	4.166	0.052	12.952	0.123	0.525
dr219	1.993	59.33	3.183	0.983	6.835	0.039	18.25	0.071	0.73
dr226	2.223	55.52	3.792	0.987	8.179	0.07	20.547	0.243	0.854
dr220	2.476	59.21	3.962	0.983	7.189	0.139	16.612	0.354	0.487
dr235	2.757	56.18	4.65	0.991	6.15	0.271	13.403	0.601	0.479
dr222	2.953	65.45	4.274	0.994	5.126	0.12	10.863	0.267	0.361
dr225	3.477	57.32	5.747	0.995	5.517	0.177	10.796	0.254	0.452
	25 kts								
dr238	0.993	62.31	1.51	0.883	1.547	0.155	5.824	0.574	0.109
dr239	1.511	60.04	2.384	0.985	3.56	0.173	11.035	0.438	0.077
dr240	1.932	55.83	3.279	0.99	4.992	0.085	13.179	0.115	0.507
dr241	2.456	58.53	3.976	0.989	6.353	0.183	14.641	0.348	0.402
dr245	2.735	62.99	4.113	0.973	5.741	0.05	13.204	0.159	0.208
dr246	3.019	67.49	4.238	0.98	5.858	0.147	12.601	0.177	0.054
dr242	3.019	69.69	4.104	0.937	5.645	0.097	11.582	0.142	0.434
dr247	3.254	66.74	4.619	0.963	5.629	0.126	11.452	0.13	0.378
dr243	3.445	62	5.264	0.982	5.45	0.054	10.8	0.08	0.315
dr244	3.848	56.15	6.492	0.967	5.5	0.162	10.244	0.316	0.447

Table 18. Motion Amplitudes for TH Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Tumbl Hull	GM(1.5m),	BK(1.25m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr256	1	67.74	1.399	0.047	0.065	0.05	0.066	0.044	0.058
dr259	1.509	59.84	2.389	0.053	0.124	0.057	0.122	0.049	0.113
dr260	1.985	66.74	2.818	0.06	0.18	0.059	0.172	0.062	0.17
dr263	2.237	59.62	3.555	0.066	0.201	0.064	0.191	0.07	0.19
dr261	2.518	56.66	4.211	0.053	0.124	0.056	0.115	0.053	0.118
dr262	2.953	58.77	4.76	0.046	0.037	0.053	0.031	0.04	0.036
dr264	3.471	60.78	5.41	0.048	0.033	0.047	0.032	0.049	0.03
	5 kts								
dr227	1.005	65.13	1.461	0.052	0.076	0.047	0.071	0.055	0.072
dr228	1.482	62.67	2.24	0.058	0.133	0.054	0.125	0.062	0.127
dr234	1.706	71.05	2.275	0.058	0.16	0.059	0.152	0.059	0.152
dr229	1.965	59.37	3.136	0.063	0.19	0.065	0.181	0.064	0.181
dr233	2.203	58.88	3.545	0.072	0.201	0.075	0.191	0.071	0.191
dr230	2.454	59.14	3.931	0.056	0.127	0.052	0.12	0.061	0.118
dr235	2.757	56.18	4.65	0.052	0.062	0.054	0.056	0.051	0.059
dr231	2.964	52.41	5.358	0.051	0.05	0.055	0.044	0.048	0.049
dr232	3.541	55.38	6.058	0.058	0.036	0.061	0.031	0.055	0.035
	15 kts								
dr217	0.993	64.68	1.455	0.05	0.072	0.053	0.071	0.047	0.066
dr218	1.476	55.17	2.534	0.054	0.109	0.056	0.104	0.052	0.102
dr219	1.993	59.33	3.183	0.057	0.132	0.059	0.126	0.056	0.125
dr226	2.223	55.52	3.792	0.063	0.145	0.063	0.139	0.063	0.137
dr220	2.476	59.21	3.962	0.051	0.102	0.053	0.095	0.05	0.099
dr235	2.757	56.18	4.65	0.052	0.062	0.054	0.056	0.051	0.059
dr222	2.953	65.45	4.274	0.046	0.052	0.047	0.048	0.045	0.05
dr225	3.477	57.32	5.747	0.057	0.053	0.058	0.05	0.057	0.05
	25 kts								
dr238	0.993	62.31	1.51	0.048	0.063	0.05	0.06	0.048	0.061
dr239	1.511	60.04	2.384	0.054	0.099	0.058	0.095	0.05	0.096
dr240	1.932	55.83	3.279	0.057	0.111	0.059	0.108	0.056	0.105
dr241	2.456	58.53	3.976	0.052	0.111	0.053	0.105	0.052	0.109
dr245	2.735	62.99	4.113	0.05	0.084	0.051	0.079	0.05	0.08
dr246	3.019	67.49	4.238	0.047	0.078	0.049	0.073	0.047	0.076
dr242	3.019	69.69	4.104	0.047	0.078	0.047	0.074	0.046	0.076
dr247	3.254	66.74	4.619	0.047	0.076	0.048	0.071	0.047	0.074
dr243	3.445	62	5.264	0.052	0.064	0.053	0.061	0.052	0.062
dr244	3.848	56.15	6.492	0.051	0.071	0.052	0.066	0.051	0.071

Table 19. Acceleration Amp. For TH Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
90 DEG									
	λ/L	λ/H							
RUN									
	0 kts								
dr55	0.999	63.98	1.479	0.992	1.329	0.085	5.065	0.291	0.469
dr56	1.512	58.78	2.437	0.998	3.903	0.226	11.831	0.687	0.816
dr65	1.753	54.45	3.049	0.999	5.451	0.221	15.254	0.605	1.008
dr64	1.985	66.51	2.828	0.991	7.783	0.223	20.098	0.583	0.951
dr63	2.248	68.11	3.127	0.999	9.027	0.26	22.052	0.691	0.723
dr58	2.496	53.03	4.46	0.998	7.982	0.454	18.539	1.105	0.471
dr59	2.96	55.82	5.023	0.996	4.794	0.483	10.15	1.066	0.269
	5 kts								
dr41	0.97	69.9	1.314	0.945	1.543	0.043	6.006	0.179	0.29
dr42	1.456	61.03	2.26	0.978	4.431	0.121	13.56	0.37	0.232
dr43	2.005	60.91	3.119	0.995	8.023	0.15	20.708	0.466	0.468
dr54	2.252	58.87	3.624	1	9.457	0.065	22.864	0.196	0.666
dr44	2.511	51.79	4.593	0.998	7.476	0.166	17.345	0.548	0.213
dr45	3.034	56.71	5.069	0.997	4.756	0.264	9.813	0.472	0.106
dr49	3.445	49.6	6.58	0.957	5.401	0.4	10.446	0.621	0.322
	15 kts								
dr16	1.007	64.74	1.474	0.94	1.447	0.071	5.797	0.287	0.558
dr17	1.499	56.48	2.514	0.923	3.793	0.088	11.466	0.179	0.36
dr18	2.005	67.31	2.822	0.984	5.618	0.121	14.892	0.309	0.745
dr23	2.203	63.32	3.296	0.996	7.391	0.141	18.334	0.334	0.593
dr19	2.434	60.7	3.8	0.987	7.288	0.084	17.224	0.191	0.816
dr24	2.735	62.7	4.132	0.994	6.777	0.091	15.109	0.029	0.664
dr20	3.058	57.13	5.071	0.995	6.78	0.218	14.181	0.564	0.379
dr21	3.622	57.11	6.008	0.982	5.858	0.014	11.156	0.14	0.18
dr22	3.811	57.26	6.306	0.96	5.797	0.061	10.799	0.055	0.475
	25 kts								
dr29	1.003	63.5	1.496	0.939	1.363	0.14	5.177	0.509	0.244
dr31	1.511	58.29	2.455	0.79	2.628	0.126	8.401	0.253	0.16
dr33	1.999	65.02	2.912	0.967	4.147	0.038	11.142	0.08	0.52
dr34	2.577	63.06	3.872	0.967	5.408	0.022	13.744	0.186	0.332
dr39	2.739	60.09	4.319	0.977	5.877	0.076	13.425	0.078	0.385
dr40	3.211	71.17	4.274	0.957	5.16	0.127	10.571	0.125	0.334
dr37	3.429	59	5.507	0.968	5.656	0.035	11.294	0.049	0.314
dr38	3.823	61.96	5.846	0.978	5.146	0.236	9.6	0.355	0.343

Table 20. Motion Amplitudes for TH Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr55	0.999	63.98	1.479	0.049	0.062	0.053	0.063	0.044	0.054
dr56	1.512	58.78	2.437	0.054	0.11	0.057	0.11	0.051	0.101
dr65	1.753	54.45	3.049	0.044	0.126	0.043	0.124	0.045	0.116
dr64	1.985	66.51	2.828	0.058	0.158	0.057	0.153	0.061	0.149
dr63	2.248	68.11	3.127	0.055	0.152	0.053	0.144	0.059	0.144
dr58	2.496	53.03	4.46	0.049	0.107	0.052	0.099	0.048	0.103
dr59	2.96	55.82	5.023	0.048	0.044	0.055	0.038	0.042	0.042
	5 kts								
dr41	0.97	69.9	1.314	0.059	0.071	0.06	0.07	0.056	0.066
dr42	1.456	61.03	2.26	0.066	0.124	0.067	0.117	0.065	0.119
dr43	2.005	60.91	3.119	0.058	0.162	0.059	0.153	0.059	0.156
dr54	2.252	58.87	3.624	0.061	0.164	0.065	0.155	0.059	0.156
dr44	2.511	51.79	4.593	0.053	0.096	0.058	0.089	0.048	0.092
dr45	3.034	56.71	5.069	0.045	0.042	0.049	0.036	0.042	0.042
dr49	3.445	49.6	6.58	0.056	0.045	0.06	0.038	0.052	0.044
	15 kts								
dr16	1.007	64.74	1.474	0.051	0.064	0.052	0.065	0.049	0.059
dr17	1.499	56.48	2.514	0.053	0.102	0.055	0.098	0.053	0.098
dr18	2.005	67.31	2.822	0.049	0.113	0.049	0.11	0.05	0.107
dr23	2.203	63.32	3.296	0.06	0.13	0.059	0.124	0.062	0.123
dr19	2.434	60.7	3.8	0.058	0.114	0.059	0.109	0.058	0.109
dr24	2.735	62.7	4.132	0.056	0.09	0.058	0.085	0.056	0.085
dr20	3.058	57.13	5.071	0.055	0.081	0.058	0.074	0.052	0.08
dr21	3.622	57.11	6.008	0.055	0.057	0.056	0.053	0.054	0.055
dr22	3.811	57.26	6.306	0.059	0.052	0.06	0.05	0.059	0.049
	25 kts								
dr29	1.003	63.5	1.496	0.047	0.058	0.048	0.055	0.048	0.057
dr31	1.511	58.29	2.455	0.053	0.087	0.054	0.084	0.052	0.083
dr33	1.999	65.02	2.912	0.054	0.093	0.056	0.09	0.053	0.088
dr34	2.577	63.06	3.872	0.05	0.101	0.05	0.096	0.05	0.098
dr39	2.739	60.09	4.319	0.054	0.094	0.054	0.09	0.053	0.09
dr40	3.211	71.17	4.274	0.047	0.066	0.047	0.063	0.046	0.063
dr37	3.429	59	5.507	0.054	0.067	0.055	0.064	0.054	0.063
dr38	3.823	61.96	5.846	0.054	0.052	0.054	0.049	0.054	0.049

Table 21. Acceleration Amp. For TH Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
90 DEG									
RUN	λ/L	λ/H							
	0 kts								
dr404	0.976	59.85	1.544	0.958	4.04	0.139	14.628	0.479	0.822
dr412	1.249	57.15	2.171	0.992	7.737	0.109	25.436	0.379	0.748
dr405	1.513	59.29	2.336	0.999	8.329	0.285	24.736	0.826	1.111
dr415	1.74	82.67	2.767	0.998	5.333	0.092	14.614	0.243	0.561
DR410	2.002	62.32	2.59	0.999	6.041	0.118	15.405	0.29	0.584
dr411	1.985	59.53	2.769	0.998	6.315	0.067	16.085	0.126	0.614
dr416	2.245	46.84	3.47	0.997	6.066	0.262	14.757	0.622	0.611
dr407	2.467	56.86	4.243	0.995	4.378	0.504	9.945	1.184	0.667
dr409	2.999	72.98	4.823	0.974	3.433	0.409	7.193	0.896	0.241
	5 kts								
dr387	0.993	57.91	1.64	0.997	3.972	0.1	14.941	0.346	0.767
dr394	1.227	58.67	2.077	0.999	7.216	0.142	23.993	0.436	1.146
dr388	1.52	55.24	2.203	0.997	9.611	0.23	28.245	0.669	1.072
dr395	1.79	57.05	2.378	1	7.358	0.202	19.835	0.522	0.757
dr389	1.985	61.75	2.97	0.996	6.279	0.112	16.235	0.235	0.802
dr390	2.445	49.68	4.078	0.986	5.413	0.397	12.206	0.942	0.6
dr391	3.034	60.85	5.345	0.982	4.334	0.407	9.281	0.867	0.407
dr392	3.449	51.64	5.938	0.967	4.208	0.191	8.122	0.345	0.319
	15 kts								
dr379	0.979	56.61	1.606	0.97	3.572	0.095	13.621	0.402	0.832
dr385	1.241	59.62	2.128	0.997	7.135	0.139	23.031	0.453	0.533
dr380	1.487	57.82	2.315	0.997	8.003	0.085	24.226	0.284	0.863
dr386	1.771	63.65	2.756	0.997	6.218	0.033	17.055	0.154	0.391
dr381	1.926	56.66	3.385	0.999	5.687	0.153	14.855	0.361	0.281
dr382	2.387	58.07	3.744	0.987	4.729	0.082	10.982	0.294	0.388
dr383	2.957	68.56	4.564	0.985	3.647	0.273	8.072	0.489	0.269
dr384	3.381	63.76	4.977	0.983	3.852	0.167	7.668	0.397	0.316
	25 kts								
dr396	1.012	60.41	1.605	0.876	4.51	0.415	16.376	1.341	0.369
dr403	1.242	60.27	1.989	0.965	4.879	0.027	16.984	0.168	0.534
dr397	1.49	60.63	2.405	0.989	6.561	0.079	19.936	0.187	0.396
dr402	1.734	64.47	2.637	0.994	6.013	0.088	16.889	0.277	0.377
dr398	2.015	61.82	3.142	0.967	5.936	0.212	15.029	0.436	0.273
dr399	2.46	57.48	4.014	0.982	5.061	0.02	11.588	0.223	0.205
dr400	2.941	69.68	4.273	0.915	3.777	0.098	7.413	0.415	0.111
dr401	3.557	63.97	5.297	0.974	4.537	0.137	8.354	0.399	0.763

Table 22. Motion Amplitudes for TH Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr404	0.976	59.85	1.544	0.048	0.108	0.053	0.106	0.043	0.095
dr412	1.249	57.15	2.171	0.054	0.156	0.053	0.146	0.055	0.145
dr405	1.513	59.29	2.336	0.051	0.13	0.057	0.125	0.047	0.116
dr415	1.74	82.67	2.767	0.041	0.063	0.039	0.058	0.042	0.055
DR410	2.002	62.32	2.59	0.057	0.062	0.057	0.056	0.057	0.055
dr411	1.985	59.53	2.769	0.06	0.065	0.06	0.06	0.061	0.057
dr416	2.245	46.84	3.47	0.062	0.055	0.059	0.051	0.065	0.049
dr407	2.467	56.86	4.243	0.049	0.033	0.051	0.029	0.048	0.03
dr409	2.999	72.98	4.823	0.046	0.019	0.053	0.014	0.04	0.02
	5 kts								
dr387	0.993	57.91	1.64	0.054	0.108	0.059	0.105	0.049	0.096
dr394	1.227	58.67	2.077	0.053	0.155	0.055	0.149	0.052	0.139
dr388	1.52	55.24	2.203	0.056	0.154	0.055	0.142	0.059	0.142
dr395	1.79	57.05	2.378	0.055	0.088	0.055	0.08	0.056	0.08
dr389	1.985	61.75	2.97	0.053	0.066	0.053	0.064	0.054	0.057
dr390	2.445	49.68	4.078	0.055	0.043	0.053	0.04	0.059	0.039
dr391	3.034	60.85	5.345	0.054	0.026	0.059	0.021	0.05	0.026
dr392	3.449	51.64	5.938	0.059	0.022	0.058	0.018	0.059	0.021
	15 kts								
dr379	0.979	56.61	1.606	0.058	0.104	0.056	0.1	0.06	0.093
dr385	1.241	59.62	2.128	0.053	0.139	0.055	0.128	0.052	0.131
dr380	1.487	57.82	2.315	0.055	0.133	0.056	0.123	0.055	0.123
dr386	1.771	63.65	2.756	0.05	0.078	0.052	0.071	0.049	0.073
dr381	1.926	56.66	3.385	0.05	0.062	0.048	0.056	0.052	0.058
dr382	2.387	58.07	3.744	0.056	0.039	0.057	0.036	0.055	0.036
dr383	2.957	68.56	4.564	0.047	0.025	0.051	0.022	0.044	0.023
dr384	3.381	63.76	4.977	0.053	0.022	0.053	0.021	0.053	0.019
	25 kts								
dr396	1.012	60.41	1.605	0.032	0.101	0.037	0.084	0.036	0.104
dr403	1.242	60.27	1.989	0.055	0.114	0.055	0.107	0.055	0.107
dr397	1.49	60.63	2.405	0.054	0.118	0.054	0.11	0.055	0.111
dr402	1.734	64.47	2.637	0.05	0.089	0.051	0.081	0.049	0.084
dr398	2.015	61.82	3.142	0.051	0.073	0.054	0.065	0.049	0.071
dr399	2.46	57.48	4.014	0.053	0.051	0.052	0.046	0.053	0.049
dr400	2.941	69.68	4.273	0.042	0.03	0.042	0.026	0.042	0.03
dr401	3.557	63.97	5.297	0.05	0.045	0.048	0.04	0.051	0.045

Table 23. Acceleration Amp. For TH Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Tumbl Hull	GM(2.5m),	BK(1.25m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
90 DEG	λ/L	λ/H							
RUN	0 kts								
dr368	0.998	60.19	1.518	0.988	5.742	0.205	21.004	0.732	0.528
dr374	1.253	55.19	2.195	0.988	9.78	0.525	31.89	1.843	2.18
dr369	1.499	55.8	2.378	0.998	10.082	0.242	29.834	0.709	0.925
dr376	1.753	79.18	2.948	0.996	5.024	0.212	13.707	0.615	0.269
dr370	1.985	60.13	2.665	0.998	5.782	0.042	14.694	0.101	0.502
dr371	2.48	54.13	4.572	0.98	4.478	0.411	10.103	0.978	0.506
dr372	2.988	70.04	4.92	0.984	3.652	0.528	7.56	1.162	0.661
	5 kts								
DR283	0.993	68.66	1.527	0.992	4.926	0.177	18.047	0.587	1.109
DR289	1.241	58.74	2.203	0.996	8.774	0.456	29.496	1.495	1.909
DR284	1.487	61.43	2.234	0.999	9.897	0.282	29.494	0.828	1.47
DR290	1.79	57.04	2.533	1	6.791	0.333	18.263	0.922	0.791
DR285	2.012	49.76	3.172	1	6.442	0.422	16.425	1.059	0.809
DR286	2.504	48.86	3.839	0.996	5.137	0.328	11.487	0.717	0.613
DR287	2.964	62.16	5.263	0.973	3.873	0.304	8.159	0.673	0.303
DR291	3.442	55.08	5.986	0.948	3.93	0.145	7.655	0.26	0.33
	15 kts								
DR275	1.007	66.4	1.489	0.989	5.882	0.146	21.534	0.499	0.547
DR279	1.257	57.27	2.067	0.994	8.286	0.092	26.519	0.308	0.642
DR276	1.49	59.35	2.315	0.983	7.509	0.141	21.973	0.446	0.698
DR282	1.743	60.99	2.636	0.981	5.723	0.179	15.754	0.484	0.539
DR277	2.005	60.17	3.224	0.995	5.46	0.145	13.922	0.371	0.392
DR278	2.522	63.02	3.957	0.985	4.371	0.075	10.213	0.187	0.162
DR280	2.95	66.22	4.109	0.98	3.867	0.121	8.028	0.237	0.238
DR281	3.349	65.09	5.158	0.976	3.659	0.051	6.837	0.091	0.305
	25 kts								
DR292	0.993	63.71	1.44	0.964	4.559	0.118	16.836	0.326	0.249
DR301	1.244	62.08	2.015	0.989	6.426	0.119	21.463	0.418	0.872
DR293	1.482	58.67	2.413	0.975	6.901	0.132	21.234	0.387	0.36
DR302	1.69	63.8	2.65	0.98	6.118	0.228	17.214	0.523	0.422
DR294	1.985	60.14	3.263	0.98	5.583	0.05	14.372	0.162	0.243
DR295	2.025	50.97	3.789	0.995	6.726	0.149	17.247	0.517	0.25
DR300	2.423	58.69	3.78	0.988	4.992	0.049	11.544	0.14	0.187
DR296	2.941	68.34	4.067	0.985	3.983	0.184	8.431	0.158	0.132

Table 24. Motion Amplitudes for TH Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Tumbl Hull	GM(2.5m)	BK(1.25m)	Fwd Wave AMP1 inch	Accelerations					
				Vert CG AMP1 g's	Tran CG AMP1 g's	Vert Bow AMP1 g's	Tran Bow AMP1 g's	Vert Str AMP1 g's	Tran Str AMP1 g's
90 DEG									
RUN	λ/L	λ/H							
	0 kts								
dr368	0.998	60.19	1.518	0.048	0.129	0.049	0.119	0.049	0.12
dr374	1.253	55.19	2.195	0.056	0.196	0.062	0.196	0.055	0.17
dr369	1.499	55.8	2.378	0.053	0.14	0.052	0.127	0.054	0.131
dr376	1.753	79.18	2.948	0.045	0.051	0.049	0.044	0.041	0.048
dr370	1.985	60.13	2.665	0.06	0.053	0.06	0.049	0.059	0.047
dr371	2.48	54.13	4.572	0.051	0.032	0.05	0.031	0.053	0.028
dr372	2.988	70.04	4.92	0.045	0.022	0.04	0.022	0.05	0.018
	5 kts								
DR283	0.993	68.66	1.527	0.046	0.119	0.05	0.116	0.043	0.103
DR289	1.241	58.74	2.203	0.054	0.182	0.058	0.179	0.055	0.159
DR284	1.487	61.43	2.234	0.053	0.151	0.05	0.144	0.059	0.134
DR290	1.79	57.04	2.533	0.056	0.072	0.059	0.064	0.054	0.067
DR285	2.012	49.76	3.172	0.058	0.061	0.055	0.056	0.062	0.056
DR286	2.504	48.86	3.839	0.059	0.037	0.054	0.034	0.064	0.033
DR287	2.964	62.16	5.263	0.047	0.022	0.049	0.017	0.045	0.022
DR291	3.442	55.08	5.986	0.058	0.02	0.059	0.016	0.058	0.02
	15 kts								
DR275	1.007	66.4	1.489	0.047	0.127	0.052	0.116	0.045	0.119
DR279	1.257	57.27	2.067	0.055	0.149	0.059	0.136	0.052	0.14
DR276	1.49	59.35	2.315	0.053	0.106	0.055	0.093	0.051	0.101
DR282	1.743	60.99	2.636	0.048	0.065	0.049	0.057	0.048	0.062
DR277	2.005	60.17	3.224	0.051	0.054	0.052	0.047	0.05	0.051
DR278	2.522	63.02	3.957	0.051	0.036	0.054	0.031	0.05	0.034
DR280	2.95	66.22	4.109	0.045	0.026	0.045	0.023	0.046	0.024
DR281	3.349	65.09	5.158	0.051	0.02	0.051	0.018	0.052	0.017
	25 kts								
DR292	0.993	63.71	1.44	0.048	0.109	0.051	0.101	0.046	0.103
DR301	1.244	62.08	2.015	0.058	0.13	0.062	0.125	0.056	0.119
DR293	1.482	58.67	2.413	0.053	0.112	0.053	0.102	0.054	0.105
DR302	1.69	63.8	2.65	0.046	0.086	0.045	0.077	0.048	0.083
DR294	1.985	60.14	3.263	0.052	0.065	0.052	0.059	0.052	0.061
DR295	2.025	50.97	3.789	0.063	0.079	0.065	0.07	0.06	0.075
DR300	2.423	58.69	3.78	0.054	0.048	0.054	0.044	0.054	0.045
DR296	2.941	68.34	4.067	0.046	0.031	0.046	0.028	0.047	0.029

