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# LAMPIRAN

Lampiran 1. Tabel Offset Lines plan Kapal Cepat Semi Planning SS 4

WL	Draft (m)	Tabel Offset (m)										
		0	1	2	3	4	5	6	7	8	9	10
BL	0	0.383	0.445	0.486	0.506	0.511	0.511	0.511	0.511	0.468	0.24	--
1	0.075	0.591	0.706	0.797	0.851	0.869	0.869	0.869	0.839	0.726	0.404	--
2	0.15	0.796	0.967	1.107	1.195	1.228	1.228	1.228	1.172	0.985	0.568	--
3	0.225	1.005	1.225	1.417	1.538	1.587	1.587	1.587	1.51	1.238	0.731	--
4	0.3	1.213	1.482	1.723	1.881	1.945	1.945	1.945	1.84	1.488	0.895	--
5	0.375	1.42	1.739	1.952	1.976	1.982	1.982	1.982	1.947	1.738	1.059	--
6 (T)	0.45	1.672	1.9	1.967	1.99	1.996	1.996	1.996	1.962	1.824	1.223	--
9	0.675	1.829	1.948	2.013	2.034	2.039	2.039	2.039	2.006	1.887	1.518	0.236
12	0.9	1.88	1.996	2.058	2.077	2.062	2.062	2.062	2.053	1.949	1.605	0.458
15	1.125	1.931	2.045	2.103	2.12	2.124	2.124	2.124	2.099	2.012	1.691	0.622
18	1.35	1.962	2.093	2.148	2.163	2.167	2.167	2.167	2.144	2.075	1.777	0.785
21	1.575	2.033	2.141	2.193	2.206	2.21	2.21	2.21	2.19	2.137	1.864	0.934
24	1.8	2.084	2.189	2.238	2.25	2.252	2.252	2.252	2.237	2.2	1.95	1.076
Deck		2.084	2.189	2.238	2.25	2.252	2.252	2.252	2.251	2.244	2.059	1.359

Lampiran 2. Ukuran Utama Model Kapal

<b>No</b>	<b>Ukuran Utama</b>	<b>Besaran</b>	<b>Satuan</b>
1	Length Over All (LOA)	1.30	m
2	Length Between Perpendicular (LBP)	1.18	m
3	Length Water Line (LWL)	1.18	m
4	Breadth (B)	0.3	m
5	Height (H)	0.12	m
6	Draft (T)	0.03	m

Lampiran 3: Perhitungan tahanan Model Kapal  
Tanpa stepped

Trim 1		Trim 2		Trim 3	
BOUNDARY ID	15	BOUNDARY ID	24	BOUNDARY ID	9
-----		-----		-----	
Area	338.36 cm <sup>2</sup>	Area	20.2586 cm <sup>2</sup>	Area	20.2586 cm <sup>2</sup>
sum FX	-0.13649 Newton	sum FX	-1.22463 Newton	sum FX	-1.24114 Newton
sum FY	0.000303 Newton	sum FY	-0.00057 Newton	sum FY	-0.00062 Newton
sum FZ	0.043508 Newton	sum FZ	-0.18226 Newton	sum FZ	-0.1848 Newton
BOUNDARY ID	14	BOUNDARY ID	22	BOUNDARY ID	8
-----		-----		-----	
Area	20.2058 cm <sup>2</sup>	Area	20.259 cm <sup>2</sup>	Area	20.259 cm <sup>2</sup>
sum FX	-0.26974 Newton	sum FX	-1.21705 Newton	sum FX	-1.23411 Newton
sum FY	0.000253 Newton	sum FY	0.000539 Newton	sum FY	0.000592 Newton
sum FZ	-0.03567 Newton	sum FZ	-0.18111 Newton	sum FZ	-0.18372 Newton
BOUNDARY ID	13	BOUNDARY ID	21	BOUNDARY ID	7
-----		-----		-----	
Area	896.464 cm <sup>2</sup>	Area	280.097 cm <sup>2</sup>	Area	280.097 cm <sup>2</sup>
sum FX	-0.49749 Newton	sum FX	-0.16292 Newton	sum FX	-0.17753 Newton
sum FY	-0.02092 Newton	sum FY	-0.00088 Newton	sum FY	-0.00095 Newton
sum FZ	0.115287 Newton	sum FZ	-1.08084 Newton	sum FZ	-1.09997 Newton
BOUNDARY ID	12	BOUNDARY ID	20	BOUNDARY ID	6
-----		-----		-----	
Area	4.64694 cm <sup>2</sup>	Area	1.49116 cm <sup>2</sup>	Area	1.49116 cm <sup>2</sup>
sum FX	-0.00142 Newton	sum FX	-0.00349 Newton	sum FX	-0.00364 Newton
sum FY	8.94E-05 Newton	sum FY	-0.03384 Newton	sum FY	-0.03522 Newton
sum FZ	-0.00319 Newton	sum FZ	-0.09374 Newton	sum FZ	-0.09757 Newton
BOUNDARY ID	11	BOUNDARY ID	19	BOUNDARY ID	5
-----		-----		-----	
Area	338.362 cm <sup>2</sup>	Area	280.097 cm <sup>2</sup>	Area	280.097 cm <sup>2</sup>
sum FX	-0.13689 Newton	sum FX	-0.16599 Newton	sum FX	-0.18082 Newton
sum FY	8.31E-06 Newton	sum FY	0.000655 Newton	sum FY	0.000707 Newton
sum FZ	0.044601 Newton	sum FZ	-1.05065 Newton	sum FZ	-1.06772 Newton
BOUNDARY ID	10	BOUNDARY ID	18	BOUNDARY ID	4
-----		-----		-----	
Area	1.49008 cm <sup>2</sup>	Area	537.071 cm <sup>2</sup>	Area	537.071 cm <sup>2</sup>
sum FX	-0.00138 Newton	sum FX	-0.59213 Newton	sum FX	-0.6385 Newton
sum FY	0.008452 Newton	sum FY	-0.88205 Newton	sum FY	-0.90693 Newton
sum FZ	-0.02341 Newton	sum FZ	-2.8953 Newton	sum FZ	-2.9585 Newton