Table 25. Acceleration Amp. For TH Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Wall Hull	GM(1.5m),	BK(1.25m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
0 kts									
dr151	1.006	55.15	1.505	0.998	1.882	0.061	7.062	0.206	0.311
dr152	1.509	55.43	2.482	0.997	5.614	0.247	17.035	0.719	0.294
dr156	1.753	70.75	3.007	0.998	7.953	0.176	21.496	0.542	0.638
dr153	1.995	62.13	2.931	0.999	10.641	0.286	27.723	0.855	1.285
dr157	2.225	47.73	3.35	0.995	10.651	0.377	26.232	0.985	0.933
dr154	2.489	56.23	4.573	0.998	7.171	0.647	16.544	1.583	0.862
dr155	2.988	66.48	5.021	0.998	5.581	0.545	11.718	1.193	0.775
dr158	3.421	62.35	6.064	0.99	4.802	0.25	9.303	0.501	0.269
5 kts									
DR127	1.005	60.42	1.367	0.988	2.014	0.092	7.43	0.353	0.252
DR128	1.512	59.85	2.299	0.992	5.45	0.044	16.39	0.151	0.654
dr134	1.761	60.3	2.69	0.992	7.657	0.139	21.511	0.433	0.851
DR129	2.066	62.37	2.593	0.993	9.526	0.6	24.894	1.401	0.305
DR133	2.236	63.53	3.973	0.974	8.722	0.414	21.599	1.042	1.153
DR130	2.482	60.66	4.077	0.994	7.567	0.144	17.477	0.337	0.612
DR131	2.949	57.42	4.747	0.998	6.177	0.253	12.904	0.568	0.506
DR132	3.471	70.98	6.819	0.993	4.507	0.15	8.728	0.309	0.444
15 kts									
dr136	0.985	58.72	1.58	0.975	2.043	0.041	7.631	0.225	0.549
dr137	1.502	60.08	2.447	0.964	4.623	0.119	14.101	0.378	0.461
dr142	1.748	59.27	2.844	0.991	6.363	0.027	17.931	0.155	0.74
dr138	1.997	57.49	3.307	0.996	7.959	0.062	20.878	0.198	0.708
dr143	2.264	59.75	3.722	0.973	7.589	0.124	18.814	0.327	0.469
dr139	2.502	56.57	3.885	0.991	7.373	0.09	17.342	0.206	0.423
dr140	2.988	64.35	4.383	0.991	5.442	0.053	11.673	0.096	0.24
dr141	3.461	62.12	5.842	0.98	4.869	0.157	9.693	0.312	0.081
25 kts									
dr144	1.022	60.49	1.643	0.942	1.872	0.222	7.235	0.864	0.297
dr145	1.511	57.99	2.37	0.99	4.098	0.129	12.464	0.366	0.181
dr146	2.017	60.03	3.239	0.927	5.195	0.06	14.035	0.23	0.355
dr147	2.489	60.86	3.912	0.986	6.101	0.036	14.325	0.162	0.192
dr148	3.065	62.17	4.286	0.93	5.677	0.101	11.655	0.178	0.236
dr149	3.413	58.3	6.065	0.986	5.472	0.098	10.687	0.129	0.167

Table 26. Motion Amplitude for Wall Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Wall Hull	GM(1.5m)	BK(1.25m)	Accelerations						
90 DEG			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
RUN	λ/L	λ/H	inch AMP1	g's AMP1	g's AMP1	g's AMP1	g's AMP1	g's AMP1	g's AMP1
	0 kts								
dr151	1.006	55.15	1.505	0.052	0.074	0.05	0.072	0.054	0.068
dr152	1.509	55.43	2.482	0.053	0.136	0.049	0.127	0.057	0.13
dr156	1.753	70.75	3.007	0.049	0.162	0.05	0.155	0.047	0.153
dr153	1.995	62.13	2.931	0.054	0.205	0.056	0.2	0.051	0.19
dr157	2.225	47.73	3.35	0.061	0.169	0.065	0.162	0.056	0.157
dr154	2.489	56.23	4.573	0.047	0.091	0.046	0.088	0.049	0.082
dr155	2.988	66.48	5.021	0.047	0.055	0.041	0.054	0.054	0.049
dr158	3.421	62.35	6.064	0.052	0.039	0.054	0.036	0.051	0.036
	5 kts								
DR127	1.005	60.42	1.367	0.054	0.077	0.054	0.074	0.054	0.072
DR128	1.512	59.85	2.299	0.054	0.135	0.055	0.13	0.055	0.127
dr134	1.761	60.3	2.69	0.053	0.164	0.055	0.157	0.051	0.153
DR129	2.066	62.37	2.593	0.054	0.17	0.058	0.157	0.05	0.162
DR133	2.236	63.53	3.973	0.056	0.142	0.057	0.139	0.054	0.129
DR130	2.482	60.66	4.077	0.054	0.096	0.053	0.09	0.054	0.088
DR131	2.949	57.42	4.747	0.048	0.063	0.045	0.059	0.051	0.057
DR132	3.471	70.98	6.819	0.049	0.037	0.048	0.036	0.05	0.033
	15 kts								
dr136	0.985	58.72	1.58	0.056	0.079	0.058	0.078	0.055	0.072
dr137	1.502	60.08	2.447	0.053	0.115	0.054	0.11	0.052	0.109
dr142	1.748	59.27	2.844	0.053	0.136	0.052	0.131	0.054	0.129
dr138	1.997	57.49	3.307	0.054	0.147	0.052	0.139	0.054	0.139
dr143	2.264	59.75	3.722	0.058	0.121	0.058	0.115	0.057	0.116
dr139	2.502	56.57	3.885	0.051	0.101	0.05	0.095	0.051	0.096
dr140	2.988	64.35	4.383	0.047	0.058	0.047	0.054	0.047	0.056
dr141	3.461	62.12	5.842	0.058	0.044	0.06	0.041	0.056	0.043
	25 kts								
dr144	1.022	60.49	1.643	0.051	0.07	0.052	0.067	0.051	0.068
dr145	1.511	57.99	2.37	0.053	0.106	0.052	0.101	0.054	0.103
dr146	2.017	60.03	3.239	0.053	0.107	0.053	0.103	0.053	0.103
dr147	2.489	60.86	3.912	0.051	0.096	0.051	0.09	0.051	0.094
dr148	3.065	62.17	4.286	0.047	0.073	0.049	0.069	0.046	0.071
dr149	3.413	58.3	6.065	0.059	0.063	0.06	0.059	0.059	0.061

Table 27. Acceleration Amp. for Wall Hull (GM=1.5m & BK=1.25m) in Beam Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
90 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
DR53	0.999	57.84	1.637	0.989	1.334	0.095	5.045	0.354	0.453
DR54	1.513	62.83	2.281	0.989	3.86	0.453	11.512	1.363	1.099
DR61	1.748	49.23	3.364	0.999	5.953	0.185	16.614	0.572	0.516
DR59	1.991	65.58	2.876	0.99	8.044	0.273	20.889	0.702	1.02
DR60	2.247	65.18	3.266	0.991	8.833	0.34	21.642	0.786	1.055
DR56	2.496	51.86	4.56	0.998	7.765	0.269	18.122	0.671	0.447
DR57	2.964	53.1	5.289	0.999	5.221	0.572	10.892	1.21	0.661
DR58	3.449	58.67	5.57	0.998	4.458	0.489	8.702	0.976	0.575
DR62	3.836	60.56	6	0.985	4.892	0.376	8.986	0.678	0.729
	5 kts								
DR22	1.01	56.03	1.708	0.987	1.785	0.141	6.788	0.52	0.2
DR27	1.499	53.85	2.637	0.979	4.284	0.064	13.003	0.182	0.598
DR24	1.965	61.58	3.024	0.974	8.048	0.093	20.791	0.221	0.888
DR29	2.239	56.84	3.733	0.989	9.482	0.246	23.23	0.67	0.415
DR25	2.489	58.44	4.035	0.995	9.171	0.406	21.442	0.98	0.749
DR30	2.727	54.61	4.731	0.994	7.537	0.373	16.484	0.835	0.593
DR26	2.988	56.18	5.038	0.997	6.101	0.325	12.645	0.654	0.386
DR31	3.502	54.86	6.048	0.981	5.317	0.296	10.158	0.574	0.426
	15 kts								
DR32	1.01	55.88	1.713	0.916	1.575	0.083	6.16	0.35	0.548
DR33	1.528	64.04	2.261	0.988	3.711	0.031	11.204	0.107	0.443
DR34	1.985	60.18	3.125	0.982	6.541	0.029	16.882	0.132	0.395
DR38	2.239	57.68	3.678	0.978	7.228	0.095	17.904	0.269	0.522
DR35	2.489	59.36	3.973	0.991	7.094	0.059	16.76	0.137	0.504
DR36	2.941	60.46	4.609	0.993	4.879	0.196	10.385	0.545	0.396
DR37	3.461	62.25	5.267	0.967	4.82	0.046	9.422	0.081	0.184
DR39	3.848	57.34	6.358	0.979	4.808	0.115	8.843	0.214	0.338
	25 kts								
DR40	1.012	59.07	1.623	0.918	1.643	0.217	6.088	0.807	0.328
DR44	1.508	63.81	2.238	0.99	3.021	0.097	9.472	0.272	0.145
DR45	1.974	57.94	3.227	0.751	4.618	0.186	11.983	0.467	0.189
DR49	2.179	53.3	3.873	0.966	6.407	0.159	15.194	0.508	0.141
DR46	2.489	57.27	4.117	0.887	6.314	0.189	14.213	0.458	0.344
DR52	2.879	62.93	4.335	0.987	5.679	0.044	12.464	0.134	0.338
DR48	3.445	60.93	5.357	0.983	5.261	0.1	10.442	0.138	0.212
DR50	3.775	55.9	6.398	0.884	5.125	0.146	9.549	0.243	0.218

Table 28. Motion Amplitudes for Wall Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	TranBow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
DR53	0.999	57.84	1.637	0.052	0.066	0.054	0.066	0.05	0.059
DR54	1.513	62.83	2.281	0.048	0.107	0.055	0.108	0.045	0.096
DR61	1.748	49.23	3.364	0.049	0.138	0.045	0.13	0.052	0.131
DR59	1.991	65.58	2.876	0.063	0.166	0.063	0.161	0.063	0.155
DR60	2.247	65.18	3.266	0.062	0.154	0.061	0.15	0.063	0.142
DR56	2.496	51.86	4.56	0.051	0.107	0.052	0.1	0.052	0.101
DR57	2.964	53.1	5.289	0.049	0.047	0.058	0.039	0.042	0.048
DR58	3.449	58.67	5.57	0.049	0.04	0.048	0.038	0.051	0.036
DR62	3.836	60.56	6	0.048	0.039	0.046	0.04	0.051	0.034
	5 kts								
DR22	1.01	56.03	1.708	0.061	0.078	0.063	0.074	0.059	0.073
DR27	1.499	53.85	2.637	0.049	0.116	0.048	0.11	0.049	0.107
DR24	1.965	61.58	3.024	0.059	0.165	0.06	0.156	0.059	0.155
DR29	2.239	56.84	3.733	0.064	0.158	0.068	0.143	0.062	0.152
DR25	2.489	58.44	4.035	0.057	0.133	0.055	0.123	0.062	0.126
DR30	2.727	54.61	4.731	0.056	0.086	0.059	0.078	0.055	0.081
DR26	2.988	56.18	5.038	0.054	0.06	0.058	0.053	0.052	0.057
DR31	3.502	54.86	6.048	0.056	0.044	0.057	0.04	0.056	0.042
	15 kts								
DR32	1.01	55.88	1.713	0.06	0.075	0.062	0.074	0.058	0.069
DR33	1.528	64.04	2.261	0.051	0.099	0.053	0.096	0.049	0.094
DR34	1.985	60.18	3.125	0.054	0.128	0.057	0.12	0.052	0.123
DR38	2.239	57.68	3.678	0.056	0.126	0.056	0.118	0.057	0.121
DR35	2.489	59.36	3.973	0.053	0.104	0.054	0.099	0.053	0.099
DR36	2.941	60.46	4.609	0.042	0.052	0.046	0.049	0.039	0.049
DR37	3.461	62.25	5.267	0.051	0.046	0.052	0.044	0.051	0.044
DR39	3.848	57.34	6.358	0.054	0.038	0.054	0.035	0.054	0.036
	25 kts								
DR40	1.012	59.07	1.623	0.052	0.069	0.055	0.066	0.05	0.068
DR44	1.508	63.81	2.238	0.05	0.088	0.05	0.084	0.05	0.085
DR45	1.974	57.94	3.227	0.044	0.095	0.048	0.09	0.041	0.093
DR49	2.179	53.3	3.873	0.052	0.12	0.056	0.114	0.049	0.118
DR46	2.489	57.27	4.117	0.05	0.106	0.053	0.099	0.048	0.105
DR52	2.879	62.93	4.335	0.05	0.079	0.053	0.076	0.048	0.076
DR48	3.445	60.93	5.357	0.052	0.062	0.052	0.059	0.051	0.06
DR50	3.775	55.9	6.398	0.055	0.05	0.054	0.048	0.055	0.049

Table 29. Acceleration Amp. for Wall Hull (GM=1.5m & BK=1.75m) in Beam Waves.

Wall Hull	GM(2.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
			inch	deg	deg	deg	dps	dps	dps
RUN									
	0 kts								
dr466	1.001	56.54	1.508	0.968	6.592	0.156	24.292	0.671	1.337
dr469	1.257	60.63	2.016	0.996	8.195	0.328	26.725	1.193	1.339
dr467	1.513	55.75	2.457	0.993	7.049	0.086	20.805	0.25	0.834
dr468	1.994	59.5	2.824	0.993	5.23	0.089	13.275	0.234	0.446
dr470	2.48	56.19	4.401	0.989	4.08	0.514	9.375	1.237	0.507
dr471	2.971	64.14	5.215	0.985	3.781	0.534	7.861	1.171	0.69
dr472	3.447	61.4	6.041	0.924	3.504	0.448	6.416	0.933	0.597
dr473	3.872	59.87	5.629	0.748	3.755	0.406	6.947	0.764	0.544
	5 kts								
dr441	1.001	59.8	1.504	0.997	6.111	0.125	22.572	0.438	0.747
dr447	1.124	55.36	1.994	0.992	7.937	0.205	27.804	0.776	1.552
dr446	1.259	64.34	1.797	0.997	7.621	0.118	24.776	0.368	0.781
dr442	1.485	63.99	2.593	0.999	6.317	0.358	18.868	1.136	0.863
dr443	1.989	65.63	3.189	0.992	4.79	0.158	12.239	0.428	0.371
dr444	2.471	59.28	4.154	0.985	4.289	0.045	9.763	0.106	0.379
dr445	2.966	59.54	4.927	0.982	3.964	0.104	8.239	0.226	0.356
dr448	3.432	60.29	6.414	0.942	3.789	0.109	7.197	0.227	0.324
dr449	3.856	57.64	6.502	0.798	3.667	0.367	6.68	0.705	0.486
	15 kts								
dr450	1.005	62.35	1.563	0.988	6.07	0.086	22.481	0.311	0.857
dr454	1.265	65.74	1.899	0.992	6.765	0.083	22.34	0.328	0.803
dr451	1.504	59.84	2.434	0.944	5.926	0.089	17.641	0.242	0.492
dr452	2.02	60.28	3.244	0.972	4.919	0.088	12.744	0.239	0.358
dr453	2.504	54.31	3.841	0.987	4.762	0.092	10.931	0.195	0.306
dr455	2.946	57.61	4.43	0.978	4.135	0.104	8.778	0.242	0.158
dr456	3.401	58.29	5.903	0.96	3.825	0.133	7.549	0.264	0.097
dr457	3.848	55.95	6.353	0.858	3.725	0.218	6.888	0.415	0.19
	25 kts								
dr458	0.993	60.26	1.568	0.945	4.72	0.111	17.799	0.38	0.402
dr461	1.249	63.21	1.875	0.991	6.239	0.074	20.479	0.28	0.417
dr459	1.512	61.18	2.405	0.979	6.201	0.063	18.505	0.305	0.377
dr460	1.995	56.99	3.114	0.982	5.213	0.051	13.335	0.157	0.228
dr462	2.439	56.31	3.791	0.96	4.457	0.065	10.341	0.15	0.134
dr463	2.988	61.49	4.412	0.982	3.902	0.125	8.431	0.308	0.133
dr464	3.421	57.79	6.2	0.968	3.981	0.036	7.892	0.155	0.077
dr465	3.787	56.6	6.177	0.932	3.951	0.041	7.332	0.124	0.109

Table 30. Motion Amplitude for Wall Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Wall Hull	GM(2.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr466	1.001	56.54	1.508	0.051	0.14	0.052	0.137	0.05	0.121
dr469	1.257	60.63	2.016	0.053	0.131	0.057	0.127	0.05	0.112
dr467	1.513	55.75	2.457	0.054	0.086	0.052	0.078	0.056	0.076
dr468	1.994	59.5	2.824	0.059	0.043	0.061	0.04	0.057	0.038
dr470	2.48	56.19	4.401	0.047	0.027	0.047	0.026	0.049	0.023
dr471	2.971	64.14	5.215	0.047	0.021	0.041	0.022	0.054	0.016
dr472	3.447	61.4	6.041	0.052	0.016	0.054	0.014	0.051	0.014
dr473	3.872	59.87	5.629	0.045	0.017	0.048	0.012	0.043	0.018
	5 kts								
dr441	1.001	59.8	1.504	0.052	0.131	0.052	0.122	0.052	0.119
dr447	1.124	55.36	1.994	0.06	0.155	0.062	0.151	0.059	0.134
dr446	1.259	64.34	1.797	0.05	0.117	0.051	0.107	0.048	0.106
dr442	1.485	63.99	2.593	0.053	0.078	0.057	0.074	0.049	0.066
dr443	1.989	65.63	3.189	0.049	0.04	0.051	0.036	0.047	0.035
dr444	2.471	59.28	4.154	0.053	0.028	0.052	0.025	0.053	0.025
dr445	2.966	59.54	4.927	0.048	0.021	0.047	0.02	0.049	0.018
dr448	3.432	60.29	6.414	0.06	0.017	0.059	0.017	0.06	0.015
dr449	3.856	57.64	6.502	0.05	0.016	0.05	0.017	0.051	0.013
	15 kts								
dr450	1.005	62.35	1.563	0.054	0.126	0.053	0.118	0.054	0.115
dr454	1.265	65.74	1.899	0.051	0.105	0.052	0.097	0.049	0.095
dr451	1.504	59.84	2.434	0.052	0.074	0.053	0.066	0.051	0.07
dr452	2.02	60.28	3.244	0.053	0.045	0.054	0.041	0.052	0.042
dr453	2.504	54.31	3.841	0.053	0.035	0.054	0.031	0.052	0.033
dr455	2.946	57.61	4.43	0.052	0.025	0.052	0.022	0.051	0.023
dr456	3.401	58.29	5.903	0.058	0.021	0.059	0.019	0.057	0.02
dr457	3.848	55.95	6.353	0.053	0.017	0.053	0.016	0.052	0.015
	25 kts								
dr458	0.993	60.26	1.568	0.056	0.108	0.06	0.101	0.053	0.1
dr461	1.249	63.21	1.875	0.051	0.106	0.052	0.096	0.051	0.1
dr459	1.512	61.18	2.405	0.052	0.085	0.053	0.076	0.051	0.082
dr460	1.995	56.99	3.114	0.055	0.053	0.056	0.047	0.054	0.05
dr462	2.439	56.31	3.791	0.053	0.037	0.054	0.033	0.052	0.036
dr463	2.988	61.49	4.412	0.053	0.026	0.055	0.024	0.05	0.025
dr464	3.421	57.79	6.2	0.061	0.024	0.061	0.022	0.06	0.023
dr465	3.787	56.6	6.177	0.055	0.023	0.054	0.02	0.055	0.023

Table 31. Acceleration Amp. for Wall Hull (GM=2.5m & BK=1.75m) in Beam Waves.

Wall Hull	GM2.5m)	BK(1.25m)		Motions					
				Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate
90 DEG	A/L	A/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	0 kts								
dr419	0.998	58.33	1.498	0.978	8.613	0.167	31.499	0.576	0.88
dr423	1.127	62.13	2.012	0.973	10.209	0.21	34.798	0.723	0.978
dr422	1.25	59.54	2.028	0.995	8.902	0.247	29.011	0.89	1.273
dr420	1.515	57	2.387	0.998	6.316	0.468	18.409	1.432	1.245
dr424	2.48	51.6	4.615	0.985	4.185	0.452	9.459	1.077	0.384
dr427	2.982	68.51	5.058	0.978	3.505	0.592	7.24	1.297	0.733
dr428	3.485	63.22	5.906	0.972	3.409	0.509	6.602	1.149	0.643
dr429	3.889	60.67	5.572	0.669	3.789	0.423	6.886	0.798	0.623
	5 kts								
dr393	1.011	64.49	1.513	0.943	7.508	0.17	27.518	0.732	1.56
dr400	1.125	51.85	1.926	0.999	10.287	0.223	35.224	0.864	1.671
dr399	1.256	65.7	1.881	1	7.45	0.082	24.075	0.26	0.849
dr394	1.512	55.98	2.565	0.988	6.413	0.202	18.92	0.612	0.545
dr395	2.021	64.29	2.798	0.989	4.852	0.219	12.316	0.56	0.139
dr396	2.495	55.99	4.347	0.981	4.325	0.203	9.984	0.501	0.546
dr397	2.988	60.18	4.936	0.964	3.665	0.344	7.752	0.768	0.487
dr398	3.425	62.89	5.093	0.867	3.375	0.274	6.607	0.623	0.262
dr401	3.848	56.91	6.449	0.744	3.822	0.365	6.801	0.738	0.534
	15 kts								
dr402	1.007	60.48	1.544	0.998	7.772	0.097	28.444	0.388	1.041
dr407	1.121	50.84	2.126	0.989	8.857	0.141	31.037	0.556	1.306
dr408	1.121	53.55	2.03	0.988	8.543	0.158	29.998	0.628	1.259
dr406	1.225	66.25	1.791	0.999	6.845	0.049	22.28	0.142	0.793
dr404	1.482	58.84	2.445	0.992	6.478	0.1	19.317	0.347	0.751
dr405	2	59.44	3.063	0.984	4.892	0.029	12.492	0.053	0.38
dr409	2.518	53.82	4.018	0.989	4.43	0.011	10.183	0.035	0.15
dr411	3.83	56.15	6.217	0.832	3.71	0.207	6.746	0.405	0.187
	25 kts								
dr412	1.016	62.44	1.579	0.97	6.127	0.154	22.318	0.536	0.372
dr415	1.265	64.86	1.856	0.99	6.486	0.121	20.808	0.355	0.405
dr413	1.514	59.22	2.466	0.988	6.165	0.038	18.376	0.181	0.443
dr414	1.992	58.95	3.131	0.976	5.036	0.064	12.978	0.139	0.24
dr416	2.48	58.07	4.07	0.979	4.425	0.046	10.211	0.109	0.112
dr417	3.175	57.01	4.993	0.955	3.85	0.166	8.095	0.338	0.179
dr418	3.718	51.75	6.239	0.898	3.957	0.093	7.198	0.314	0.187

Table 32. Motion Amplitude for Wall Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Wall Hull	GM(2.5m)	BK(1.25m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
90 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	0 kts								
dr419	0.998	58.33	1.498	0.048	0.162	0.047	0.147	0.049	0.146
dr423	1.127	62.13	2.012	0.056	0.168	0.058	0.153	0.052	0.152
dr422	1.25	59.54	2.028	0.053	0.129	0.054	0.121	0.052	0.11
dr420	1.515	57	2.387	0.053	0.067	0.053	0.061	0.058	0.059
dr424	2.48	51.6	4.615	0.049	0.025	0.05	0.023	0.048	0.021
dr427	2.982	68.51	5.058	0.045	0.018	0.039	0.019	0.051	0.014
dr428	3.485	63.22	5.906	0.051	0.014	0.052	0.012	0.052	0.013
dr429	3.889	60.67	5.572	0.046	0.015	0.049	0.012	0.043	0.016
	5 kts								
dr393	1.011	64.49	1.513	0.051	0.151	0.054	0.146	0.049	0.128
dr400	1.125	51.85	1.926	0.063	0.174	0.065	0.167	0.061	0.151
dr399	1.256	65.7	1.881	0.049	0.102	0.05	0.093	0.048	0.09
dr394	1.512	55.98	2.565	0.056	0.071	0.058	0.064	0.054	0.062
dr395	2.021	64.29	2.798	0.049	0.037	0.053	0.031	0.044	0.034
dr396	2.495	55.99	4.347	0.059	0.028	0.058	0.027	0.06	0.023
dr397	2.988	60.18	4.936	0.05	0.02	0.048	0.02	0.052	0.016
dr398	3.425	62.89	5.093	0.062	0.015	0.065	0.013	0.058	0.014
dr401	3.848	56.91	6.449	0.053	0.016	0.054	0.017	0.053	0.012
	15 kts								
dr402	1.007	60.48	1.544	0.055	0.146	0.056	0.136	0.054	0.131
dr407	1.121	50.84	2.126	0.065	0.15	0.064	0.141	0.064	0.132
dr408	1.121	53.55	2.03	0.063	0.144	0.063	0.136	0.061	0.127
dr406	1.225	66.25	1.791	0.047	0.097	0.046	0.089	0.048	0.087
dr404	1.482	58.84	2.445	0.056	0.078	0.054	0.072	0.056	0.069
dr405	2	59.44	3.063	0.051	0.042	0.051	0.037	0.051	0.039
dr409	2.518	53.82	4.018	0.05	0.03	0.05	0.026	0.052	0.029
dr411	3.83	56.15	6.217	0.052	0.016	0.053	0.014	0.051	0.014
	25 kts								
dr412	1.016	62.44	1.579	0.051	0.123	0.053	0.11	0.05	0.116
dr415	1.265	64.86	1.856	0.048	0.099	0.049	0.088	0.048	0.095
dr413	1.514	59.22	2.466	0.053	0.079	0.053	0.07	0.053	0.076
dr414	1.992	58.95	3.131	0.053	0.048	0.054	0.042	0.053	0.045
dr416	2.48	58.07	4.07	0.055	0.033	0.055	0.029	0.055	0.032
dr417	3.175	57.01	4.993	0.056	0.024	0.056	0.022	0.056	0.021
dr418	3.718	51.75	6.239	0.055	0.02	0.055	0.019	0.056	0.018

Table 33. Acceleration Amp. for Wall Hull (GM=2.5m & BK=1.25m) in Beam Waves.

Flare Hull	GM(1.5m)	BK(1.25m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr115	1	56.91	1.665	0.981	1.495	1.423	5.778	6.013	1.786
dr116	1.5	51.4	2.765	0.99	3.869	1.805	12.225	6.161	2.645
dr117	1.75	56.91	2.913	0.979	4.676	1.982	13.961	6.223	2.831
dr118	2	56.62	3.346	0.993	6.571	1.874	18.583	5.402	2.882
dr119	2.246	56.03	3.798	0.989	7.004	2.06	18.827	5.562	2.772
dr120	2.492	63.14	3.74	0.993	6.144	1.594	15.364	4.122	2.813
dr127	2.734	51.64	5.015	0.988	5.584	2.182	13.399	5.338	2.339
dr126	2.973	56.58	4.978	0.992	3.658	1.874	8.401	4.45	1.956
dr123	3.434	68.27	4.766	0.994	3.786	1.944	8.057	4.181	2.044
dr124	3.871	59.29	6.185	0.962	3.011	1.837	6.273	3.626	1.87
	15 kts								
dr130	0.5	55.02	0.861	0.806	0.118	0.221	0.9	1.743	0.35
dr129	1	60.38	1.569	0.893	0.876	1.617	3.992	8.331	1.595
dr128	1.5	53.47	2.658	0.961	1.94	2.111	7.192	8.434	2.456
dr131	2	61.5	3.08	0.967	2.992	1.976	9.834	6.615	2.567
dr134	2.246	61.87	3.439	0.968	4.381	1.788	13.439	5.557	2.742
dr132	2.492	53.38	4.424	0.989	4.637	2.117	13.384	6.193	2.545
dr133	2.734	57.81	4.48	0.985	4.388	2.257	12.054	6.261	2.158
dr137	2.973	64.81	4.345	0.985	4.68	1.92	12.197	5.048	1.986
dr136	3.871	66.74	5.495	0.977	3.656	1.792	7.817	4.087	1.928
	25 kts								
dr139	1	61.57	1.539	0.189	0.441	1.712	1.811	10.149	1.351
dr141	1.75	54.69	3.031	0.496	1.073	2.386	4.337	9.862	2.571
dr142	2	57.66	3.285	0.829	1.611	2.203	6.076	8.246	2.485
dr147	2.246	65.25	3.261	0.899	1.271	1.787	5.482	6.329	2.67
dr148	2.492	53.53	4.412	0.89	1.988	2.06	6.866	6.815	2.174
dr149	2.734	56.89	4.552	0.958	2.761	2.195	8.291	6.754	2.189
dr150	2.973	57.56	4.893	0.953	2.066	2.462	6.665	7.979	2.137
dr151	3.434	70.45	4.618	0.97	3.895	1.796	10.748	4.862	1.979
dr152	3.871	67.48	5.435	0.972	4.489	1.809	10.436	4.64	1.724

Table 34. Motion Amplitudes for Flared Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Flare Hull	GM(1.5m)	BK(1.25m)		Accelerations					
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr115	1	56.91	1.665	0.037	0.038	0.104	0.032	0.071	0.053
dr116	1.5	51.4	2.765	0.048	0.092	0.092	0.087	0.067	0.094
dr117	1.75	56.91	2.913	0.059	0.114	0.094	0.116	0.073	0.106
dr118	2	56.62	3.346	0.057	0.144	0.083	0.15	0.066	0.126
dr119	2.246	56.03	3.798	0.054	0.139	0.08	0.149	0.066	0.116
dr120	2.492	63.14	3.74	0.051	0.112	0.069	0.127	0.055	0.087
dr127	2.734	51.64	5.015	0.063	0.088	0.081	0.099	0.071	0.068
dr126	2.973	56.58	4.978	0.057	0.05	0.073	0.06	0.059	0.035
dr123	3.434	68.27	4.766	0.049	0.043	0.061	0.054	0.053	0.029
dr124	3.871	59.29	6.185	0.051	0.026	0.06	0.034	0.052	0.018
	15 kts								
dr130	0.5	55.02	0.861	0.018	0.003	0.065	0.01	0.026	0.008
dr129	1	60.38	1.569	0.067	0.03	0.185	0.035	0.101	0.043
dr128	1.5	53.47	2.658	0.082	0.065	0.156	0.068	0.108	0.07
dr131	2	61.5	3.08	0.073	0.086	0.114	0.09	0.089	0.079
dr134	2.246	61.87	3.439	0.069	0.111	0.095	0.119	0.08	0.097
dr132	2.492	53.38	4.424	0.08	0.106	0.109	0.116	0.09	0.087
dr133	2.734	57.81	4.48	0.082	0.087	0.108	0.098	0.091	0.068
dr137	2.973	64.81	4.345	0.072	0.078	0.089	0.088	0.08	0.059
dr136	3.871	66.74	5.495	0.066	0.031	0.075	0.038	0.07	0.024
	25 kts								
dr139	1	61.57	1.539	0.141	0.026	0.327	0.037	0.137	0.034
dr141	1.75	54.69	3.031	0.119	0.057	0.207	0.07	0.142	0.059
dr142	2	57.66	3.285	0.109	0.066	0.169	0.077	0.125	0.062
dr147	2.246	65.25	3.261	0.086	0.062	0.118	0.073	0.1	0.057
dr148	2.492	53.53	4.412	0.101	0.064	0.139	0.077	0.108	0.053
dr149	2.734	56.89	4.552	0.101	0.066	0.131	0.079	0.111	0.05
dr150	2.973	57.56	4.893	0.114	0.056	0.152	0.069	0.125	0.042
dr151	3.434	70.45	4.618	0.083	0.052	0.096	0.066	0.09	0.033
dr152	3.871	67.48	5.435	0.082	0.04	0.091	0.045	0.09	0.033

Table 35. Acceleration Amp. For Flared Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Flare Hull	GM(1.5m),	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr513	1	59.34	1.596	0.9	1.289	1.464	4.722	6.197	1.882
dr514	1.5	58.51	2.429	0.956	2.956	1.906	9.204	6.396	2.468
dr515	2	55.65	3.404	0.994	5.681	1.956	15.673	5.633	2.637
dr520	2.246	58.54	3.635	1	6.577	2.085	17.325	5.7	2.907
dr516	2.492	69.56	3.395	0.996	7.153	2.051	18.135	5.354	2.881
dr517	2.973	71.97	3.913	0.977	5.81	1.744	13.53	3.949	2.245
dr518	3.434	71.89	4.526	0.919	4.33	1.584	9.17	3.376	2.064
dr519	3.871	66.2	5.54	0.988	3.581	2.16	7.019	4.146	2.319
	15 kts								
dr529	0.75	57.02	1.246	0.421	0.538	1.084	2.168	6.152	1.276
dr521	1	62.12	1.525	0.211	0.731	1.842	3.042	9.557	1.756
dr522	1.5	63.97	2.222	0.845	1.32	1.906	4.722	7.575	2.144
dr528	1.75	51.19	3.238	0.889	1.59	2.075	5.274	7.474	2.255
dr523	2	58.52	3.237	0.876	2.288	2.255	7.255	7.556	2.336
dr524	2.492	61.84	3.819	0.962	3.382	1.878	10.158	5.395	2.562
dr525	2.973	55.92	5.036	0.987	3.921	2.106	10.368	5.555	2.046
dr526	3.434	54.67	5.951	0.987	4.103	2.075	9.983	5.181	2.249
	25 kts								
dr564	1	60.93	1.555	0.109	0.276	1.818	0.895	10.969	1.557
dr565	1.5	59.54	2.387	0.316	0.525	1.922	2.61	8.536	2.56
dr566	2	61.21	3.095	0.535	1.501	2.191	3.62	8.151	2.295
dr568	2.492	56.88	4.151	0.873	1.349	1.904	4.872	6.187	2.328
dr569	2.973	56.85	4.954	0.924	2.345	2.007	6.982	6.157	1.82
dr570	3.434	60.94	5.34	0.952	3.925	1.92	10.123	5.215	2.101
dr571	3.871	60.69	6.043	0.988	3.911	1.99	8.905	4.912	1.78

Table 36. Motion Amplitudes for Flared Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Flare Hull	GM(1.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr513	1	59.34	1.596	0.034	0.032	0.103	0.026	0.069	0.05
dr514	1.5	58.51	2.429	0.053	0.077	0.099	0.074	0.07	0.081
dr515	2	55.65	3.404	0.047	0.124	0.074	0.124	0.064	0.116
dr520	2.246	58.54	3.635	0.053	0.139	0.075	0.146	0.069	0.122
dr516	2.492	69.56	3.395	0.055	0.138	0.071	0.149	0.07	0.114
dr517	2.973	71.97	3.913	0.051	0.086	0.059	0.095	0.059	0.067
dr518	3.434	71.89	4.526	0.053	0.048	0.06	0.056	0.057	0.037
dr519	3.871	66.2	5.54	0.065	0.037	0.071	0.047	0.07	0.024
	15 kts								
dr529	0.75	57.02	1.246	0.063	0.019	0.175	0.023	0.082	0.036
dr521	1	62.12	1.525	0.077	0.028	0.217	0.037	0.117	0.043
dr522	1.5	63.97	2.222	0.07	0.048	0.139	0.053	0.099	0.056
dr528	1.75	51.19	3.238	0.078	0.059	0.135	0.063	0.098	0.061
dr523	2	58.52	3.237	0.081	0.073	0.128	0.077	0.1	0.071
dr524	2.492	61.84	3.819	0.071	0.091	0.094	0.103	0.079	0.076
dr525	2.973	55.92	5.036	0.075	0.077	0.095	0.088	0.082	0.059
dr526	3.434	54.67	5.951	0.072	0.06	0.085	0.071	0.08	0.043
	25 kts								
dr564	1	60.93	1.555	0.148	0.027	0.336	0.043	0.146	0.038
dr565	1.5	59.54	2.387	0.104	0.048	0.192	0.064	0.123	0.056
dr566	2	61.21	3.095	0.105	0.06	0.166	0.074	0.121	0.054
dr568	2.492	56.88	4.151	0.092	0.058	0.126	0.071	0.1	0.05
dr569	2.973	56.85	4.954	0.097	0.049	0.122	0.063	0.104	0.032
dr570	3.434	60.94	5.34	0.088	0.046	0.105	0.061	0.093	0.027
dr571	3.871	60.69	6.043	0.089	0.029	0.102	0.037	0.093	0.022

Table 37. Acceleration Amp. for Flared Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Flare Hull	GM(2.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	Λ/L	Λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr364	0.75	68.87	1.032	0.931	0.699	1.135	3.043	5.584	1.568
dr360	1	62.84	1.508	0.997	2.982	1.389	11.631	5.798	2.169
dr361	1.251	64.81	1.829	0.998	5.298	1.636	18.816	6.148	2.72
dr356	1.5	56.23	2.528	0.975	4.99	1.58	16.883	5.314	2.757
dr362	1.75	54.53	3.04	0.987	4.311	1.83	12.925	5.606	2.77
dr366	2	53.78	3.522	0.973	3.607	1.86	10.159	5.403	2.536
dr363	2.246	75.59	2.815	0.991	2.432	1.672	6.197	4.399	1.941
dr358	2.492	61.53	3.838	0.995	3.62	2.168	8.992	5.538	2.387
dr365	2.973	67.55	4.169	0.962	3.057	1.819	7.14	3.842	1.982
	15 kts								
dr373	0.75	56.68	1.254	0.748	0.321	1.341	1.621	8.221	1.212
dr367	1	61.18	1.548	0.966	0.974	1.816	4.495	9.263	1.802
dr371	1.251	67.7	1.75	0.957	2.183	1.96	8.93	8.956	2.122
dr368	1.5	64.82	2.193	0.986	4.033	1.793	15.532	7.125	2.69
dr372	1.75	63.36	2.616	0.992	5.39	1.895	19.156	6.866	2.909
dr369	2	54.91	3.45	1.001	5.863	2.041	18.856	6.819	2.723
dr370	2.492	62.63	3.77	0.994	4.451	1.871	12.847	5.435	2.09
dr374	2.973	56.18	5.013	0.948	3.162	2.149	7.675	5.787	1.885
dr375	3.434	63.94	5.089	0.998	3.192	1.998	7.36	4.872	1.892
	25 kts								
dr376	1	57.26	1.654	0.953	0.49	1.849	2.85	11.103	1.705
dr377	1.5	61.06	2.328	0.976	1.638	2.054	7.422	9.284	2.28
dr382	1.75	55.67	2.978	0.995	2.778	2.338	11.18	9.81	2.511
dr378	2	62.72	3.02	0.998	4.443	1.947	16.515	7.397	2.663
dr381	2.246	66.04	3.223	0.988	4.762	1.831	16.488	6.324	2.993
dr380	2.492	61.17	3.861	0.983	4.568	1.945	14.535	6.589	2.578
dr383	2.973	59.43	4.739	0.955	2.673	2.335	7.928	6.994	2.261
dr386	3.206	62.26	4.878	0.973	3.684	2.12	9.307	5.998	1.895
dr384	3.434	67.11	4.849	0.98	3.693	1.844	9.177	4.988	2.421

Table 38. Motion Amplitudes for Flared Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Flare Hull	GM(2.5m),	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr364	0.75	68.87	1.032	0.026	0.022	0.111	0.021	0.069	0.041
dr360	1	62.84	1.508	0.037	0.072	0.096	0.069	0.072	0.074
dr361	1.251	64.81	1.829	0.045	0.108	0.095	0.118	0.073	0.087
dr356	1.5	56.23	2.528	0.041	0.089	0.081	0.107	0.06	0.057
dr362	1.75	54.53	3.04	0.051	0.061	0.089	0.08	0.065	0.035
dr366	2	53.78	3.522	0.049	0.046	0.077	0.064	0.064	0.025
dr363	2.246	75.59	2.815	0.046	0.024	0.061	0.036	0.057	0.012
dr358	2.492	61.53	3.838	0.065	0.032	0.082	0.046	0.078	0.019
dr365	2.973	67.55	4.169	0.052	0.023	0.06	0.033	0.059	0.014
	15 kts								
dr373	0.75	56.68	1.254	0.081	0.016	0.238	0.025	0.1	0.033
dr367	1	61.18	1.548	0.074	0.036	0.212	0.044	0.113	0.047
dr371	1.251	67.7	1.75	0.073	0.061	0.176	0.066	0.113	0.06
dr368	1.5	64.82	2.193	0.07	0.097	0.131	0.109	0.095	0.077
dr372	1.75	63.36	2.616	0.078	0.105	0.124	0.123	0.096	0.071
dr369	2	54.91	3.45	0.08	0.093	0.12	0.109	0.099	0.06
dr370	2.492	62.63	3.77	0.075	0.05	0.098	0.062	0.083	0.033
dr374	2.973	56.18	5.013	0.082	0.021	0.104	0.031	0.088	0.016
dr375	3.434	63.94	5.089	0.078	0.017	0.096	0.026	0.077	0.018
	25 kts								
dr376	1	57.26	1.654	0.154	0.034	0.34	0.048	0.149	0.044
dr377	1.5	61.06	2.328	0.108	0.06	0.213	0.072	0.129	0.056
dr382	1.75	55.67	2.978	0.116	0.077	0.206	0.093	0.137	0.06
dr378	2	62.72	3.02	0.101	0.094	0.15	0.112	0.118	0.066
dr381	2.246	66.04	3.223	0.09	0.076	0.123	0.096	0.103	0.044
dr380	2.492	61.17	3.861	0.095	0.066	0.134	0.081	0.101	0.04
dr383	2.973	59.43	4.739	0.101	0.009	0.132	0.017	0.108	0.019
dr386	3.206	62.26	4.878	0.097	0.022	0.12	0.025	0.103	0.027
dr384	3.434	67.11	4.849	0.085	0.016	0.098	0.018	0.092	0.026

Table 39. Acceleration Amp. for Flared Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Flare Hull	GM(2.5m)	BK(1.25m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG			AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr312	0.75	72.49	0.98	0.952	0.878	0.983	3.779	4.692	1.32
dr300	1	54.62	1.734	0.992	3.953	1.53	15.824	6.434	2.255
dr305	1.251	56.91	2.082	0.998	5.986	1.621	21.27	6.108	2.745
dr301	1.5	53.83	2.641	0.998	5.554	2.032	18.267	6.999	2.927
dr306	1.75	61.82	2.682	0.991	4.779	1.902	14.529	5.906	2.914
dr302	2	53.68	3.529	0.994	3.876	1.974	10.838	5.719	2.488
dr307	2.246	55.63	3.825	0.987	2.804	2.001	7.491	5.483	2.218
dr304	2.492	61.64	3.831	0.97	2.466	1.897	6.444	4.951	2.264
dr308	2.973	50.06	5.626	0.97	2.079	2.045	4.941	5.499	2.037
dr310	3.434	63.56	5.119	0.928	2.499	2.286	5.193	5.149	2.065
dr311	3.871	64.99	5.643	0.863	2.5	1.892	3.97	4.168	2.302
	15 kts								
dr313	1	62.72	1.51	0.939	1.467	1.87	6.787	9.514	1.859
dr318	1.251	66.73	1.776	0.989	3.234	1.795	13.415	7.969	2.254
dr314	1.5	55.85	2.545	0.995	5.568	1.863	21.375	7.443	3.119
dr319	1.75	58.28	2.844	0.972	5.617	1.964	19.893	7.034	3.36
dr315	2	58.47	3.24	0.986	4.72	2.239	15.339	7.502	2.59
dr316	2.492	53.49	4.415	0.98	4.38	1.954	12.495	5.605	2.259
dr317	2.973	58.26	4.834	0.927	3.215	1.819	8.631	4.512	1.467
dr320	3.434	61.53	5.288	0.925	3.389	1.717	8.806	4.087	2.772
	25 kts								
dr321	1	55.9	1.695	0.845	0.608	1.822	3.586	11.151	1.574
dr322	1.5	55.37	2.567	0.891	2.558	2.064	11.506	9.125	2.655
dr323	2	58.71	3.227	0.967	4.599	2.138	17.447	8.02	2.744
dr324	2.492	53.23	4.436	0.987	5.02	2.239	15.96	7.352	1.95
dr327	2.734	58.72	4.411	0.991	3.995	2.127	11.742	6.751	1.763
dr325	2.973	58.76	4.793	0.949	4.883	1.979	13.405	5.89	1.482
dr326	3.434	64.34	5.057	0.987	3.305	2.027	8.604	5.51	1.906