BOUNDARY ID	9	BOUNDARY ID	17	BOUNDARY ID	3
-----		-----		-----	
Area	20.2058 cm <sup>2</sup>	Area	1.49116 cm <sup>2</sup>	Area	1.49116 cm <sup>2</sup>
sum FX	-0.27101 Newton	sum FX	-0.00347 Newton	sum FX	-0.00362 Newton
sum FY	-0.0002 Newton	sum FY	0.033147 Newton	sum FY	0.034415 Newton
sum FZ	-0.03578 Newton	sum FZ	-0.09182 Newton	sum FZ	-0.09533 Newton
BOUNDARY ID	8	BOUNDARY ID	16	BOUNDARY ID	2
-----		-----		-----	
Area	2453.11 cm <sup>2</sup>	Area	537.05 cm <sup>2</sup>	Area	537.05 cm <sup>2</sup>
sum FX	0 Newton	sum FX	-0.60191 Newton	sum FX	-0.649 Newton
sum FY	0 Newton	sum FY	0.875256 Newton	sum FY	0.899047 Newton
sum FZ	0 Newton	sum FZ	-2.87696 Newton	sum FZ	-2.93725 Newton
BOUNDARY ID	7	BOUNDARY ID	9	BOUNDARY ID	1
-----		-----		-----	
Area	12.0169 cm <sup>2</sup>	Area	1610.01 cm <sup>2</sup>	Area	1610.01 cm <sup>2</sup>
sum FX	-0.06765 Newton	sum FX	0 Newton	sum FX	0 Newton
sum FY	-0.14159 Newton	sum FY	0 Newton	sum FY	0 Newton
sum FZ	0.151991 Newton	sum FZ	0 Newton	sum FZ	0 Newton
BOUNDARY ID	6	Summary		Summary	
-----		-----		-----	
Area	7.85567 cm <sup>2</sup>	Total area	3287.82 cm <sup>2</sup>	Total area	3287.82 cm <sup>2</sup>
sum FX	-0.00257 Newton	TOTAL FX	-3.97159 Newton	TOTAL FX	-4.12836 Newton
sum FY	0.001475 Newton	TOTAL FY	-0.00775 Newton	TOTAL FY	-0.00896 Newton
sum FZ	-0.00032 Newton	TOTAL FZ	-8.45268 Newton	TOTAL FZ	-8.62486 Newton
BOUNDARY ID	5				
-----					
Area	4.64677 cm <sup>2</sup>				
sum FX	-0.00151 Newton				
sum FY	-5.61E-05 Newton				
sum FZ	0.000123 Newton				
BOUNDARY ID	4				
-----					
Area	896.438 cm <sup>2</sup>				
sum FX	-0.50055 Newton				
sum FY	0.055853 Newton				
sum FZ	0.235805 Newton				
BOUNDARY ID	3				
-----					
Area	1.49008 cm <sup>2</sup>				
sum FX	-0.00134 Newton				
sum FY	-0.00808 Newton				
sum FZ	-0.02238 Newton				