Table 40. Motion Amplitudes for Flared Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Flare Hull	GM2.5m)	BK(1.25m)	Accelerations						
			Fwd Wave	Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr312	0.75	72.49	0.98	0.026	0.023	0.098	0.023	0.056	0.035
dr300	1	54.62	1.734	0.038	0.085	0.105	0.082	0.076	0.083
dr305	1.251	56.91	2.082	0.04	0.113	0.091	0.124	0.072	0.085
dr301	1.5	53.83	2.641	0.052	0.088	0.102	0.107	0.085	0.054
dr306	1.75	61.82	2.682	0.059	0.065	0.096	0.085	0.072	0.037
dr302	2	53.68	3.529	0.059	0.045	0.092	0.061	0.067	0.026
dr307	2.246	55.63	3.825	0.056	0.031	0.084	0.046	0.065	0.016
dr304	2.492	61.64	3.831	0.048	0.025	0.071	0.041	0.054	0.012
dr308	2.973	50.06	5.626	0.061	0.014	0.084	0.028	0.062	0.006
dr310	3.434	63.56	5.119	0.059	0.016	0.068	0.028	0.069	0.008
dr311	3.871	64.99	5.643	0.059	0.008	0.064	0.019	0.065	0.013
	15 kts								
dr313	1	62.72	1.51	0.078	0.047	0.215	0.053	0.119	0.053
dr318	1.251	66.73	1.776	0.069	0.081	0.156	0.083	0.102	0.073
dr314	1.5	55.85	2.545	0.072	0.121	0.136	0.135	0.098	0.094
dr319	1.75	58.28	2.844	0.077	0.112	0.13	0.132	0.099	0.077
dr315	2	58.47	3.24	0.082	0.071	0.133	0.088	0.101	0.042
dr316	2.492	53.49	4.415	0.077	0.046	0.103	0.058	0.086	0.03
dr317	2.973	58.26	4.834	0.062	0.034	0.078	0.041	0.068	0.026
dr320	3.434	61.53	5.288	0.065	0.019	0.074	0.022	0.071	0.025
	25 kts								
dr321	1	55.9	1.695	0.154	0.032	0.352	0.043	0.151	0.043
dr322	1.5	55.37	2.567	0.108	0.077	0.207	0.092	0.128	0.067
dr323	2	58.71	3.227	0.106	0.094	0.164	0.112	0.123	0.064
dr324	2.492	53.23	4.436	0.109	0.061	0.15	0.072	0.119	0.041
dr327	2.734	58.72	4.411	0.102	0.039	0.136	0.047	0.11	0.029
dr325	2.973	58.76	4.793	0.097	0.048	0.12	0.048	0.104	0.045
dr326	3.434	64.34	5.057	0.089	0.016	0.102	0.02	0.101	0.021

Table 41. Acceleration Amp. for Flared Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Tumbl Hull	GM(1.5m)	BK(1.25m)		Roll Ang AMP1/RQ0	Motions				
			Fwd Wave		Roll Ang AMP1	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1 inch	AMP1/RQ0 deg	AMP1 deg	AMP1 deg	AMP1 dps	AMP1 dps	AMP1 dps
RUN	5 kts								
DR194	1	63.43	1.415	0.967	1.412	1.333	5.42	5.621	2.061
DR195	1.5	62.8	2.458	0.997	3.476	1.907	10.804	6.338	2.69
dr196	2	56.62	3.346	0.993	5.438	1.906	15.12	5.502	2.538
DR200	2.246	58.85	3.632	0.995	7.177	2.16	18.615	5.954	2.906
DR197	2.492	58.28	3.645	0.997	7.445	2.08	18.598	5.365	2.858
dr204	2.734	54.09	4.788	0.983	5.589	1.751	13.386	4.237	2.471
DR198	2.973	63.34	4.085	0.997	5.217	1.959	12.178	4.505	2.072
DR205	3.434	66.02	5.812	0.974	3.125	1.978	6.821	4.263	2.242
	15 kts								
dr182	1	63.24	1.498	0.956	0.704	1.79	3.15	9.132	1.765
dr183	1.5	62.11	2.289	0.956	1.607	1.914	5.94	7.656	2.372
dr184	2	62.43	3.035	0.963	2.967	2.126	9.416	7.097	2.506
dr188	2.246	66.29	3.21	0.964	2.737	2.137	8.73	6.812	2.464
dr185	2.492	62.34	3.788	0.973	4.388	1.747	12.786	4.941	2.872
dr189	2.734	54.98	4.711	0.979	4.799	1.967	13.121	5.228	2.379
dr186	2.973	56.69	4.968	0.979	4.853	2.028	12.668	5.391	2.087
dr187	3.434	58.75	5.539	0.985	4.904	1.928	11.819	4.788	2.143
dr190	3.871	60.08	6.105	0.972	4.074	2.059	9.059	4.59	2.059
	25 kts								
dr206	1	66.17	1.554	0.281	0.225	1.52	0.499	9.312	1.297
dr207	1.5	58.28	2.453	0.703	0.69	2.133	3.021	9.679	2.418
dr208	2	58.72	3.126	0.713	1.194	2.071	4.194	7.539	2.629
dr210	2.492	69.59	4.481	0.911	1.813	1.971	5.908	6.924	2.32
dr211	2.973	62.52	4.597	0.924	2.667	2.046	7.827	6.243	1.943
dr214	3.206	64.92	4.91	0.897	2.418	2.036	6.667	5.778	1.604
dr215	3.434	56.04	5.012	0.971	4.029	2.015	10.489	5.325	1.994
dr213	3.871	61.21	6.387	0.968	3.895	2.27	11.919	5.552	2.169

Table 42. Motion Amplitudes for TH Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Tumbl Hull	GM(1.5m),	BK(1.25m)		Accelerations					
			Fwd Wave	Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	5 kts								
DR194	1	63.43	1.415	0.041	0.042	0.096	0.044	0.066	0.054
DR195	1.5	62.8	2.458	0.057	0.093	0.1	0.093	0.075	0.092
dr196	2	56.62	3.346	0.046	0.118	0.072	0.117	0.063	0.111
DR200	2.246	58.85	3.632	0.054	0.149	0.076	0.155	0.071	0.132
DR197	2.492	58.28	3.645	0.046	0.147	0.066	0.158	0.062	0.124
dr204	2.734	54.09	4.788	0.051	0.09	0.07	0.102	0.054	0.069
DR198	2.973	63.34	4.085	0.053	0.073	0.066	0.083	0.062	0.057
DR205	3.434	66.02	5.812	0.051	0.039	0.064	0.051	0.056	0.025
	15 kts								
dr182	1	63.24	1.498	0.078	0.03	0.212	0.04	0.107	0.042
dr183	1.5	62.11	2.289	0.075	0.058	0.142	0.065	0.098	0.062
dr184	2	62.43	3.035	0.08	0.086	0.119	0.093	0.098	0.077
dr188	2.246	66.29	3.21	0.08	0.083	0.12	0.093	0.091	0.072
dr185	2.492	62.34	3.788	0.069	0.107	0.088	0.12	0.076	0.088
dr189	2.734	54.98	4.711	0.074	0.1	0.095	0.112	0.079	0.081
dr186	2.973	56.69	4.968	0.076	0.088	0.096	0.099	0.082	0.069
dr187	3.434	58.75	5.539	0.069	0.067	0.083	0.077	0.074	0.05
dr190	3.871	60.08	6.105	0.067	0.04	0.079	0.047	0.072	0.032
	25 kts								
dr206	1	66.17	1.554	0.17	0.025	0.33	0.036	0.14	0.033
dr207	1.5	58.28	2.453	0.118	0.049	0.227	0.065	0.128	0.054
dr208	2	58.72	3.126	0.103	0.061	0.159	0.072	0.115	0.06
dr210	2.492	69.59	4.481	0.103	0.056	0.143	0.073	0.108	0.042
dr211	2.973	62.52	4.597	0.098	0.055	0.125	0.068	0.105	0.037
dr214	3.206	64.92	4.91	0.095	0.041	0.119	0.054	0.099	0.024
dr215	3.434	56.04	5.012	0.092	0.054	0.109	0.067	0.097	0.036
dr213	3.871	61.21	6.387	0.099	0.045	0.117	0.056	0.104	0.027

Table 43. Acceleration Amp. for TH Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr67	1	58.27	1.626	0.919	1.215	1.334	4.473	5.722	2.069
dr68	1.5	55.95	2.54	0.994	2.481	2.113	7.673	7.171	2.3
dr69	2	57.17	3.314	0.988	4.632	2.315	12.511	6.646	2.67
dr73	2.246	68.4	3.111	0.986	5.504	2.11	14.399	5.852	2.819
dr70	2.492	66.95	3.527	0.996	7.118	1.848	17.589	4.293	3.232
dr74	2.734	53.7	4.823	0.996	6.014	1.765	14.353	4.235	2.547
dr71	2.973	53.26	5.288	0.986	4.023	1.875	9.541	4.498	1.973
dr72	3.434	61.94	5.253	0.992	2.204	2.25	4.87	4.68	2.024
dr76	3.871	62.32	5.885	0.988	3.979	1.81	7.829	3.514	1.904
	15 kts								
dr77	1	64.3	1.473	0.837	0.638	1.716	2.728	8.695	1.651
dr78	1.5	64.3	2.211	0.967	1.022	2.125	3.552	8.362	2.369
dr79	2	57.63	3.287	0.935	1.642	2.361	5.361	7.928	2.384
dr87	2.246	65.82	3.233	0.981	2.236	1.723	7.723	5.206	2.707
dr80	2.492	54.91	4.301	0.991	3.151	1.817	9.358	5.172	2.671
dr86	2.734	55.38	4.677	0.989	3.651	2.331	9.843	6.578	2.272
dr81	2.973	61.4	4.587	0.966	4.097	2.06	10.839	5.473	2.041
dr84	3.206	60.13	5.051	0.996	4.285	1.834	10.618	4.641	1.688
dr85	3.434	67.46	4.823	0.984	4.329	1.849	10.084	4.447	1.956
	25 kts								
dr89	1	62.67	1.512	0.494	0.169	1.689	0.835	10.289	0.929
dr94	1.5	54.67	2.6	0.515	0.588	2.166	1.537	10.061	2.262
dr95	2	57.57	3.291	0.761	0.834	2.3	3.45	8.674	2.487
dr99	2.246	63.08	3.373	0.796	1.091	1.855	4.399	6.3	2.453
dr96	2.492	56.73	4.163	0.895	1.407	1.969	5.034	6.444	2.462
dr100	2.734	54.77	4.729	0.791	1.823	2.166	6.059	6.863	2.006
dr97	2.973	64.5	4.366	0.947	1.962	2.177	6.046	6.647	1.892
dr98	3.434	58.14	5.596	0.988	2.948	2.046	7.295	5.865	1.859

Table 44. Motion Amplitudes for TH Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Accelerations						
			Fwd Wave	Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr67	1	58.27	1.626	0.041	0.037	0.101	0.034	0.067	0.054
dr68	1.5	55.95	2.54	0.053	0.067	0.103	0.061	0.082	0.074
dr69	2	57.17	3.314	0.065	0.113	0.095	0.116	0.08	0.105
dr73	2.246	68.4	3.111	0.058	0.126	0.08	0.134	0.072	0.111
dr70	2.492	66.95	3.527	0.05	0.146	0.064	0.158	0.059	0.125
dr74	2.734	53.7	4.823	0.056	0.105	0.074	0.118	0.056	0.083
dr71	2.973	53.26	5.288	0.049	0.063	0.066	0.073	0.055	0.046
dr72	3.434	61.94	5.253	0.048	0.026	0.059	0.039	0.057	0.01
dr76	3.871	62.32	5.885	0.057	0.037	0.064	0.044	0.06	0.027
	15 kts								
dr77	1	64.3	1.473	0.075	0.029	0.198	0.037	0.106	0.042
dr78	1.5	64.3	2.211	0.078	0.047	0.155	0.057	0.107	0.054
dr79	2	57.63	3.287	0.085	0.062	0.135	0.07	0.104	0.06
dr87	2.246	65.82	3.233	0.062	0.076	0.086	0.087	0.071	0.067
dr80	2.492	54.91	4.301	0.071	0.087	0.096	0.099	0.076	0.073
dr86	2.734	55.38	4.677	0.085	0.083	0.11	0.094	0.094	0.066
dr81	2.973	61.4	4.587	0.075	0.078	0.095	0.089	0.082	0.061
dr84	3.206	60.13	5.051	0.07	0.067	0.089	0.075	0.07	0.052
dr85	3.434	67.46	4.823	0.066	0.059	0.078	0.07	0.071	0.043
	25 kts								
dr89	1	62.67	1.512	0.153	0.023	0.329	0.032	0.124	0.028
dr94	1.5	54.67	2.6	0.127	0.041	0.243	0.061	0.13	0.041
dr95	2	57.57	3.291	0.113	0.05	0.177	0.065	0.126	0.048
dr99	2.246	63.08	3.373	0.087	0.053	0.125	0.069	0.097	0.047
dr96	2.492	56.73	4.163	0.095	0.057	0.135	0.072	0.1	0.047
dr100	2.734	54.77	4.729	0.106	0.048	0.14	0.063	0.113	0.035
dr97	2.973	64.5	4.366	0.098	0.044	0.127	0.056	0.106	0.03
dr98	3.434	58.14	5.596	0.093	0.027	0.113	0.038	0.1	0.014

Table 45. Acceleration Amp. for TH Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
45 DEG	λ/L	λ/H							
RUN									
	5 kts								
dr429	1	56.14	1.687	0.942	2.325	1.619	9.043	6.842	2.456
dr439	1.251	57.06	2.077	0.947	4.235	1.566	14.516	5.553	2.591
dr431	1.5	55.25	2.573	0.996	5.441	2.168	17.705	7.366	2.971
dr437	1.75	60.19	2.754	0.995	5.642	1.807	17.186	5.56	2.697
dr432	2	58.91	3.216	0.998	5.166	1.685	14.514	4.916	2.724
dr438	2.246	55.43	3.839	0.996	4.358	2.071	11.583	5.58	2.86
dr433	2.492	63.72	3.706	0.988	3.117	2.013	7.844	5.271	2.272
dr434	2.973	64.58	4.361	0.987	3.23	1.844	7.194	4.161	2.017
dr435	3.434	59.3	5.486	0.999	3.744	1.881	8.142	3.984	2.42
dr440	3.871	63.08	5.814	0.93	3.14	2.186	5.964	4.441	2.337
	15 kts								
dr419	1	59.59	1.59	0.93	0.901	1.87	4.03	9.621	1.796
dr421	1.5	67.06	2.12	0.942	3.032	2.083	11.567	8.231	2.551
dr422	2	52.58	3.603	0.99	4.975	2.13	16.744	7.08	2.871
dr426	2.246	53.66	3.966	0.994	5.711	2.321	17.226	7.4	2.817
dr423	2.492	66.99	3.525	0.975	5.53	1.987	15.853	5.95	2.204
dr427	2.734	57.55	4.501	0.989	3.986	1.782	10.717	4.797	1.841
dr424	2.973	58.3	4.831	0.986	3.676	2.107	9.419	5.59	1.881
dr425	3.434	65.68	4.954	0.989	3.838	1.965	8.746	4.791	1.848
dr428	3.871	62.49	5.869	0.924	3.231	2.173	6.976	5.018	2.113
	25 kts								
dr441	1	59.39	1.595	0.198	0.168	1.77	0.609	10.87	1.143
dr442	1.5	59.84	2.376	0.725	1.043	2.318	4.617	10.701	2.348
dr448	1.75	57.1	2.903	0.979	1.682	2.096	6.955	8.796	2.204
dr443	2	59.38	3.19	0.946	2.95	2.185	10.88	8.251	2.505
dr447	2.246	63.93	3.329	0.985	3.842	1.951	13.386	6.92	2.72
dr445	2.492	61.1	3.865	0.947	4.198	1.8	13.596	6.191	2.478
dr444	2.973	64.66	4.356	0.973	3.647	1.948	10.856	6.132	2.044
dr446	3.434	61.13	5.323	0.99	3.596	2.047	9.409	5.585	1.893
dr449	3.871	62.9	5.831	0.979	3.426	2.205	7.79	5.352	1.985

Table 46. Motion Amplitudes for TH Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Fwd Wave AMP1 inch	Accelerations					
				Vert CG AMP1 g's	Tran CG AMP1 g's	Vert Bow AMP1 g's	Tran Bow AMP1 g's	Vert Str AMP1 g's	Tran Str AMP1 g's
45DEG									
RUN	λ/L	λ/H							
	5 kts								
dr429	1	56.14	1.687	0.047	0.064	0.119	0.063	0.077	0.072
dr439	1.251	57.06	2.077	0.045	0.1	0.091	0.1	0.066	0.095
dr431	1.5	55.25	2.573	0.057	0.121	0.114	0.129	0.079	0.102
dr437	1.75	60.19	2.754	0.045	0.106	0.081	0.121	0.062	0.078
dr432	2	58.91	3.216	0.046	0.083	0.074	0.1	0.058	0.055
dr438	2.246	55.43	3.839	0.063	0.058	0.08	0.076	0.079	0.036
dr433	2.492	63.72	3.706	0.044	0.04	0.066	0.055	0.058	0.022
dr434	2.973	64.58	4.361	0.053	0.029	0.061	0.04	0.063	0.017
dr435	3.434	59.3	5.486	0.066	0.03	0.076	0.042	0.068	0.018
dr440	3.871	63.08	5.814	0.065	0.022	0.071	0.034	0.07	0.012
	15 kts								
dr419	1	59.59	1.59	0.084	0.034	0.227	0.041	0.111	0.047
dr421	1.5	67.06	2.12	0.076	0.085	0.149	0.091	0.105	0.079
dr422	2	52.58	3.603	0.08	0.11	0.128	0.125	0.091	0.083
dr426	2.246	53.66	3.966	0.08	0.103	0.122	0.12	0.097	0.074
dr423	2.492	66.99	3.525	0.07	0.091	0.094	0.105	0.085	0.066
dr427	2.734	57.55	4.501	0.066	0.05	0.088	0.06	0.071	0.035
dr424	2.973	58.3	4.831	0.078	0.038	0.096	0.047	0.087	0.025
dr425	3.434	65.68	4.954	0.071	0.032	0.083	0.041	0.078	0.023
dr428	3.871	62.49	5.869	0.074	0.018	0.084	0.025	0.081	0.016
	25 kts								
dr441	1	59.39	1.595	0.188	0.024	0.374	0.03	0.164	0.036
dr442	1.5	59.84	2.376	0.121	0.051	0.245	0.067	0.132	0.049
dr448	1.75	57.1	2.903	0.11	0.063	0.19	0.074	0.12	0.057
dr443	2	59.38	3.19	0.109	0.085	0.169	0.098	0.123	0.068
dr447	2.246	63.93	3.329	0.096	0.095	0.14	0.111	0.106	0.072
dr445	2.492	61.1	3.865	0.092	0.084	0.128	0.102	0.098	0.057
dr444	2.973	64.66	4.356	0.097	0.037	0.122	0.049	0.105	0.022
dr446	3.434	61.13	5.323	0.091	0.028	0.108	0.036	0.097	0.021
dr449	3.871	62.9	5.831	0.087	0.014	0.099	0.018	0.096	0.021

Table 47. Acceleration Amp. for TH Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Tumbl Hull	GM(2.5m)	BK(1.25m)	Motions						
			Fwd Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
45 DEG									
RUN	λ/L	λ/H							
	5 kts								
dr312	1	66.88	1.417	0.981	2.287	1.423	8.948	6.013	1.95
dr325	1.251	55.07	2.152	1	5.216	2.04	18.059	7.646	2.753
dr328	1.5	61.25	2.556	0.995	7.818	2.068	24.9	6.94	3.072
dr326	1.75	54.61	3.035	0.991	6.894	2.09	20.13	6.611	2.773
dr320	2	67.34	2.813	0.999	4.637	1.625	12.978	4.677	2.448
dr322	2.492	66.89	3.53	0.995	3.406	1.839	8.535	4.764	2.322
dr323	2.973	65.72	4.286	0.997	2.156	1.895	5.019	4.376	1.909
dr327	3.434	66.75	4.875	0.984	2.845	1.982	5.864	4.283	2.029
	15 kts								
dr304	1	67.12	1.411	0.935	1.182	1.846	5.453	9.428	1.738
dr305	1.5	67.23	2.114	0.973	3.884	2.002	14.625	7.826	2.647
dr309	1.75	55.69	2.976	0.991	5.539	1.942	19.188	7.021	2.763
dr306	2	60.16	3.149	0.987	6.134	2.169	20.081	7.214	2.913
dr310	2.246	61.04	3.487	0.995	6.406	2.193	19.514	6.908	2.96
dr307	2.492	55.6	4.247	0.993	5.079	1.93	14.521	5.474	2.277
dr308	2.973	59.14	4.762	0.989	3.583	2.056	9.268	5.487	1.706
dr311	3.434	59.76	5.444	0.975	3.08	1.937	7.531	4.799	1.791
	25 kts								
dr329	1	63.55	1.491	0.73	0.485	1.623	2.79	9.753	1.491
dr330	1.5	63.89	2.225	0.929	1.719	2.056	7.546	9.219	2.454
dr331	2	58.49	3.239	0.965	3.191	2.315	12.18	8.854	2.662
dr336	2.246	58.02	3.668	0.981	4.632	1.975	16.592	6.887	2.986
dr332	2.492	55.81	4.231	0.991	5.071	1.787	16.438	6.115	2.879
dr337	2.734	55.09	4.701	0.987	4.26	2.236	12.953	7.045	1.889
dr334	2.973	57.37	4.909	0.98	3.96	2.14	11.417	6.162	1.537
dr338	3.434	62.69	5.19	0.986	3.675	1.98	9.233	5.336	1.83

Table 48. Motion Amplitudes for TH Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Tumbl Hull	GM(2.5m),	BK(1.25m)	Fwd Wave AMP1	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG									
	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr312	1	66.88	1.417	0.039	0.056	0.107	0.054	0.068	0.062
dr325	1.251	55.07	2.152	0.053	0.115	0.121	0.113	0.084	0.108
dr328	1.5	61.25	2.556	0.05	0.155	0.099	0.16	0.078	0.131
dr326	1.75	54.61	3.035	0.06	0.114	0.102	0.129	0.078	0.083
dr320	2	67.34	2.813	0.042	0.066	0.064	0.081	0.057	0.043
dr322	2.492	66.89	3.53	0.048	0.04	0.064	0.054	0.061	0.023
dr323	2.973	65.72	4.286	0.049	0.022	0.063	0.034	0.056	0.01
dr327	3.434	66.75	4.875	0.06	0.021	0.07	0.032	0.064	0.013
	15 kts								
dr304	1	67.12	1.411	0.082	0.039	0.221	0.043	0.112	0.049
dr305	1.5	67.23	2.114	0.077	0.1	0.145	0.106	0.104	0.088
dr309	1.75	55.69	2.976	0.074	0.123	0.126	0.132	0.091	0.101
dr306	2	60.16	3.149	0.08	0.121	0.126	0.136	0.097	0.091
dr310	2.246	61.04	3.487	0.083	0.107	0.119	0.124	0.097	0.075
dr307	2.492	55.6	4.247	0.072	0.068	0.097	0.081	0.08	0.047
dr308	2.973	59.14	4.762	0.077	0.037	0.097	0.045	0.084	0.027
dr311	3.434	59.76	5.444	0.07	0.024	0.085	0.032	0.074	0.02
	25 kts								
dr329	1	63.55	1.491	0.161	0.031	0.325	0.043	0.127	0.039
dr330	1.5	63.89	2.225	0.114	0.067	0.217	0.08	0.127	0.064
dr331	2	58.49	3.239	0.116	0.086	0.186	0.101	0.128	0.068
dr336	2.246	58.02	3.668	0.099	0.107	0.141	0.125	0.107	0.082
dr332	2.492	55.81	4.231	0.094	0.092	0.129	0.11	0.099	0.061
dr337	2.734	55.09	4.701	0.104	0.059	0.142	0.071	0.11	0.038
dr334	2.973	57.37	4.909	0.096	0.045	0.128	0.053	0.098	0.032
dr338	3.434	62.69	5.19	0.089	0.027	0.107	0.033	0.093	0.024

Table 49. Acceleration Amp. for TH Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Wall Hull	GM(1.5m),	BK(1.25m)		Motions					
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
DR281	1	53.91	1.757	0.99	1.544	1.585	5.896	6.665	2.026
DR282	1.5	58.18	2.443	0.987	3.383	2.056	10.701	6.981	2.482
DR289	1.75	61.83	2.681	0.986	4.905	1.872	14.354	5.807	2.574
DR283	2	55.13	3.436	0.985	6.606	2.17	18.184	6.3	2.854
DR287	2.246	60.59	3.512	0.985	7.641	2.197	20.194	6.048	3.04
DR284	2.492	61.62	3.832	0.984	8.333	1.787	20.877	4.525	3.073
DR316	2.613	60.23	4.11	0.98	6.449	1.685	15.666	4.162	2.599
DR288	2.734	54.39	4.762	0.976	5.329	1.842	12.742	4.471	2.419
DR285	2.973	53.95	5.221	0.981	4.26	2.04	9.856	4.756	2.073
DR286	3.434	60.2	5.405	0.966	3.502	2.132	7.608	4.672	2.267
DR290	3.871	59.44	6.17	0.967	3.714	2.264	7.496	4.443	2.154
	15 kts								
DR291	1	60.06	1.577	0.791	0.71	1.597	3.182	8.138	1.383
dr292	1.5	54.01	2.632	0.964	1.936	2.234	6.855	9.005	2.374
DR299	1.75	63.63	2.605	0.771	1.988	1.673	6.678	5.983	1.938
DR293	2	59.13	3.204	0.955	2.927	2.081	9.33	6.96	2.493
DR303	2.246	60.86	3.497	0.982	3.78	1.914	11.405	5.942	2.771
dr294	2.492	50.97	4.633	0.98	4.302	2.391	12.211	6.973	2.581
DR295	2.973	54.73	5.146	0.988	4.052	2.307	10.635	6.233	2.15
DR300	3.206	59.2	5.13	0.986	4.71	2.116	11.651	5.435	2.147
DR296	3.434	65.38	4.977	0.985	4.839	1.87	11.422	4.42	2.192
DR301	3.656	59.61	5.81	0.952	4.218	2.006	9.8	4.63	2.052
	25 kts								
DR304	1	61.04	1.552	0.348	0.33	1.724	1.601	10.245	1.475
DR305	1.5	58.39	2.435	0.619	0.822	2.179	3.555	9.825	2.416
DR313	1.75	58.42	2.837	0.812	0.99	2.145	3.894	8.708	2.249
DR306	2	58.81	3.221	0.813	1.326	2.094	5.061	7.824	2.332
DR312	2.246	60.53	3.516	0.837	1.503	2.035	5.254	7.072	2.477
DR307	2.492	55.37	4.265	0.951	1.968	2.167	6.736	7.007	2.403
DR314	2.734	54.55	4.748	0.938	2.249	2.069	7.073	6.264	2.094
DR308	2.973	58.69	4.799	0.883	2.587	2.14	7.746	6.203	1.93
DR311	3.206	58.16	5.221	0.73	3.13	2.16	8.712	5.991	2.24
DR309	3.434	60.03	5.42	0.961	4.036	2.043	10.648	5.532	2.2
DR315	3.871	59.98	6.114	0.932	4.328	1.976	10.243	5.011	2.243

Table 50. Motion Amplitudes for Wall Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Wall Hull	GM(1.5m),	BK(1.25m)		Accelerations					
			Fwd Wave	Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	5 kts								
DR281	1	53.91	1.757	0.04	0.041	0.115	0.036	0.077	0.057
DR282	1.5	58.18	2.443	0.051	0.082	0.101	0.077	0.077	0.086
DR289	1.75	61.83	2.681	0.053	0.114	0.085	0.113	0.069	0.109
DR283	2	55.13	3.436	0.06	0.146	0.09	0.149	0.073	0.133
DR287	2.246	60.59	3.512	0.061	0.161	0.087	0.169	0.073	0.142
DR284	2.492	61.62	3.832	0.053	0.156	0.07	0.17	0.06	0.13
DR316	2.613	60.23	4.11	0.05	0.112	0.067	0.125	0.054	0.089
DR288	2.734	54.39	4.762	0.053	0.088	0.071	0.101	0.056	0.068
DR285	2.973	53.95	5.221	0.057	0.062	0.073	0.072	0.062	0.046
DR286	3.434	60.2	5.405	0.055	0.047	0.067	0.06	0.061	0.031
DR290	3.871	59.44	6.17	0.052	0.04	0.061	0.05	0.058	0.028
	15 kts								
DR291	1	60.06	1.577	0.063	0.023	0.191	0.028	0.102	0.037
dr292	1.5	54.01	2.632	0.084	0.063	0.165	0.066	0.113	0.069
DR299	1.75	63.63	2.605	0.065	0.061	0.107	0.064	0.08	0.062
DR293	2	59.13	3.204	0.078	0.086	0.118	0.091	0.095	0.081
DR303	2.246	60.86	3.497	0.073	0.103	0.101	0.112	0.085	0.093
dr294	2.492	50.97	4.633	0.086	0.104	0.119	0.115	0.097	0.088
DR295	2.973	54.73	5.146	0.083	0.074	0.107	0.087	0.09	0.055
DR300	3.206	59.2	5.13	0.075	0.072	0.093	0.084	0.082	0.053
DR296	3.434	65.38	4.977	0.069	0.061	0.079	0.073	0.076	0.046
DR301	3.656	59.61	5.81	0.069	0.051	0.082	0.061	0.074	0.037
	25 kts								
DR304	1	61.04	1.552	0.133	0.025	0.311	0.038	0.13	0.038
DR305	1.5	58.39	2.435	0.108	0.05	0.216	0.063	0.133	0.056
DR313	1.75	58.42	2.837	0.105	0.054	0.18	0.065	0.125	0.055
DR306	2	58.81	3.221	0.098	0.06	0.156	0.071	0.114	0.058
DR312	2.246	60.53	3.516	0.094	0.064	0.137	0.077	0.107	0.058
DR307	2.492	55.37	4.265	0.099	0.065	0.136	0.08	0.109	0.053
DR314	2.734	54.55	4.748	0.095	0.061	0.124	0.075	0.102	0.048
DR308	2.973	58.69	4.799	0.094	0.053	0.12	0.067	0.101	0.037
DR311	3.206	58.16	5.221	0.097	0.053	0.119	0.068	0.102	0.034
DR309	3.434	60.03	5.42	0.091	0.052	0.108	0.068	0.097	0.032
DR315	3.871	59.98	6.114	0.083	0.035	0.094	0.039	0.091	0.032

Table 51. Acceleration Amp. for Wall Hull (GM=1.5m & BK=1.25m) in Bow Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Motions						
			Fwd Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
DR64	1	53.79	1.761	0.893	1.334	1.64	4.93	6.932	2.287
DR65	1.5	61.5	2.311	0.985	2.682	1.763	8.294	5.9	2.373
DR72	2	64.53	2.936	0.993	4.905	2.267	13.539	6.671	2.517
DR73	2.246	55.73	3.818	0.996	5.553	2.077	14.62	5.664	2.699
DR67	2.492	64.45	3.664	0.984	6.448	1.674	16.241	4.219	2.898
DR71	2.734	57.22	4.526	0.951	5.285	1.727	12.459	4.183	2.22
DR68	2.973	64.4	4.373	0.981	5.375	1.904	12.437	4.43	2.394
DR69	3.434	64.96	5.009	0.966	3.917	2.14	8.26	4.506	2.096
	15 kts								
DR74	1	60.33	1.57	0.912	0.724	1.892	3.035	9.623	1.777
DR75	1.5	60.99	2.331	0.954	1.358	1.848	4.798	7.35	2.189
DR76	2	58.02	3.265	0.909	2.167	2.141	6.771	7.203	2.421
DR81	2.492	50.15	4.709	0.977	2.906	2.307	8.484	6.829	2.432
DR78	2.973	63.14	4.461	0.987	4.04	1.987	10.606	5.343	1.997
DR79	3.434	60.74	5.357	0.98	4.622	1.946	11.025	4.768	2.156
DR80	3.871	57.1	6.423	0.982	3.86	2.293	8.574	5.211	2.134
	25 kts								
DR82	1	57.1	1.659	0.139	0.212	1.857	0.424	11.242	1.524
DR86	1.5	58.29	2.439	0.529	0.457	2.228	1.847	10.445	2.109
DR83	2	57.19	3.312	0.447	0.693	2.23	3.158	8.404	2.428
DR87	2.492	56.99	4.143	0.719	1.458	1.888	5.15	6.195	2.356
DR91	2.973	62.66	4.495	0.832	2.571	1.934	7.869	5.715	1.837
DR93	3.206	57.63	5.269	0.831	2.575	2.187	6.998	6.191	1.794
DR89	3.434	63.77	5.102	0.928	3.833	1.861	9.804	5.037	1.934
DR92	3.656	65.96	5.251	0.932	3.455	1.926	9.045	4.879	1.987
DR90	3.871	59.92	6.121	0.982	4.277	2.08	10.216	5.081	2.095

Table 52. Motion Amplitudes for Wall Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Fwd Wave	Acceleration					
				Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG	λ/L	λ/H	AMP1 inch	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's
RUN	5 kts								
DR64	1	53.79	1.761	0.045	0.04	0.12	0.039	0.079	0.059
DR65	1.5	61.5	2.311	0.05	0.072	0.093	0.067	0.064	0.077
DR72	2	64.53	2.936	0.064	0.123	0.093	0.121	0.083	0.117
DR73	2.246	55.73	3.818	0.053	0.126	0.078	0.132	0.065	0.112
DR67	2.492	64.45	3.664	0.048	0.134	0.064	0.145	0.054	0.112
DR71	2.734	57.22	4.526	0.043	0.098	0.057	0.108	0.052	0.078
DR68	2.973	64.4	4.373	0.054	0.084	0.068	0.096	0.061	0.064
DR69	3.434	64.96	5.009	0.051	0.05	0.063	0.061	0.058	0.035
	15 kts								
DR74	1	60.33	1.57	0.075	0.027	0.221	0.035	0.118	0.045
DR75	1.5	60.99	2.331	0.073	0.052	0.139	0.055	0.094	0.059
DR76	2	58.02	3.265	0.083	0.075	0.125	0.081	0.1	0.072
DR81	2.492	50.15	4.709	0.082	0.083	0.115	0.093	0.093	0.072
DR78	2.973	63.14	4.461	0.075	0.08	0.092	0.091	0.083	0.063
DR79	3.434	60.74	5.357	0.072	0.068	0.085	0.08	0.078	0.051
DR80	3.871	57.1	6.423	0.074	0.038	0.086	0.047	0.08	0.028
	25 kts								
DR82	1	57.1	1.659	0.163	0.024	0.357	0.038	0.156	0.04
DR86	1.5	58.29	2.439	0.118	0.04	0.238	0.051	0.135	0.049
DR83	2	57.19	3.312	0.109	0.054	0.171	0.066	0.127	0.054
DR87	2.492	56.99	4.143	0.092	0.055	0.124	0.071	0.1	0.046
DR91	2.973	62.66	4.495	0.092	0.054	0.112	0.068	0.102	0.038
DR93	3.206	57.63	5.269	0.099	0.037	0.122	0.052	0.106	0.02
DR89	3.434	63.77	5.102	0.087	0.05	0.103	0.065	0.093	0.031
DR92	3.656	65.96	5.251	0.084	0.037	0.097	0.051	0.09	0.02
DR90	3.871	59.92	6.121	0.088	0.035	0.102	0.045	0.093	0.025

Table 53. Acceleration Amp. for Wall Hull (GM=1.5m & BK=1.75m) in Bow Waves.

Wall Hull	GM(2.5m)	BK(1.75m)	Fwd Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	Dps
	5 kts								
dr519	1	58.75	1.613	0.982	2.192	1.452	8.65	6.125	1.994
dr524	1.251	56.18	2.109	0.972	4.484	1.735	16.097	6.475	2.815
dr526	1.375	57.71	2.257	0.988	5.106	1.627	17.47	5.736	2.799
dr520	1.5	61.59	2.308	0.991	5.56	1.938	18.07	6.49	3.107
dr525	1.75	57.18	2.899	0.978	4.492	1.894	13.506	5.909	2.644
dr521	2	56.07	3.378	0.949	3.604	1.951	10.29	5.685	2.584
dr522	2.492	62.91	3.754	0.983	2.971	1.846	7.466	4.731	2.358
dr531	2.973	54.1	5.206	0.954	2.23	2.015	5.178	4.714	1.943
dr530	3.434	63.21	5.148	0.95	2.571	2.013	5.433	4.352	2.152
dr532	3.871	61.38	5.974	0.883	2.487	2.104	4.919	4.31	2.059
	15 kts								
dr533	1	61.16	1.549	0.886	0.901	1.765	4.168	9.015	1.791
dr539	1.251	59.61	1.988	0.95	2.213	1.922	9.215	8.593	2.245
dr534	1.5	58.13	2.445	0.973	4.034	2.059	15.541	8.213	2.832
dr540	1.75	61.87	2.679	0.995	5.294	1.986	18.541	7.141	2.918
dr535	2	59.17	3.202	0.987	4.997	2.017	16.365	6.775	2.489
dr542	2.246	62.81	3.388	0.982	4.486	1.838	13.588	5.684	2.322
dr536	2.492	61.81	3.82	0.975	4.418	1.66	12.487	4.807	2.228
dr541	2.734	54.22	4.776	0.976	3.422	2.072	9.216	5.69	1.955
dr537	2.973	58.18	4.841	0.962	3.181	2.077	7.893	5.478	1.827
dr538	3.434	62.91	5.172	0.98	3.008	1.935	7.126	4.734	1.974
dr543	3.871	63.34	5.79	0.956	2.844	1.904	6.145	4.271	1.986
	25 kts								
dr544	1	60.98	1.554	0.778	0.409	1.848	2.576	10.837	1.704
dr545	1.5	57.98	2.452	0.912	1.803	2.22	8.052	9.984	2.487
dr552	1.75	57.39	2.888	0.969	3.153	2.226	12.401	9.044	2.556
dr546	2	58.94	3.214	0.985	3.996	2.126	14.747	7.918	2.51
dr556	2.246	65.61	3.244	0.992	5.251	1.796	17.828	6.169	2.582
dr547	2.492	55.13	4.284	0.992	5.074	2.057	15.997	6.607	2.304
dr554	2.734	53.02	4.885	0.976	3.949	2.358	11.447	7.251	1.864
dr548	2.973	58.15	4.844	0.98	3.509	2.074	9.581	6.2	1.803
dr549	3.434	59.82	5.439	0.982	3.635	1.975	8.814	5.347	1.892
dr555	3.871	61.82	5.932	0.926	3.381	2.058	7.735	5.135	2.003

Table 54. Motion Amplitudes for Wall Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Wall Hull	GM(2.5m)	BK(1.75m)	Fwd Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr519	1	58.75	1.613	0.034	0.053	0.105	0.051	0.069	0.06
dr524	1.251	56.18	2.109	0.047	0.098	0.104	0.109	0.074	0.079
dr526	1.375	57.71	2.257	0.045	0.099	0.091	0.115	0.066	0.07
dr520	1.5	61.59	2.308	0.052	0.099	0.099	0.119	0.076	0.063
dr525	1.75	57.18	2.899	0.055	0.063	0.091	0.081	0.071	0.036
dr521	2	56.07	3.378	0.057	0.044	0.087	0.063	0.069	0.022
dr522	2.492	62.91	3.754	0.05	0.027	0.07	0.043	0.058	0.015
dr531	2.973	54.1	5.206	0.055	0.017	0.07	0.028	0.061	0.011
dr530	3.434	63.21	5.148	0.054	0.016	0.064	0.028	0.059	0.01
dr532	3.871	61.38	5.974	0.054	0.013	0.062	0.024	0.059	0.008
	15 kts								
dr533	1	61.16	1.549	0.074	0.036	0.206	0.044	0.11	0.046
dr539	1.251	59.61	1.988	0.073	0.065	0.169	0.073	0.108	0.062
dr534	1.5	58.13	2.445	0.078	0.097	0.151	0.111	0.107	0.077
dr540	1.75	61.87	2.679	0.077	0.102	0.128	0.122	0.099	0.069
dr535	2	59.17	3.202	0.078	0.081	0.121	0.097	0.095	0.051
dr542	2.246	62.81	3.388	0.07	0.059	0.1	0.075	0.082	0.036
dr536	2.492	61.81	3.82	0.068	0.05	0.09	0.063	0.074	0.032
dr541	2.734	54.22	4.776	0.078	0.032	0.102	0.042	0.086	0.022
dr537	2.973	58.18	4.841	0.077	0.024	0.096	0.031	0.085	0.02
dr538	3.434	62.91	5.172	0.069	0.017	0.082	0.024	0.075	0.019
dr543	3.871	63.34	5.79	0.066	0.012	0.076	0.018	0.069	0.018
	25 kts								
dr544	1	60.98	1.554	0.145	0.032	0.329	0.047	0.14	0.042
dr545	1.5	57.98	2.452	0.111	0.065	0.222	0.081	0.135	0.059
dr552	1.75	57.39	2.888	0.106	0.082	0.185	0.099	0.127	0.063
dr546	2	58.94	3.214	0.102	0.085	0.16	0.103	0.118	0.059
dr556	2.246	65.61	3.244	0.087	0.086	0.123	0.105	0.099	0.054
dr547	2.492	55.13	4.284	0.097	0.064	0.133	0.078	0.106	0.041
dr554	2.734	53.02	4.885	0.106	0.036	0.142	0.044	0.116	0.028
dr548	2.973	58.15	4.844	0.095	0.026	0.121	0.032	0.102	0.026
dr549	3.434	59.82	5.439	0.088	0.021	0.104	0.021	0.094	0.029
dr555	3.871	61.82	5.932	0.088	0.017	0.101	0.01	0.092	0.03

Table 55. Acceleration Amp. for Wall Hull (GM=2.5m & BK=1.75m) in Bow Waves.

Wall Hull	GM(2.5m)	BK(1.25m)	Fwd Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
45 DEG	N/L	N/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr319	1	61.12	1.55	0.945	3.283	1.4	13.069	5.874	2.34
dr326	1.126	56.08	1.902	0.982	4.93	1.716	18.315	6.628	2.886
dr325	1.251	65.38	1.813	0.974	5.464	1.434	19.529	5.343	2.676
dr320	1.5	53.66	2.649	0.978	5.537	2.132	17.954	7.291	2.943
dr321	2	57.82	3.277	0.976	3.483	1.793	9.862	5.22	2.412
dr322	2.492	65.91	3.582	0.958	2.303	1.869	5.963	4.906	2.234
dr323	2.973	60.39	4.663	0.972	1.86	1.865	4.405	4.416	1.963
dr324	3.434	64.74	5.025	0.965	3.316	1.884	6.541	4.142	2.207
dr331	3.656	64.46	5.373	0.977	2.853	2.269	5.673	4.739	2.244
dr328	3.871	56.99	6.435	0.784	2.203	2.302	4.42	4.652	2.082
	15 kts								
dr332	1	60.13	1.576	0.95	1.421	1.762	6.715	8.999	1.811
dr337	1.251	68.06	1.741	0.987	3.12	1.652	13.187	7.267	2.15
dr333	1.5	56.28	2.526	0.965	5.436	1.956	20.797	7.75	3.084
dr338	1.75	58.2	2.848	0.994	6.071	2.03	21.503	7.301	2.941
dr334	2	60.6	3.126	0.969	4.38	2.132	14.18	7.23	2.172
dr339	2.246	61.1	3.483	0.979	4.753	1.835	14.387	5.684	2.423
dr335	2.492	52.1	4.532	0.989	4.032	2.188	11.429	6.466	2.158
dr336	2.973	61.94	4.547	0.908	2.789	2.047	7.051	5.423	1.601
dr342	3.434	58.4	5.572	0.981	3.087	2.071	7.145	5.122	2.089
dr341	3.871	59.21	6.194	0.91	2.845	2.025	6.201	4.524	2.044
	25 kts								
dr343	1	59.39	1.595	0.669	0.755	1.859	4.298	10.91	1.86
dr348	1	60.78	1.559	0.887	0.692	1.917	3.97	11.268	1.808
dr350	1.5	58.01	2.45	0.965	2.65	2.222	11.652	9.959	2.685
dr351	2	59.68	3.174	0.984	4.831	2.112	17.755	7.933	2.534
dr355	2.246	61	3.488	0.987	5.359	2.143	18.083	7.709	2.489
dr352	2.492	57.03	4.141	0.994	5.367	2.015	16.863	6.532	2.284
dr356	2.734	53.5	4.841	0.989	3.74	2.276	11.237	6.956	1.737
dr353	2.973	58.42	4.821	0.99	3.411	2.215	9.478	6.38	1.729
dr354	3.434	59.57	5.462	0.954	3.595	2.071	9.183	5.435	1.986
dr357	3.871	60.56	6.055	0.972	3.279	2.118	7.521	5.333	1.97

Table 56. Motion Amplitudes for Wall Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Wall Hull	GM(2.5m)	BK(1.25m)	Fwd Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
45 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	N/L	N/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr319	1	61.12	1.55	0.037	0.075	0.1	0.078	0.068	0.07
dr326	1.126	56.08	1.902	0.045	0.105	0.11	0.115	0.076	0.086
dr325	1.251	65.38	1.813	0.039	0.105	0.086	0.118	0.062	0.078
dr320	1.5	53.66	2.649	0.056	0.09	0.112	0.109	0.083	0.054
dr321	2	57.82	3.277	0.052	0.039	0.08	0.055	0.062	0.023
dr322	2.492	65.91	3.582	0.047	0.023	0.067	0.039	0.056	0.011
dr323	2.973	60.39	4.663	0.051	0.015	0.065	0.028	0.057	0.009
dr324	3.434	64.74	5.025	0.064	0.018	0.07	0.029	0.07	0.016
dr331	3.656	64.46	5.373	0.056	0.014	0.065	0.026	0.064	0.012
dr328	3.871	56.99	6.435	0.055	0.011	0.064	0.022	0.061	0.009
	15 kts								
dr332	1	60.13	1.576	0.073	0.045	0.202	0.05	0.111	0.052
dr337	1.251	68.06	1.741	0.066	0.079	0.145	0.085	0.095	0.07
dr333	1.5	56.28	2.526	0.078	0.118	0.145	0.133	0.102	0.088
dr338	1.75	58.2	2.848	0.077	0.109	0.132	0.128	0.1	0.072
dr334	2	60.6	3.126	0.078	0.066	0.125	0.082	0.096	0.039
dr339	2.246	61.1	3.483	0.072	0.059	0.102	0.075	0.084	0.037
dr335	2.492	52.1	4.532	0.082	0.042	0.115	0.054	0.092	0.027
dr336	2.973	61.94	4.547	0.074	0.02	0.093	0.027	0.082	0.018
dr342	3.434	58.4	5.572	0.074	0.017	0.089	0.025	0.08	0.019
dr341	3.871	59.21	6.194	0.069	0.011	0.079	0.017	0.074	0.02
	25 kts								
dr343	1	59.39	1.595	0.142	0.038	0.323	0.055	0.139	0.047
dr348	1	60.78	1.559	0.145	0.036	0.339	0.051	0.143	0.045
dr350	1.5	58.01	2.45	0.112	0.081	0.218	0.095	0.136	0.071
dr351	2	59.68	3.174	0.101	0.096	0.161	0.113	0.117	0.067
dr355	2.246	61	3.488	0.102	0.085	0.153	0.102	0.116	0.054
dr352	2.492	57.03	4.141	0.096	0.065	0.132	0.078	0.106	0.044
dr356	2.734	53.5	4.841	0.1	0.035	0.136	0.043	0.107	0.028
dr353	2.973	58.42	4.821	0.095	0.026	0.123	0.031	0.103	0.025
dr354	3.434	59.57	5.462	0.087	0.02	0.104	0.022	0.094	0.027
dr357	3.871	60.56	6.055	0.09	0.015	0.104	0.01	0.095	0.027

Table 57. Acceleration Amp. for Wall Hull (GM=2.5m & BK=1.25m) in Bow Waves.

Flare Hull	GM(1.5m)	BK(1.25m)		Motions					
		Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate	
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr161	1	69.18	1.369	0.999	3.843	1.302	12.353	4.271	2.177
dr160	1.251	67.03	1.768	0.991	6.401	1.345	18.644	3.924	1.995
dr154	1.5	52.29	2.718	0.998	10.112	1.415	26.938	3.977	2.966
dr155	1.75	52.53	3.156	0.996	9.263	1.61	22.949	4.141	2.959
dr156	2	56.27	3.366	0.995	7.379	1.536	17.334	3.832	3.091
dr162	2.246	53.54	3.975	0.974	5.457	1.544	11.924	3.596	3.06
dr157	2.492	61.47	3.842	0.996	5.192	2.182	11.037	4.81	2.856
dr158	2.973	60.86	4.627	0.972	3.497	1.936	6.722	3.963	2.383
dr159	3.434	48.76	6.673	0.989	4.674	1.738	8.717	3.239	2.586
	15 kts								
dr170	0.75	46.05	1.543	0.995	6.062	0.83	15.05	2.121	2.513
dr164	1	58.9	1.608	0.98	6.028	1.037	14.28	2.515	2.75
dr169	1.251	66.49	1.782	0.992	5.209	1.269	11.728	2.898	2.905
dr165	1.5	76	1.87	0.993	5.521	1.454	11.797	3.164	3.145
dr171	1.75	61.01	2.717	0.976	5.161	1.79	10.15	3.658	3.429
dr166	2	58.27	3.251	0.972	4.368	1.576	8.296	3.142	3.046
dr167	2.492	57.84	4.082	0.942	4.649	1.499	8.527	2.881	3.275
dr172	2.734	66.72	3.882	0.834	3.756	1.856	6.528	3.247	2.626
dr168	2.973	69.03	4.08	0.954	3.615	1.814	6.195	3.113	2.465
	25 kts								
dr176	1	65.22	1.453	0.888	6.169	0.965	13.235	1.553	3.148
dr178	1.5	60.38	2.354	0.966	9.349	1.044	14.239	1.898	4.023
dr179	2	62.88	3.013	0.966	7.64	1.39	11.791	2.373	3.459
dr180	2.492	59.05	3.999	0.951	8.192	1.528	11.505	2.603	3.353
dr183	2.734	68.12	3.802	0.958	5.403	1.643	7.402	2.329	2.322
dr186	2.973	61.94	4.547	0.948	3.591	1.724	5.474	2.549	1.618
dr182	3.434	59.91	5.431	0.877	7.875	1.643	12.087	2.556	3.042
dr184	3.871	58.35	6.286	0.958	7.647	1.901	9.335	2.532	3.212

Table 58. Motion Amp for Flared Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Flare Hull	GM(1.5m)	BK(1.25m)	Accelerations						
			Beam Wave	Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λH	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr161	1	69.18	1.369	0.022	0.076	0.057	0.045	0.042	0.096
dr160	1.251	67.03	1.768	0.022	0.114	0.049	0.082	0.038	0.13
dr154	1.5	52.29	2.718	0.029	0.17	0.049	0.133	0.042	0.187
dr155	1.75	52.53	3.156	0.039	0.137	0.059	0.118	0.046	0.144
dr156	2	56.27	3.366	0.036	0.1	0.051	0.096	0.044	0.098
dr162	2.246	53.54	3.975	0.039	0.063	0.049	0.062	0.047	0.063
dr157	2.492	61.47	3.842	0.052	0.058	0.068	0.06	0.057	0.056
dr158	2.973	60.86	4.627	0.037	0.032	0.051	0.038	0.039	0.031
dr159	3.434	48.76	6.673	0.042	0.041	0.046	0.045	0.047	0.037
	15 kts								
dr170	0.75	46.05	1.543	0.005	0.109	0.021	0.081	0.016	0.126
dr164	1	58.9	1.608	0.01	0.104	0.026	0.08	0.02	0.119
dr169	1.251	66.49	1.782	0.014	0.086	0.03	0.068	0.022	0.098
dr165	1.5	76	1.87	0.021	0.085	0.036	0.07	0.027	0.097
dr171	1.75	61.01	2.717	0.024	0.076	0.039	0.063	0.03	0.087
dr166	2	58.27	3.251	0.025	0.062	0.036	0.051	0.029	0.072
dr167	2.492	57.84	4.082	0.027	0.063	0.033	0.052	0.031	0.073
dr172	2.734	66.72	3.882	0.033	0.046	0.043	0.038	0.034	0.055
dr168	2.973	69.03	4.08	0.029	0.047	0.036	0.039	0.031	0.054
	25 kts								
dr176	1	65.22	1.453	0.013	0.111	0.015	0.091	0.017	0.125
dr178	1.5	60.38	2.354	0.013	0.173	0.018	0.151	0.015	0.188
dr179	2	62.88	3.013	0.018	0.137	0.022	0.123	0.02	0.146
dr180	2.492	59.05	3.999	0.017	0.141	0.024	0.127	0.018	0.152
dr183	2.734	68.12	3.802	0.019	0.093	0.024	0.084	0.02	0.101
dr186	2.973	61.94	4.547	0.018	0.059	0.023	0.053	0.019	0.063
dr182	3.434	59.91	5.431	0.022	0.134	0.028	0.123	0.021	0.141
dr184	3.871	58.35	6.286	0.024	0.135	0.027	0.124	0.025	0.142

Table 59. Accel. Amp for Flared Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Flare Hull	GM(1.5m)	BK(1.75m)	Beam Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG			AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr532	1	59.17	1.601	0.992	2.798	1.305	9.074	4.336	2.604
dr538	1.251	64.24	1.845	0.999	5.514	1.252	16.007	3.704	2.309
dr533	1.5	66.16	2.148	0.991	7.543	1.694	20.378	4.56	2.486
dr537	1.75	60.62	2.734	0.999	8.156	1.383	20.315	3.551	2.6
dr534	2	59.53	3.183	0.991	8.138	1.508	19.27	3.882	3.153
dr539	2.246	62.65	3.397	0.995	6.706	1.689	14.892	4.014	3.224
dr535	2.492	66.26	3.564	0.998	4.889	2.096	10.034	4.681	2.791
dr536	2.973	54.13	5.203	0.96	3.528	1.911	6.558	3.946	2.239
dr540	3.434	71.45	4.554	0.969	3.136	1.52	5.318	2.875	2.241
	15 kts								
DR544	1	51.85	1.827	0.99	6.738	1.013	15.001	2.467	2.885
dr545	1	57.94	1.635	0.994	6.349	1.099	14.962	2.642	2.836
DR542	1.5	67.28	2.113	0.993	6.84	1.344	14.936	2.964	3.384
dr548	1.75	67.1	2.47	0.964	3.953	1.645	7.832	3.255	2.862
dr543	2	51.98	3.645	0.977	5.129	1.57	10.509	3.319	3.05
dr552	2	51.98	3.644	0.99	4.991	1.418	10.052	3.076	3.157
dr551	2.492	69.13	3.416	0.964	4.579	1.728	8.086	3.052	3.027
	25 kts								
dr562	0.75	69.98	1.016	0.875	5.286	0.423	7.522	0.668	2.611
dr563	1	64.87	1.461	0.967	7.183	0.876	10.92	1.444	3.086
dr554	1.5	57.13	2.488	0.963	8.748	1.495	13.55	2.263	3.597
dr558	1.75	66.01	2.511	0.944	7.25	1.341	11.156	2.322	3.12
dr555	2	63.77	2.971	0.981	7.324	1.396	10.866	2.317	3.022
dr560	2.492	65.89	3.584	0.995	5.63	1.954	7.751	2.743	2.735
dr561	2.973	66.02	4.266	0.846	4.898	1.442	7.962	2.324	1.368

Table 60. Motion Amp for Flared Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Flare Hull	GM(1.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr532	1	59.17	1.601	0.022	0.058	0.056	0.03	0.044	0.082
dr538	1.251	64.24	1.845	0.025	0.103	0.047	0.068	0.04	0.122
dr533	1.5	66.16	2.148	0.034	0.128	0.057	0.095	0.049	0.145
dr537	1.75	60.62	2.734	0.031	0.126	0.047	0.109	0.04	0.128
dr534	2	59.53	3.183	0.037	0.116	0.05	0.107	0.045	0.115
dr539	2.246	62.65	3.397	0.037	0.089	0.049	0.091	0.047	0.082
dr535	2.492	66.26	3.564	0.046	0.056	0.061	0.06	0.053	0.051
dr536	2.973	54.13	5.203	0.043	0.034	0.055	0.041	0.044	0.028
dr540	3.434	71.45	4.554	0.03	0.03	0.036	0.039	0.034	0.021
	15 kts								
DR544	1	51.85	1.827	0.012	0.118	0.024	0.094	0.019	0.134
dr545	1	57.94	1.635	0.011	0.111	0.026	0.086	0.02	0.128
DR542	1.5	67.28	2.113	0.022	0.112	0.033	0.093	0.029	0.125
dr548	1.75	67.1	2.47	0.022	0.058	0.034	0.049	0.028	0.067
dr543	2	51.98	3.645	0.026	0.074	0.037	0.065	0.031	0.082
dr552	2	51.98	3.644	0.025	0.074	0.035	0.061	0.029	0.086
dr551	2.492	69.13	3.416	0.028	0.064	0.035	0.053	0.032	0.074
	25 kts								
dr562	0.75	69.98	1.016	0.003	0.102	0.005	0.092	0.004	0.11
dr563	1	64.87	1.461	0.006	0.132	0.01	0.12	0.009	0.141
dr554	1.5	57.13	2.488	0.014	0.158	0.018	0.142	0.019	0.169
dr558	1.75	66.01	2.511	0.015	0.13	0.021	0.116	0.018	0.141
dr555	2	63.77	2.971	0.016	0.13	0.021	0.118	0.018	0.138
dr560	2.492	65.89	3.584	0.02	0.093	0.026	0.084	0.022	0.1
dr561	2.973	66.02	4.266	0.021	0.074	0.025	0.069	0.023	0.077

Table 61. Accel. Amp for Flared Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Flare Hull	GM(2.5m)	BK(1.75m)		Motions					
				Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr390	0.75	55.29	1.285	0.991	2.962	0.878	10.576	2.964	1.817
dr387	1	59.01	1.605	0.999	4.827	1.133	15.425	3.749	2.904
dr391	1.251	61.32	1.933	0.993	3.976	1.319	11.414	3.997	3.014
dr388	1.5	65.18	2.181	0.994	3.543	1.733	9.649	4.855	2.867
dr394	1.75	57.23	2.896	0.97	2.77	1.555	6.274	3.826	3.14
dr389	2	60.52	3.13	0.987	2.931	1.662	6.558	4.161	3.092
dr411	2.246	65.73	3.237	0.987	2.307	1.921	4.797	4.224	2.278
dr395	2.492	66.73	3.539	0.981	2.568	2.23	5.396	5.003	2.508
dr396	2.973	54.04	5.212	0.849	2.951	1.831	6.308	3.747	2.445
dr397	3.434	82.49	3.944	0.88	2.166	1.163	4.008	2.329	2.05
	15 kts								
dr412	0.75	51.16	1.389	0.973	1.883	0.722	4.779	1.855	2.677
dr399	1	54.24	1.747	0.99	2.273	1.011	5.33	2.481	3.074
dr404	1.251	62.65	1.892	0.977	1.934	1.17	4.393	2.651	2.792
dr405	1.5	71.94	1.976	0.943	2.252	1.585	4.644	3.323	3.331
dr406	1.75	63.17	2.624	0.991	2.783	1.505	5.792	3.308	3.239
dr402	2	53.94	3.512	0.96	2.843	1.577	5.702	3.22	3.211
dr407	2.492	65.66	3.597	0.966	2.686	1.681	4.73	3.134	2.902
dr408	2.973	58.08	4.849	0.968	2.581	1.822	4.477	3.159	2.38
dr409	3.434	73.46	4.429	0.982	2.157	1.372	3.52	2.261	2.187
	25 kts								
dr424	0.75	61.24	1.161	0.984	2.835	0.589	3.73	0.881	2.855
dr413	1	64.87	1.46	0.958	3.302	1.019	5.041	1.622	3.067
dr414	1.251	63.76	1.859	0.987	3.686	1.173	5.812	1.99	3.305
dr416	1.5	61.56	2.309	0.929	4.613	1.299	6.62	2.266	4.231
dr420	1.75	61.55	2.693	0.995	3.656	1.436	5.613	2.427	2.243
dr415	2	58.75	3.225	0.977	4.962	1.915	6.318	2.557	4.628
dr419	2.492	65.06	3.629	1.001	3.407	1.6	4.929	2.536	2.922
dr423	2.973	61.56	4.575	0.997	2.657	1.379	3.954	2.426	1.965
dr422	3.434	69.41	4.687	0.997	2.972	1.479	4.336	1.945	2.294

Table 62. Motion Amp for Flared Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Flare Hull	GM(2.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
dr390	0.75	55.29	1.285	0.01	0.051	0.042	0.029	0.032	0.067
dr387	1	59.01	1.605	0.022	0.07	0.053	0.066	0.042	0.074
dr391	1.251	61.32	1.933	0.029	0.048	0.056	0.06	0.045	0.043
dr388	1.5	65.18	2.181	0.037	0.038	0.063	0.05	0.053	0.035
dr394	1.75	57.23	2.896	0.027	0.026	0.045	0.04	0.039	0.029
dr389	2	60.52	3.13	0.036	0.024	0.052	0.038	0.045	0.026
dr411	2.246	65.73	3.237	0.039	0.015	0.051	0.026	0.047	0.016
dr395	2.492	66.73	3.539	0.045	0.019	0.058	0.031	0.055	0.018
dr396	2.973	54.04	5.212	0.043	0.019	0.058	0.025	0.042	0.022
dr397	3.434	82.49	3.944	0.029	0.012	0.036	0.017	0.03	0.016
	15 kts								
dr412	0.75	51.16	1.389	0.004	0.033	0.018	0.031	0.014	0.044
dr399	1	54.24	1.747	0.009	0.036	0.025	0.031	0.019	0.051
dr404	1.251	62.65	1.892	0.012	0.029	0.025	0.024	0.017	0.044
dr405	1.5	71.94	1.976	0.018	0.027	0.034	0.027	0.023	0.042
dr406	1.75	63.17	2.624	0.022	0.033	0.034	0.031	0.028	0.045
dr402	2	53.94	3.512	0.025	0.032	0.035	0.03	0.029	0.043
dr407	2.492	65.66	3.597	0.028	0.028	0.035	0.024	0.033	0.038
dr408	2.973	58.08	4.849	0.032	0.023	0.038	0.02	0.035	0.031
dr409	3.434	73.46	4.429	0.023	0.022	0.027	0.018	0.026	0.029
	25 kts								
dr424	0.75	61.24	1.161	0.001	0.058	0.005	0.05	0.004	0.065
dr413	1	64.87	1.46	0.004	0.064	0.011	0.054	0.008	0.074
dr414	1.251	63.76	1.859	0.008	0.07	0.015	0.058	0.012	0.081
dr416	1.5	61.56	2.309	0.01	0.087	0.018	0.076	0.013	0.098
dr420	1.75	61.55	2.693	0.012	0.06	0.02	0.048	0.015	0.07
dr415	2	58.75	3.225	0.013	0.094	0.021	0.084	0.015	0.104
dr419	2.492	65.06	3.629	0.016	0.056	0.021	0.05	0.018	0.064
dr423	2.973	61.56	4.575	0.02	0.037	0.026	0.033	0.019	0.042
dr422	3.434	69.41	4.687	0.019	0.043	0.023	0.037	0.017	0.048

Table 63. Accel. Amp for Flared Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Flare Hull	GM(2.5 m)	BK(1.25m)		Motions					
				Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate
135 DEG	Λ/L	Λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	Deg	deg	deg	dps	dps	dps
		5 kts							
dr234	0.75	58.13	1.223	0.995	4.155	0.938	14.95	3.518	1.607
dr228	1	64.27	1.474	0.996	5.37	1.073	17.158	3.542	2.934
dr235	1.251	62.93	1.883	0.967	3.747	1.239	10.905	3.764	2.937
dr229	1.5	69.8	2.037	0.984	3.433	1.87	9.172	5.176	3.267
dr230	2	64.47	2.939	0.998	3.042	1.592	7.045	3.986	3.092
dr231	2.492	61.99	3.809	0.985	2.58	2.41	5.201	5.465	2.736
dr232	2.973	55.44	5.08	0.807	2.655	1.753	5.512	3.605	2.242
dr233	3.434	58.4	5.571	0.89	2.403	1.604	4.199	3.077	2.386
		15 kts							
dr243	0.75	65.75	1.081	0.978	1.772	0.672	4.22	1.719	2.35
dr236	1	56.97	1.663	0.98	2.126	1.02	4.967	2.497	2.81
dr244	1.251	68.58	1.728	0.927	1.977	1.154	4.429	2.613	2.773
dr237	1.5	62.71	2.267	0.983	3.167	1.413	6.913	3.273	3.651
dr245	1.75	59.77	2.773	0.973	2.697	1.669	5.469	3.59	3.52
dr238	2	56.49	3.353	0.963	2.432	1.607	4.686	3.231	3.401
dr240	2.492	61.58	3.835	0.968	2.624	1.991	4.582	3.434	3.254
dr241	2.973	61.12	4.608	0.961	2.555	1.728	4.545	2.961	2.62
dr242	3.434	59.35	5.482	0.958	2.633	1.658	4.233	2.695	2.848
		25 kts							
dr253	0.75	60.75	1.17	0.933	2.77	0.626	4.005	0.906	3.186
dr254	1	63.26	1.498	0.945	4.264	1.036	6.177	1.611	3.829
dr248	1.5	59.05	2.407	0.967	3.903	1.586	6.131	2.429	3.816
dr257	2	66.35	2.855	0.913	3.22	1.249	5.983	2.411	2.325
dr259	2.246	60.06	3.543	0.969	3.191	1.387	5.168	2.489	2.863
dr256	2.492	60.83	3.882	0.935	4.437	1.618	6.759	2.72	3.776
dr258	2.973	67.57	4.168	0.949	3.592	1.507	5.165	2.446	2.436
DR251	1.75	60.83	2.726	0.989	3.791	1.541	5.965	2.602	3.323
DR260	1.999	60.89	3.11	0.987	3.445	1.976	5.214	2.588	3.293
DR259	2.247	60.07	3.543	0.969	3.191	1.387	5.168	2.489	2.863
DR256	2.492	60.82	3.882	0.935	4.437	1.618	6.759	2.72	3.776
DR258	2.972	67.56	4.168	0.949	3.592	1.507	5.165	2.446	2.436

Table 64. Motion Amp for Flared Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

Flare Hull	GM(2.5 m)	BK(1.25m)	Beam Wave	Accelerations					
				Vert CG A	Tran CG A	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
		5 kts							
dr234	0.75	58.13	1.223	0.011	0.072	0.05	0.043	0.039	0.086
dr228	1	64.27	1.474	0.024	0.076	0.052	0.073	0.041	0.078
dr235	1.251	62.93	1.883	0.026	0.045	0.049	0.057	0.044	0.042
dr229	1.5	69.8	2.037	0.035	0.036	0.062	0.054	0.056	0.031
dr230	2	64.47	2.939	0.035	0.025	0.048	0.041	0.046	0.025
dr231	2.492	61.99	3.809	0.047	0.015	0.067	0.028	0.056	0.021
dr232	2.973	55.44	5.08	0.044	0.015	0.053	0.02	0.047	0.02
dr233	3.434	58.4	5.571	0.038	0.011	0.04	0.02	0.044	0.015
		15 kts							
dr243	0.75	65.75	1.081	0.004	0.031	0.017	0.026	0.013	0.043
dr236	1	56.97	1.663	0.009	0.032	0.025	0.029	0.018	0.046
dr244	1.251	68.58	1.728	0.012	0.027	0.026	0.026	0.019	0.04
dr237	1.5	62.71	2.267	0.023	0.038	0.036	0.036	0.029	0.052
dr245	1.75	59.77	2.773	0.024	0.031	0.039	0.029	0.03	0.045
dr238	2	56.49	3.353	0.023	0.026	0.035	0.024	0.027	0.038
dr240	2.492	61.58	3.835	0.029	0.028	0.037	0.023	0.034	0.039
dr241	2.973	61.12	4.608	0.033	0.025	0.038	0.02	0.036	0.033
dr242	3.434	59.35	5.482	0.03	0.025	0.034	0.021	0.032	0.035
		25 kts							
dr253	0.75	60.75	1.17	0.001	0.06	0.005	0.05	0.003	0.069
dr254	1	63.26	1.498	0.004	0.084	0.01	0.07	0.007	0.098
dr248	1.5	59.05	2.407	0.01	0.069	0.019	0.06	0.013	0.08
dr257	2	66.35	2.855	0.017	0.051	0.022	0.043	0.019	0.061
dr259	2.246	60.06	3.543	0.017	0.05	0.022	0.043	0.019	0.059
dr256	2.492	60.83	3.882	0.02	0.074	0.027	0.063	0.022	0.085
dr258	2.973	67.57	4.168	0.02	0.054	0.025	0.048	0.021	0.061
DR251	1.75	60.83	2.726	0.013	0.066	0.021	0.055	0.017	0.079
DR260	1.999	60.89	3.11	0.012	0.064	0.02	0.057	0.015	0.072
DR259	2.247	60.07	3.543	0.017	0.05	0.022	0.043	0.019	0.059
DR256	2.492	60.82	3.882	0.02	0.074	0.027	0.063	0.022	0.085
DR258	2.972	67.56	4.168	0.02	0.054	0.025	0.048	0.021	0.061

Table 65. Accel. Amp for Flared Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

Tumbl Hull	GM(1.5m)	BK(1.25m)		Motions					
			Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG	λ/L	λ/H	AMP1 inch	AMP1/RQ0 deg	AMP1 deg	AMP1 deg	AMP1 dps	AMP1 dps	AMP1 dps
RUN	5 kts								
dr160	1	70.36	1.346	0.922	2.44	1.085	8.139	3.648	2.018
dr164	1.251	54.15	2.189	0.972	4.817	1.484	14.549	4.453	2.575
dr161	1.5	65.33	2.176	0.998	6.929	1.826	18.613	4.948	2.161
dr166	1.75	56.13	2.953	0.998	9.035	1.537	22.508	4.023	2.501
dr162	2	59.63	3.177	0.988	8.157	1.655	19.757	4.055	2.936
dr167	2.246	63.33	3.36	0.995	5.748	1.872	12.593	4.299	3.077
dr163	2.492	66.54	3.549	0.992	4.086	2.375	8.458	5.287	2.536
dr168	2.973	61.03	4.615	0.994	3.463	1.604	6.851	3.344	2.162
dr169	3.434	55.88	5.823	0.982	3.551	1.582	6.169	3.021	2.653
	15 kts								
dr151	1	61.01	1.553	0.999	7.82	1.059	18.352	2.58	2.311
dr156	1.251	61.18	1.937	0.991	8.338	1.419	18.308	3.221	2.874
dr152	1.5	72.45	1.962	0.993	6.747	1.461	14.321	3.32	3.046
dr157	1.75	70.01	2.368	0.983	4.832	1.684	9.657	3.349	2.795
dr153	2	52.87	3.583	0.959	4.775	1.719	9.048	3.283	3.28
dr154	2.492	65.96	3.58	0.97	4.163	1.659	7.183	3.067	2.937
dr158	2.973	61.54	4.577	0.973	3.239	1.803	5.684	3.208	2.356
dr159	3.434	58.62	5.551	0.97	4.163	1.56	6.524	2.535	2.66
	25 kts								
dr173	1	64.95	1.459	0.906	12.276	0.718	13.58	1.031	3.271
dr178	1.251	59.45	1.994	0.957	15.796	1.35	24.425	2.249	3.422
dr174	1.5	61.8	2.3	0.938	11.144	1.462	18.038	2.359	2.939
dr175	2	56.3	3.365	0.972	9.957	1.311	15.697	2.524	3.121
dr176	2.492	59.87	3.944	0.982	10.166	1.679	14.852	2.676	3.202
dr179	2.973	68.65	4.102	0.951	6.839	1.577	9.442	2.407	2.452
DR180	3.434	53.82	6.045	0.95	6.78	1.426	7.422	1.792	2.878

Table 66. Motion Amp for TH Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Tumbl Hull	GM(1.5m)	BK(1.25m)		Accelerations						
		λ/L	λ/H	Beam Wave AMP1 inch	Vert CG TF g's	Tran CG AMP1 g's	Vert Bow AMP1 g's	Tran Bow AMP1 g's	Vert Str AMP1 g's	Tran Str AMP1 g's
135 DEG										
RUN										
		5 kts								
dr160	1	70.36	1.346	0.442	0.05	0.047	0.031	0.036	0.067	
dr164	1.251	54.15	2.189	0.607	0.097	0.055	0.065	0.047	0.117	
dr161	1.5	65.33	2.176	0.823	0.126	0.059	0.094	0.049	0.143	
dr166	1.75	56.13	2.953	0.701	0.149	0.05	0.12	0.042	0.162	
dr162	2	59.63	3.177	0.86	0.12	0.054	0.101	0.044	0.13	
dr167	2.246	63.33	3.36	0.954	0.071	0.054	0.072	0.049	0.069	
dr163	2.492	66.54	3.549	1.116	0.047	0.061	0.054	0.055	0.042	
dr168	2.973	61.03	4.615	0.885	0.031	0.049	0.037	0.038	0.029	
dr169	3.434	55.88	5.823	0.88	0.029	0.049	0.031	0.044	0.033	
		15 kts								
dr151	1	61.01	1.553	0.554	0.14	0.027	0.111	0.02	0.155	
dr156	1.251	61.18	1.937	0.732	0.146	0.033	0.119	0.026	0.163	
dr152	1.5	72.45	1.962	0.898	0.112	0.033	0.091	0.028	0.126	
dr157	1.75	70.01	2.368	0.917	0.075	0.036	0.062	0.029	0.086	
dr153	2	52.87	3.583	0.671	0.074	0.035	0.06	0.027	0.086	
dr154	2.492	65.96	3.58	0.929	0.057	0.034	0.046	0.031	0.068	
dr158	2.973	61.54	4.577	0.958	0.042	0.036	0.035	0.034	0.051	
dr159	3.434	58.62	5.551	0.887	0.058	0.031	0.049	0.033	0.067	
		25 kts								
dr173	1	64.95	1.459	2.592	0.224	0.023	0.206	0.022	0.237	
dr178	1.251	59.45	1.994	1.505	0.285	0.023	0.26	0.02	0.298	
dr174	1.5	61.8	2.3	1.026	0.202	0.021	0.183	0.016	0.213	
dr175	2	56.3	3.365	1.052	0.179	0.025	0.165	0.021	0.189	
dr176	2.492	59.87	3.944	1.09	0.181	0.027	0.166	0.025	0.191	
dr179	2.973	68.65	4.102	0.985	0.117	0.025	0.108	0.021	0.123	
DR180	3.434	53.82	6.045	0.753	0.122	0.023	0.112	0.02	0.131	

Table 67. Accel. Amp. for TH Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Beam Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
		5 kts							
dr103	1	60.99	1.553	0.998	2.289	1.25	7.356	4.088	2.472
dr104	1.5	64.93	2.189	0.995	5.953	1.634	16.374	4.499	2.288
dr111	1.75	61.57	2.692	0.999	7.387	1.52	18.293	3.789	2.45
dr105	2	60.79	3.116	0.988	8.4	1.587	20.106	3.978	2.674
dr109	2.246	61.44	3.464	0.997	6.485	1.832	14.332	4.085	2.947
dr106	2.492	61.86	3.817	0.998	4.776	2.089	10.031	4.606	2.481
dr107	2.973	59.32	4.748	0.992	3.209	1.825	6.092	3.672	2.276
dr108	3.434	56.32	5.777	0.995	3.921	1.484	7.19	2.74	2.406
dr112	3.871	64.59	5.678	0.968	3.365	1.714	5.426	3.18	2.427
		15 kts							
dr113	1	60.99	1.553	0.988	7.13	1.064	17.066	2.56	2.357
dr128	1.251	63.41	1.869	0.995	7.918	1.356	17.104	3.111	2.953
dr115	1.5	63.91	2.224	0.991	9.083	1.376	19.391	2.972	3.367
DR124	1.75	64.65	2.564	0.992	6.04	1.653	12.449	3.326	2.91
dr116	2	53.04	3.572	0.998	6.573	1.618	13.26	3.263	3.157
dr118	2.492	59.2	3.989	0.999	4.853	1.456	8.954	2.762	2.926
dr119	2.973	63.16	4.459	0.99	3.687	1.873	6.462	3.149	2.481
dr120	3.434	54.37	5.984	0.984	4.113	1.821	6.846	2.988	2.467
		25 kts							
dr130	1	63.17	1.5	0.981	11.784	0.893	16.542	1.45	2.817
dr140	1.251	59.07	2.006	0.971	13.216	1.336	19.994	2.04	3.366
dr136	1.5	60.38	2.354	0.991	12.289	1.428	19.018	2.498	3.216
dr135	1.75	67.07	2.471	0.932	9.559	1.359	14.298	2.13	2.984
dr141	2	60.7	3.121	0.945	8.994	1.745	13.736	2.685	2.814
dr133	2.492	60.84	3.881	0.966	8.538	1.445	12.952	2.294	2.765
dr142	2.973	69.96	4.025	0.943	4.591	1.874	7.573	2.697	1.692
dr143	3.434	55.14	5.901	0.913	7.163	1.468	10.53	2.265	2.314
DR136	1.5	60.37	2.354	0.991	12.289	1.428	19.018	2.498	3.216
DR135	1.75	67.09	2.471	0.932	9.559	1.359	14.298	2.13	2.984
DR141	1.999	60.68	3.121	0.945	8.994	1.745	13.736	2.685	2.814
DR133	2.492	63.14	3.739	0.986	9.596	1.328	12.369	2.164	3.668
DR147	2.734	65.95	3.928	0.969	7.81	1.661	11.059	2.625	2.602
DR148	3.206	65.95	4.605	0.936	6.525	1.652	9.845	2.438	1.92
DR143	3.434	55.13	5.901	0.913	7.161	1.465	10.548	2.264	2.306

Table 68. Motion Amp for TH Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Tumbl Hull	GM(1.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG	λ/L	λ/H	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	g's	g's	g's	g's	g's	g's
		5 kts							
dr103	1	60.99	1.553	0.019	0.051	0.051	0.028	0.042	0.073
dr104	1.5	64.93	2.189	0.035	0.116	0.055	0.085	0.051	0.134
dr111	1.75	61.57	2.692	0.028	0.125	0.046	0.098	0.041	0.14
dr105	2	60.79	3.116	0.036	0.133	0.051	0.108	0.044	0.146
dr109	2.246	61.44	3.464	0.041	0.085	0.055	0.078	0.047	0.089
dr106	2.492	61.86	3.817	0.046	0.055	0.06	0.057	0.054	0.053
dr107	2.973	59.32	4.748	0.04	0.03	0.051	0.033	0.041	0.031
dr108	3.434	56.32	5.777	0.042	0.033	0.048	0.038	0.043	0.031
dr112	3.871	64.59	5.678	0.037	0.026	0.04	0.035	0.041	0.022
		15 kts							
dr113	1	60.99	1.553	0.012	0.131	0.025	0.103	0.02	0.148
dr128	1.251	63.41	1.869	0.019	0.14	0.035	0.112	0.025	0.157
dr115	1.5	63.91	2.224	0.021	0.161	0.034	0.134	0.026	0.177
DR124	1.75	64.65	2.564	0.023	0.099	0.035	0.081	0.029	0.112
dr116	2	53.04	3.572	0.029	0.104	0.039	0.088	0.032	0.116
dr118	2.492	59.2	3.989	0.019	0.069	0.027	0.06	0.025	0.077
dr119	2.973	63.16	4.459	0.031	0.052	0.036	0.043	0.034	0.061
dr120	3.434	54.37	5.984	0.033	0.054	0.037	0.045	0.035	0.062
		25 kts							
dr130	1	63.17	1.5	0.004	0.218	0.006	0.205	0.007	0.224
dr140	1.251	59.07	2.006	0.014	0.242	0.019	0.222	0.016	0.253
dr136	1.5	60.38	2.354	0.014	0.222	0.021	0.202	0.016	0.234
dr135	1.75	67.07	2.471	0.018	0.173	0.022	0.158	0.021	0.183
dr141	2	60.7	3.121	0.018	0.161	0.024	0.146	0.02	0.17
dr133	2.492	60.84	3.881	0.019	0.153	0.025	0.139	0.019	0.163
dr142	2.973	69.96	4.025	0.019	0.078	0.024	0.071	0.021	0.083
dr143	3.434	55.14	5.901	0.023	0.118	0.028	0.109	0.023	0.124
DR136	1.5	60.37	2.354	0.014	0.222	0.021	0.202	0.016	0.234
DR135	1.75	67.09	2.471	0.018	0.173	0.022	0.158	0.021	0.183
DR141	1.999	60.68	3.121	0.018	0.161	0.024	0.146	0.02	0.17
DR133	2.492	63.14	3.739	0.016	0.178	0.021	0.166	0.017	0.187
DR147	2.734	65.95	3.928	0.02	0.137	0.025	0.126	0.022	0.144
DR148	3.206	65.95	4.605	0.022	0.109	0.026	0.101	0.023	0.115
DR143	3.434	55.13	5.901	0.023	0.118	0.028	0.109	0.023	0.124

Table 69. Accel. Amp for TH Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Beam Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
	5 kts								
dr469	0.75	64.48	1.102	0.994	2.035	0.825	7.39	3.06	1.607
dr463	1	60.57	1.564	0.997	6.461	1.254	20.209	4.068	2.36
dr464	1.5	58.47	2.431	0.998	4.889	1.878	12.83	5.169	3.171
dr465	2	61.79	3.066	0.995	3.588	1.756	8.357	4.38	3.054
dr466	2.492	61.82	3.82	0.993	3.35	2.303	6.968	5.007	2.806
dr467	2.973	53.12	5.302	0.992	2.754	1.949	5.225	3.932	2.571
dr468	3.434	58.39	5.573	0.956	2.589	2.007	4.842	3.749	2.137
dr471	3.871	56.25	6.52	0.741	2.811	1.804	4.901	3.267	2.601
	15 kts								
dr451	1	48.83	1.94	0.939	3.792	1.151	9.342	2.771	3.344
dr452	1.5	61.24	2.321	0.988	3.658	1.473	7.718	3.329	3.616
dr453	2	54.33	3.487	0.956	2.978	1.614	5.855	3.32	3.034
dr454	2.492	59.22	3.987	0.97	3.244	1.614	6.101	3.029	3.405
dr455	2.973	58.15	4.844	0.984	2.359	1.912	4.065	3.363	2.326
dr456	3.434	57.75	5.634	0.947	2.688	1.648	4.35	2.776	2.728
	25 kts								
dr477	0.75	65.24	1.09	0.769	4.016	0.826	5.766	0.924	3.006
dr472	1	59.67	1.588	0.914	4.995	1.071	7.526	1.662	3.536
dr480	1.251	64.27	1.844	0.899	4.451	1.01	7.52	1.918	2.946
dr473	1.5	53.42	2.661	0.953	5.671	1.776	8.667	2.49	4.343
dr474	2	60.67	3.122	0.891	4.796	1.514	7.705	2.491	3.231
dr481	2.492	59.13	3.994	0.985	3.282	2.379	6.971	5.341	2.719
dr476	2.973	61.87	4.552	0.892	4.444	1.582	6.638	2.588	2.824
dr478	3.434	53.09	6.129	0.719	3.809	1.491	5.321	2.254	2.065
dr479	3.871	55.89	6.561	0.919	6.173	1.88	8.284	2.367	3.356

Table 70. Motion Amp for TH Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Tumbl Hull	GM(2.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG	λ/L	λ/H	AMP1 inch	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's
RUN	5 kts								
dr469	0.75	64.48	1.102	0.01	0.04	0.043	0.014	0.033	0.058
dr463	1	60.57	1.564	0.022	0.109	0.054	0.076	0.044	0.125
dr464	1.5	58.47	2.431	0.037	0.06	0.066	0.068	0.054	0.056
dr465	2	61.79	3.066	0.038	0.036	0.052	0.052	0.05	0.028
dr466	2.492	61.82	3.82	0.051	0.027	0.066	0.04	0.058	0.022
dr467	2.973	53.12	5.302	0.041	0.018	0.054	0.03	0.042	0.017
dr468	3.434	58.39	5.573	0.032	0.017	0.039	0.028	0.04	0.016
dr471	3.871	56.25	6.52	0.043	0.016	0.05	0.026	0.044	0.016
	15 kts								
dr451	1	48.83	1.94	0.012	0.061	0.029	0.05	0.022	0.075
dr452	1.5	61.24	2.321	0.021	0.049	0.036	0.045	0.028	0.061
dr453	2	54.33	3.487	0.024	0.034	0.035	0.034	0.029	0.042
dr454	2.492	59.22	3.987	0.028	0.035	0.034	0.032	0.032	0.047
dr455	2.973	58.15	4.844	0.031	0.023	0.039	0.02	0.033	0.032
dr456	3.434	57.75	5.634	0.031	0.026	0.035	0.023	0.033	0.034
	25 kts								
dr477	0.75	65.24	1.09	0.002	0.081	0.006	0.07	0.003	0.091
dr472	1	59.67	1.588	0.006	0.096	0.011	0.083	0.01	0.107
dr480	1.251	64.27	1.844	0.01	0.084	0.015	0.069	0.013	0.097
dr473	1.5	53.42	2.661	0.01	0.101	0.019	0.09	0.014	0.113
dr474	2	60.67	3.122	0.018	0.084	0.024	0.072	0.02	0.096
dr481	2.492	59.13	3.994	0.049	0.027	0.064	0.04	0.06	0.022
dr476	2.973	61.87	4.552	0.022	0.074	0.027	0.065	0.024	0.082
dr478	3.434	53.09	6.129	0.024	0.057	0.027	0.053	0.026	0.061
dr479	3.871	55.89	6.561	0.024	0.102	0.026	0.092	0.025	0.11

Table 71. Motion Amp for TH Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Tumb Hull	GM(2.5m)	BK(1.25m)		Motions						
				Beam Wave AMP1 inch	Roll Ang AMP1/RQ0 deg	Roll Ang AMP1 deg	Pitch Ang AMP1 deg	Roll Rate AMP1 dps	Pitch Rate AMP1 dps	Yaw Rate AMP1 dps
135 DEG										
RUN	λ/L	λ/H								
	5 kts									
DR355	0.75	79.12	0.898	0.995	2.573	0.658	9.303	2.383	1.111	
dr349	1	64.58	1.467	0.999	7.179	1.153	22.699	3.767	2.287	
dr354	1.251	53.12	2.231	0.988	7.524	1.348	21.87	4.245	3.402	
dr350	1.5	76.12	1.867	0.992	3.565	1.216	9.595	3.42	2.477	
dr351	2	63.77	2.971	0.986	3.512	1.589	7.732	3.936	3.347	
dr352	2.492	64.07	3.685	0.992	3.092	2.296	6.523	4.994	2.753	
dr353	2.973	56.24	5.007	0.971	2.845	1.86	5.483	3.816	2.149	
	15 kts									
DR346	0.75	106.67	0.666	0.954	1.719	0.509	4.722	1.286	1.648	
dr340	1	57.53	1.647	0.976	3.561	1.043	8.493	2.632	3.235	
dr347	1.251	55.55	2.133	0.988	4.024	1.45	8.895	3.435	3.939	
dr341	1.5	64.92	2.19	0.979	3.342	1.339	7.001	3.052	3.387	
dr342	2	59.58	3.18	0.965	3.03	1.608	5.921	3.226	3.097	
dr343	2.492	60.66	3.893	0.981	2.959	1.468	5.225	2.802	3.323	
dr345	2.973	59.96	4.697	0.925	2.312	1.899	3.859	3.278	2.775	
dr348	3.434	55.32	5.881	0.97	2.907	1.67	4.452	2.531	3.165	
	25 kts									
dr360	1	64.85	1.461	0.962	4.245	0.839	6.465	1.491	3.212	
dr361	1.5	75.64	1.879	0.971	3.672	1	5.537	1.743	2.468	
dr362	2	60.59	3.127	0.953	5.075	1.413	8.025	2.478	3.112	
dr363	2.492	63.27	3.732	0.959	5.182	1.771	7.011	2.48	3.884	
dr366	2.734	62.4	4.151	0.991	5.739	1.636	7.171	2.559	4.547	
dr364	2.973	64.3	4.38	0.945	3.634	1.682	5.347	2.684	2.178	
dr365	3.434	55.85	5.826	0.978	3.201	1.556	4.666	2.39	2.382	

Table 72. Motion Amp for TH Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

Tumbl Hull	GM(2.5m)	BK(1.25m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
	5 kts								
DR355	0.75	79.12	0.898	0.007	0.048	0.033	0.026	0.027	0.059
dr349	1	64.58	1.467	0.023	0.118	0.052	0.09	0.042	0.129
dr354	1.251	53.12	2.231	0.036	0.106	0.06	0.096	0.051	0.109
dr350	1.5	76.12	1.867	0.027	0.042	0.046	0.051	0.037	0.037
dr351	2	63.77	2.971	0.036	0.033	0.049	0.048	0.046	0.028
dr352	2.492	64.07	3.685	0.047	0.024	0.065	0.036	0.053	0.022
dr353	2.973	56.24	5.007	0.045	0.019	0.055	0.027	0.047	0.016
	15 kts								
DR346	0.75	106.67	0.666	0.004	0.031	0.014	0.024	0.01	0.04
dr340	1	57.53	1.647	0.011	0.057	0.027	0.047	0.021	0.072
dr347	1.251	55.55	2.133	0.022	0.057	0.037	0.047	0.032	0.073
dr341	1.5	64.92	2.19	0.02	0.042	0.033	0.039	0.026	0.054
dr342	2	59.58	3.18	0.026	0.034	0.036	0.031	0.03	0.044
dr343	2.492	60.66	3.893	0.025	0.032	0.03	0.029	0.029	0.043
dr345	2.973	59.96	4.697	0.031	0.024	0.039	0.02	0.034	0.034
dr348	3.434	55.32	5.881	0.029	0.033	0.033	0.026	0.031	0.043
	25 kts								
dr360	1	64.85	1.461	0.004	0.083	0.011	0.071	0.007	0.094
dr361	1.5	75.64	1.879	0.008	0.065	0.014	0.056	0.01	0.074
dr362	2	60.59	3.127	0.019	0.089	0.025	0.074	0.022	0.103
dr363	2.492	63.27	3.732	0.019	0.089	0.024	0.079	0.021	0.098
dr366	2.734	62.4	4.151	0.02	0.107	0.029	0.095	0.017	0.117
dr364	2.973	64.3	4.38	0.021	0.057	0.025	0.05	0.023	0.064
dr365	3.434	55.85	5.826	0.022	0.052	0.025	0.047	0.023	0.058

Table 73. Accel. Amp for TH Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

Wall Hull	GM(1.5m)	BK(1.25m)		Motions					
		Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate	
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN		5 kts	inch	deg	deg	deg	dps	dps	dps
DR238	1	60.37	1.569	0.981	3.29	1.266	10.562	4.184	2.419
DR247	1.251	64.8	1.829	0.996	5.843	1.351	17.097	4.017	2.272
DR239	1.5	61.04	2.329	0.983	7.941	1.607	21.24	4.419	2.507
DR244	1.75	56.91	2.912	0.994	9.452	1.649	23.552	4.239	2.689
DR240	2	53.23	3.559	0.998	8.742	1.718	20.417	4.146	3.206
DR251	2.246	60.39	3.524	0.995	6.554	1.776	14.574	4.135	3.286
DR246	2.492	66.88	3.531	0.995	5.005	2.106	10.355	4.598	2.864
DR249	2.973	59	4.774	0.974	3.608	1.816	6.825	3.718	2.359
DR243	3.434	55.86	5.825	0.98	3.877	1.867	6.853	3.556	2.668
DR250	3.871	59.45	6.169	0.907	3.332	1.779	5.541	3.26	2.666
		15 kts							
DR252	1	48.12	1.969	0.991	7.879	1.129	18.69	2.704	2.922
DR262	1.251	66.23	1.789	0.978	7.385	1.281	16.383	2.972	3.06
DR253	1.5	65.81	2.16	0.99	6.64	1.4	14.151	3.213	3.39
DR258	1.75	62.9	2.635	0.985	4.437	1.734	8.873	3.476	2.952
DR254	2	54.11	3.501	0.99	4.936	1.623	9.574	3.313	3.226
DR263	2.246	52.3	4.069	0.966	4.74	1.514	8.74	2.947	3.382
DR255	2.492	57.15	4.132	0.983	4.373	1.543	7.731	2.882	3.251
DR256	2.973	68.52	4.11	0.969	3.121	1.83	5.22	3.155	2.379
DR259	3.434	52.45	6.203	0.957	4.257	1.719	7.058	2.893	2.894
DR264	3.871	54.99	6.67	0.882	3.972	1.869	6.304	2.954	2.802
		25 kts							
DR265	1	60.46	1.567	0.981	9.144	1.059	14.413	1.862	3.488
DR266	1.5	59.59	2.385	0.968	9.109	1.514	14.669	2.472	3.567
DR267	2	62.56	3.028	0.935	7.644	1.518	12.192	2.622	3.123
DR268	2.492	59.76	3.951	0.964	7.259	1.726	10.472	2.77	3.067
DR269	2.973	67.6	4.166	0.948	6.931	1.714	10.928	2.728	2.648
DR277	3.206	54.91	5.531	0.919	6.064	1.942	8.28	2.863	2.602
DR270	3.434	50.17	6.486	0.92	6.236	1.857	9.364	2.734	2.486
DR278	3.871	51.39	7.137	0.912	6.689	1.768	9.014	2.489	2.866

Table 74. Motion Amp for Wall Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Wall Hull	GM(1.5m)	BK(1.25m)	Accelerations						
			Beam Wave	Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG	λ/L	λ/H	AMP1 inch	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's
RUN		5 kts							
DR238	1	60.37	1.569	0.019	0.066	0.053	0.037	0.042	0.088
DR247	1.251	64.8	1.829	0.025	0.109	0.051	0.074	0.041	0.128
DR239	1.5	61.04	2.329	0.03	0.136	0.053	0.101	0.045	0.154
DR244	1.75	56.91	2.912	0.037	0.151	0.056	0.126	0.047	0.16
DR240	2	53.23	3.559	0.04	0.123	0.057	0.113	0.047	0.123
DR251	2.246	60.39	3.524	0.039	0.084	0.051	0.086	0.049	0.079
DR246	2.492	66.88	3.531	0.049	0.057	0.061	0.063	0.057	0.052
DR249	2.973	59	4.774	0.042	0.036	0.051	0.044	0.046	0.03
DR243	3.434	55.86	5.825	0.039	0.034	0.047	0.042	0.043	0.03
DR250	3.871	59.45	6.169	0.042	0.026	0.049	0.034	0.043	0.024
		15 kts							
DR252	1	48.12	1.969	0.014	0.14	0.029	0.11	0.023	0.157
DR262	1.251	66.23	1.789	0.016	0.126	0.031	0.103	0.026	0.14
DR253	1.5	65.81	2.16	0.021	0.107	0.034	0.088	0.03	0.121
DR258	1.75	62.9	2.635	0.023	0.065	0.038	0.056	0.029	0.075
DR254	2	54.11	3.501	0.026	0.07	0.038	0.061	0.03	0.08
DR263	2.246	52.3	4.069	0.025	0.067	0.033	0.058	0.029	0.078
DR255	2.492	57.15	4.132	0.025	0.061	0.031	0.052	0.029	0.07
DR256	2.973	68.52	4.11	0.029	0.04	0.035	0.034	0.033	0.048
DR259	3.434	52.45	6.203	0.032	0.054	0.036	0.046	0.035	0.063
DR264	3.871	54.99	6.67	0.033	0.047	0.038	0.04	0.034	0.055
		25 kts							
DR265	1	60.46	1.567	0.005	0.169	0.011	0.149	0.01	0.182
DR266	1.5	59.59	2.385	0.013	0.165	0.02	0.147	0.017	0.178
DR267	2	62.56	3.028	0.017	0.135	0.024	0.121	0.02	0.146
DR268	2.492	59.76	3.951	0.018	0.127	0.025	0.114	0.02	0.136
DR269	2.973	67.6	4.166	0.024	0.12	0.029	0.108	0.026	0.13
DR277	3.206	54.91	5.531	0.025	0.099	0.032	0.09	0.025	0.107
DR270	3.434	50.17	6.486	0.024	0.101	0.03	0.092	0.024	0.108
DR278	3.871	51.39	7.137	0.027	0.11	0.031	0.101	0.027	0.117

Table 75. Accel Amp for Wall Hull (GM=1.5m & BK=1.25m) in Stern Qtr Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Motions						
			Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG	λ/L	λ/H	inch	deg	deg	deg	dps	dps	dps
RUN			AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
	5 kts								
DR94	1	61.02	1.553	0.995	2.528	1.313	8.257	4.379	2.396
DR123	1.251	63.95	1.853	0.987	4.229	1.264	12.69	3.811	2.38
DR95	1.5	56.39	2.521	0.995	6.495	1.334	17.797	3.794	2.479
DR101	1.75	55.59	2.982	0.998	8.614	1.771	21.564	4.653	2.403
DR96	2	57.27	3.308	0.997	8.736	1.531	20.3	3.635	3.134
DR100	2.246	64.57	3.296	0.976	6.572	1.693	14.729	3.971	3.001
DR97	2.492	63.33	3.729	1	5.128	2.318	10.68	5.164	2.617
DR102	2.734	62.95	4.115	0.997	3.807	2.01	7.421	4.308	2.391
DR98	2.973	55.59	5.066	0.996	4.616	1.848	9.06	3.787	2.225
DR99	3.434	56.29	5.78	0.986	4.351	1.713	7.679	3.392	2.56
	15 kts								
dr103	1	51.64	1.835	0.982	7.158	1.179	17.929	2.842	2.796
DR111	1.251	63.89	1.855	0.997	6.593	1.246	14.421	2.805	2.816
DR104	1.5	76.93	1.848	0.988	6.569	1.313	13.979	2.929	3.13
DR110	1.75	65.41	2.534	0.98	6.461	1.624	13.288	3.45	3.26
DR106	2	56.22	3.37	0.992	5.564	1.795	11.091	3.56	3.266
DR107	2.492	61.49	3.84	0.978	5.029	1.475	9.316	2.749	3.136
DR124	2.734	61.89	4.185	0.972	4.139	2.059	7.109	3.737	2.643
DR108	2.973	61.97	4.545	0.959	3.632	1.795	6.64	3.18	2.322
DR112	3.434	51.13	6.364	0.982	4.597	1.657	7.487	2.766	2.837
	25 kts								
DR119	1	58.72	1.614	0.979	9.43	1.003	14.312	1.58	3.471
DR115	1.5	62.74	2.266	0.923	9.461	1.347	14.618	2.198	3.264
DR117	2	57.77	3.279	0.989	8.288	1.708	12.829	2.822	3.002
DR118	2.492	56.7	4.165	0.945	8.25	1.591	12.093	2.512	2.965
DR120	2.973	62.26	4.523	0.994	7.833	1.559	12.232	2.36	2.816
DR121	3.434	52.62	6.183	0.907	7.183	1.746	9.533	2.485	2.926

Table 76. Motion Amp for Wall Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Wall Hull	GM(1.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG									
RUN	λ/L	λ/H	AMP1 inch	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's	AMP1 g's
	5 kts								
DR94	1	61.02	1.553	0.021	0.054	0.058	0.028	0.043	0.076
DR123	1.251	63.95	1.853	0.025	0.082	0.048	0.051	0.041	0.103
DR95	1.5	56.39	2.521	0.032	0.115	0.051	0.08	0.042	0.135
DR101	1.75	55.59	2.982	0.04	0.141	0.059	0.111	0.051	0.155
DR96	2	57.27	3.308	0.041	0.131	0.052	0.112	0.048	0.139
DR100	2.246	64.57	3.296	0.038	0.089	0.05	0.088	0.047	0.086
DR97	2.492	63.33	3.729	0.049	0.06	0.069	0.062	0.054	0.056
DR102	2.734	62.95	4.115	0.045	0.041	0.059	0.048	0.048	0.036
DR98	2.973	55.59	5.066	0.045	0.049	0.054	0.054	0.049	0.044
DR99	3.434	56.29	5.78	0.037	0.042	0.042	0.05	0.043	0.034
	15 kts								
dr103	1	51.64	1.835	0.013	0.13	0.03	0.098	0.025	0.149
DR111	1.251	63.89	1.855	0.013	0.113	0.028	0.092	0.022	0.126
DR104	1.5	76.93	1.848	0.02	0.11	0.032	0.09	0.026	0.124
DR110	1.75	65.41	2.534	0.025	0.104	0.037	0.085	0.032	0.117
DR106	2	56.22	3.37	0.026	0.086	0.037	0.071	0.033	0.098
DR107	2.492	61.49	3.84	0.029	0.071	0.035	0.06	0.032	0.08
DR124	2.734	61.89	4.185	0.035	0.054	0.042	0.046	0.04	0.062
DR108	2.973	61.97	4.545	0.033	0.047	0.038	0.04	0.036	0.054
DR112	3.434	51.13	6.364	0.036	0.059	0.039	0.052	0.039	0.065
	25 kts								
DR119	1	58.72	1.614	0.008	0.175	0.011	0.159	0.012	0.186
DR115	1.5	62.74	2.266	0.01	0.173	0.016	0.155	0.014	0.184
DR117	2	57.77	3.279	0.015	0.146	0.023	0.131	0.019	0.156
DR118	2.492	56.7	4.165	0.021	0.145	0.027	0.133	0.022	0.154
DR120	2.973	62.26	4.523	0.025	0.135	0.031	0.125	0.026	0.142
DR121	3.434	52.62	6.183	0.027	0.128	0.03	0.119	0.029	0.135

Table 77. Accel. Amp for Wall Hull (GM=1.5m & BK=1.75m) in Stern Qtr Waves.

Wall Hull	GM(2.5m)	BK(1.75m)		Motions					
				Beam Wave	Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	TF
RUN			inch	deg	deg	deg	dps	dps	dps
		5 kts							
dr477	1	63.02	1.503	0.989	4.096	1.106	12.879	3.641	1.788
dr478	1.5	60.42	2.353	0.973	3.324	1.633	8.68	4.551	1.322
dr479	2	59.15	3.203	0.988	2.951	1.618	6.769	4.017	0.955
dr483	2.246	61.56	3.457	0.974	3.004	1.556	6.554	3.623	0.878
dr484	2.492	64.45	3.664	0.991	2.846	2.13	5.926	4.724	0.743
dr485	2.734	62.53	4.142	0.971	2.585	2.135	5.2	4.503	0.573
dr481	2.973	54.23	5.194	0.961	2.697	1.928	5.212	3.907	0.464
dr482	3.434	52.59	6.187	0.916	3.026	1.779	5.449	3.396	0.448
dr486	3.871	57.33	6.397	0.868	2.709	1.679	4.543	3.026	0.354
		15 kts							
dr487	1	48.93	1.936	0.975	2.557	1.098	6.191	2.686	1.639
dr491	1.251	66.71	1.777	0.96	2.51	1.286	5.593	2.945	1.769
dr489	1.5	66.01	2.153	0.961	2.963	1.511	6.314	3.33	1.597
dr492	1.75	63.05	2.629	0.9	2.46	1.551	5.169	3.281	1.207
dr488	2	56.75	3.338	0.957	2.754	1.547	5.439	3.158	0.952
dr495	2.246	53.46	3.981	0.944	2.737	1.443	5.163	2.883	0.795
dr490	2.492	61.1	3.865	0.963	2.879	1.49	5.143	2.873	0.814
dr496	2.734	68.07	3.805	0.984	2.499	1.807	4.414	3.182	0.687
dr493	2.973	60.5	4.656	0.961	2.639	1.77	4.592	3.13	0.548
dr494	3.434	53.8	6.048	0.932	2.948	1.689	4.802	2.908	0.491
dr498	3.871	56.94	6.441	0.958	2.981	1.702	4.579	2.681	0.443
		25 kts							
dr500	1	59.35	1.596	0.914	3.533	0.976	6.007	1.589	2.157
dr508	1.251	61.67	1.922	0.85	3.875	1.17	6.326	2.095	1.676
dr501	1.5	62.41	2.278	0.964	4.184	1.436	6.067	2.286	1.817
dr509	1.75	61.36	2.701	0.939	3.787	1.511	6.02	2.56	1.239
dr502	2	60.03	3.156	0.94	3.897	1.631	6.028	2.685	1.042
dr503	2.492	59.49	3.969	0.967	3.55	1.513	5.439	2.486	0.678
dr510	2.734	63.98	4.048	0.942	4.046	1.706	6.023	2.761	0.778
dr506	2.973	63.02	4.469	0.941	3.48	1.738	4.816	2.662	0.674
dr511	3.206	54.65	5.558	0.939	3.145	1.721	4.416	2.602	0.441
dr507	3.434	53.16	6.121	0.855	3.958	1.55	6.13	2.475	0.394
DR387	3.872	1114.21	0.329	0.386	1.747	0.479	2.798	0.68	5.027

Table 78. Motion Amp for Wall Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Wall Hull	GM(2.5m)	BK(1.75m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
		5 kts							
dr477	1	63.02	1.503	0.018	0.06	0.049	0.057	0.039	0.066
dr478	1.5	60.42	2.353	0.032	0.034	0.057	0.047	0.047	0.036
dr479	2	59.15	3.203	0.036	0.024	0.05	0.038	0.046	0.026
dr483	2.246	61.56	3.457	0.04	0.021	0.05	0.034	0.046	0.025
dr484	2.492	64.45	3.664	0.046	0.018	0.06	0.029	0.053	0.022
dr485	2.734	62.53	4.142	0.048	0.015	0.06	0.025	0.054	0.018
dr481	2.973	54.23	5.194	0.047	0.015	0.056	0.024	0.051	0.017
dr482	3.434	52.59	6.187	0.04	0.016	0.045	0.026	0.046	0.018
dr486	3.871	57.33	6.397	0.043	0.012	0.048	0.019	0.044	0.015
		15 kts							
dr487	1	48.93	1.936	0.011	0.039	0.029	0.033	0.021	0.055
dr491	1.251	66.71	1.777	0.015	0.035	0.03	0.032	0.023	0.048
dr489	1.5	66.01	2.153	0.021	0.037	0.035	0.034	0.028	0.052
dr492	1.75	63.05	2.629	0.023	0.026	0.035	0.028	0.029	0.039
dr488	2	56.75	3.338	0.025	0.031	0.036	0.028	0.028	0.043
dr495	2.246	53.46	3.981	0.026	0.029	0.035	0.026	0.028	0.041
dr490	2.492	61.1	3.865	0.028	0.03	0.034	0.026	0.032	0.041
dr496	2.734	68.07	3.805	0.031	0.025	0.037	0.021	0.036	0.034
dr493	2.973	60.5	4.656	0.033	0.026	0.038	0.023	0.036	0.035
dr494	3.434	53.8	6.048	0.033	0.028	0.039	0.024	0.035	0.038
dr498	3.871	56.94	6.441	0.033	0.029	0.037	0.023	0.035	0.038
		25 kts							
dr500	1	59.35	1.596	0.005	0.068	0.012	0.057	0.009	0.081
dr508	1.251	61.67	1.922	0.008	0.071	0.017	0.057	0.012	0.084
dr501	1.5	62.41	2.278	0.009	0.077	0.018	0.068	0.013	0.089
dr509	1.75	61.36	2.701	0.013	0.066	0.022	0.056	0.016	0.077
dr502	2	60.03	3.156	0.016	0.066	0.024	0.055	0.019	0.077
dr503	2.492	59.49	3.969	0.019	0.055	0.024	0.047	0.021	0.064
dr510	2.734	63.98	4.048	0.022	0.066	0.028	0.057	0.024	0.076
dr506	2.973	63.02	4.469	0.024	0.057	0.029	0.05	0.025	0.064
dr511	3.206	54.65	5.558	0.024	0.046	0.028	0.041	0.026	0.053
dr507	3.434	53.16	6.121	0.027	0.055	0.032	0.047	0.027	0.062
DR387	3.872	1114.21	0.329	0.006	0.029	0.009	0.023	0.002	0.035

Table 79. Accel. Amp for Wall Hull (GM=2.5m & BK=1.75m) in Stern Qtr Waves.

Wall Hull	GM(2.5m)	BK(1.25m)	Beam Wave	Motions					
				Roll Ang	Roll Ang	Pitch Ang	Roll Rate	Pitch Rate	Yaw Rate
135 DEG	λ/L	λ/H	AMP1	AMP1/RQ0	AMP1	AMP1	AMP1	AMP1	AMP1
RUN			inch	deg	deg	deg	dps	dps	dps
		5 kts							
dr358	1	64.42	1.471	0.992	4.302	1.118	13.564	3.703	2.837
dr359	1.5	64.42	2.206	0.984	3.499	1.645	9.263	4.574	3.203
dr360	2	61.78	3.066	0.988	2.871	1.518	6.539	3.805	3.024
dr366	2.246	56.47	3.768	0.954	3.054	1.661	6.559	3.896	3.074
dr368	2.371	61.67	3.642	0.974	2.874	2.066	6.185	4.666	2.923
dr365	2.492	65.06	3.629	0.976	2.733	2.232	5.724	4.836	2.73
dr367	2.734	59.92	4.322	0.976	2.098	2.15	4.089	4.532	2.376
dr363	2.973	54.92	5.128	0.962	2.48	1.952	4.776	3.925	2.237
dr364	3.434	51.68	6.296	0.971	2.886	1.737	5.02	3.247	2.675
		15 kts							
dr369	1	52.56	1.802	0.913	2.483	1.047	5.876	2.557	2.991
dr374	1.251	66.49	1.782	0.98	2.526	1.14	5.655	2.687	2.966
dr370	1.5	69.12	2.057	0.965	2.705	1.499	5.678	3.3	3.422
dr375	1.75	68.35	2.425	0.917	2.462	1.535	5.084	3.278	2.958
dr371	2	54.51	3.475	0.959	2.808	1.533	5.675	3.235	3.162
dr372	2.492	58	4.072	0.953	2.781	1.673	5.073	3.048	3.398
dr373	2.973	59.78	4.711	0.973	2.319	1.69	4.033	3.019	2.445
dr376	3.434	54.66	5.952	0.966	2.63	1.825	4.078	3.039	2.82
dr377	3.871	54.01	6.79	0.95	3.003	1.882	4.708	3.029	2.945
		25 kts							
dr379	1	60.17	1.574	0.95	3.318	0.946	5.396	1.757	3.428
dr380	1.5	56.91	2.498	0.941	3.831	1.38	6.298	2.575	3.651
dr392	1.75	64.6	2.566	0.953	3.461	1.334	5.714	2.558	3.311
dr383	2	62.42	3.035	0.978	3.387	1.548	5.922	2.707	2.858
dr384	2.492	55.17	4.281	0.973	3.704	1.786	5.735	2.882	2.959
dr385	2.973	64.52	4.365	0.934	2.978	1.648	4.118	2.689	2.285
dr390	3.656	52.61	6.584	0.946	4.133	1.678	6.022	2.456	2.907
dr387	3.871	52.94	6.927	0.921	3.749	1.446	5.315	2.4	3.213
DR501	1.5	58.1	2.446	0.949	4.307	1.429	6.612	2.366	3.947
DR502	1.999	60.01	3.156	0.94	3.897	1.631	6.028	2.685	3.29
DR503	2.492	59.48	3.969	0.967	3.55	1.513	5.439	2.486	2.693
DR506	2.972	62.83	4.482	0.944	3.5	1.735	4.786	2.666	3.029
DR511	3.206	54.65	5.558	0.939	3.145	1.721	4.416	2.602	2.451
DR507	3.434	53.14	6.121	0.855	3.958	1.55	6.13	2.475	2.412

Table 80. Motion Amp for Wall Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

Wall Hull	GM(2.5m)	BK(1.25m)	Beam Wave	Accelerations					
				Vert CG	Tran CG	Vert Bow	Tran Bow	Vert Str	Tran Str
135 DEG			AMP1	AMP1	AMP1	AMP1	AMP1	AMP1	AMP1
RUN	λ/L	λ/H	inch	g's	g's	g's	g's	g's	g's
		5 kts							
dr358	1	64.42	1.471	0.02	0.061	0.051	0.061	0.04	0.065
dr359	1.5	64.42	2.206	0.036	0.035	0.059	0.048	0.051	0.037
dr360	2	61.78	3.066	0.035	0.022	0.05	0.037	0.043	0.025
dr366	2.246	56.47	3.768	0.038	0.021	0.05	0.035	0.045	0.024
dr368	2.371	61.67	3.642	0.041	0.019	0.057	0.031	0.05	0.024
dr365	2.492	65.06	3.629	0.05	0.017	0.064	0.029	0.057	0.021
dr367	2.734	59.92	4.322	0.043	0.013	0.057	0.023	0.048	0.017
dr363	2.973	54.92	5.128	0.045	0.014	0.055	0.022	0.048	0.016
dr364	3.434	51.68	6.296	0.043	0.014	0.047	0.023	0.047	0.018
		15 kts							
dr369	1	52.56	1.802	0.01	0.039	0.026	0.033	0.019	0.053
dr374	1.251	66.49	1.782	0.015	0.034	0.028	0.031	0.022	0.047
dr370	1.5	69.12	2.057	0.019	0.034	0.034	0.032	0.027	0.048
dr375	1.75	68.35	2.425	0.023	0.028	0.035	0.026	0.029	0.041
dr371	2	54.51	3.475	0.026	0.03	0.037	0.028	0.03	0.042
dr372	2.492	58	4.072	0.03	0.029	0.037	0.025	0.033	0.041
dr373	2.973	59.78	4.711	0.032	0.021	0.037	0.018	0.036	0.03
dr376	3.434	54.66	5.952	0.031	0.026	0.035	0.021	0.034	0.036
dr377	3.871	54.01	6.79	0.033	0.027	0.039	0.022	0.034	0.037
		25 kts							
dr379	1	60.17	1.574	0.005	0.063	0.012	0.052	0.009	0.075
dr380	1.5	56.91	2.498	0.012	0.068	0.021	0.055	0.016	0.083
dr392	1.75	64.6	2.566	0.014	0.059	0.022	0.05	0.017	0.071
dr383	2	62.42	3.035	0.017	0.057	0.024	0.045	0.02	0.069
dr384	2.492	55.17	4.281	0.022	0.056	0.028	0.048	0.025	0.066
dr385	2.973	64.52	4.365	0.02	0.042	0.025	0.037	0.022	0.049
dr390	3.656	52.61	6.584	0.026	0.058	0.029	0.05	0.026	0.066
dr387	3.871	52.94	6.927	0.025	0.058	0.027	0.051	0.026	0.066
DR501	1.5	58.1	2.446	0.011	0.077	0.019	0.066	0.014	0.09
DR502	1.999	60.01	3.156	0.016	0.066	0.024	0.055	0.019	0.077
DR503	2.492	59.48	3.969	0.019	0.055	0.024	0.047	0.021	0.064
DR506	2.972	62.83	4.482	0.024	0.057	0.029	0.05	0.025	0.064
DR511	3.206	54.65	5.558	0.024	0.046	0.028	0.041	0.026	0.053
DR507	3.434	53.14	6.121	0.027	0.055	0.032	0.047	0.027	0.062

Table 81. Accel. Amp for Wall Hull (GM=2.5m & BK=1.25m) in Stern Qtr Waves.

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REFERENCES

1. Bhattacharyya, R., "Seakeeping Considerations in Design", *Dynamics of Marine Vehicles*, Ch. 16, John Wiley and Sons, N.Y. (1972).
2. Beck, Robert F., William E. Cummins, John F. Dalzell, Philip Mandel, and William C. Webster, "Motions in Waves," in: *Principles of Naval Architecture*, Edward V. Lewis, Ed., Ch. VIII, Vol. III, N.Y. (1989).
3. Coleman, Hugh W., and W. Glenn Steele, *Experimentation and Uncertainty Analysis for Engineers*, John Wiley and Sons, N.Y. (1989)

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