BOUNDARY ID            3  
-----  
Area            1.49008 cm^2  
sum FX        -0.00134 Newton  
sum FY        -0.00808 Newton  
sum FZ        -0.02238 Newton

BOUNDARY ID            2  
-----  
Area            12.0141 cm^2  
sum FX        -0.07225 Newton  
sum FY        0.15692 Newton  
sum FZ        0.174775 Newton

BOUNDARY ID            1  
-----  
Area            7.84635 cm^2  
sum FX        -0.00242 Newton  
sum FY        -0.0004 Newton  
sum FZ        -0.0001 Newton

Summary  
-----  
Total area        5015.15 cm^2  
TOTAL FX        -1.96272 Newton  
TOTAL FY        0.052107 Newton  
TOTAL FZ        0.645238 Newton



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Trim 1		Trim 2		Trim 3	
BOUNDARY II	22	BOUNDARY	19	BOUNDARY II	19
-----		-----		-----	
Area	43.7393 cm <sup>2</sup>	Area	13.8053 cm <sup>2</sup>	Area	43.3902 cm <sup>2</sup>
sum FX	-0.01667 Newton	sum FX	-1.18577 Newton	sum FX	-0.02817 Newton
sum FY	0.027616 Newton	sum FY	-0.00095 Newton	sum FY	0.101486 Newton
sum FZ	0.124576 Newton	sum FZ	-0.25372 Newton	sum FZ	-0.47084 Newton
BOUNDARY II	21	BOUNDARY	18	BOUNDARY II	18
-----		-----		-----	
Area	6.26628 cm <sup>2</sup>	Area	221.836 cm <sup>2</sup>	Area	67.2275 cm <sup>2</sup>
sum FX	-0.1202 Newton	sum FX	-0.27683 Newton	sum FX	-0.11586 Newton
sum FY	-0.05395 Newton	sum FY	0.002138 Newton	sum FY	0.068292 Newton
sum FZ	-0.003 Newton	sum FZ	-0.38437 Newton	sum FZ	-0.25409 Newton
BOUNDARY II	20	BOUNDARY	16	BOUNDARY II	17
-----		-----		-----	
Area	76.1994 cm <sup>2</sup>	Area	72.1745 cm <sup>2</sup>	Area	690.63 cm <sup>2</sup>
sum FX	-0.07879 Newton	sum FX	-0.1159 Newton	sum FX	-0.10005 Newton
sum FY	0.084511 Newton	sum FY	-0.03429 Newton	sum FY	-0.00086 Newton
sum FZ	0.051021 Newton	sum FZ	-0.14379 Newton	sum FZ	5.73379 Newton
BOUNDARY II	19	BOUNDARY	14	BOUNDARY II	16
-----		-----		-----	
Area	76.2131 cm <sup>2</sup>	Area	52.5623 cm <sup>2</sup>	Area	10.8877 cm <sup>2</sup>
sum FX	-0.08856 Newton	sum FX	-0.11034 Newton	sum FX	-0.04938 Newton
sum FY	-0.1106 Newton	sum FY	0.041371 Newton	sum FY	-0.11096 Newton
sum FZ	0.095576 Newton	sum FZ	0.21386 Newton	sum FZ	0.535747 Newton
BOUNDARY II	18	BOUNDARY	13	BOUNDARY II	15
-----		-----		-----	
Area	6.26684 cm <sup>2</sup>	Area	28.1903 cm <sup>2</sup>	Area	76.9653 cm <sup>2</sup>
sum FX	-0.12618 Newton	sum FX	-0.06357 Newton	sum FX	-0.12908 Newton
sum FY	0.056037 Newton	sum FY	0.046228 Newton	sum FY	0.001537 Newton
sum FZ	-0.00299 Newton	sum FZ	0.233302 Newton	sum FZ	-0.19558 Newton
BOUNDARY II	17	BOUNDARY	12	BOUNDARY II	14
-----		-----		-----	
Area	43.7239 cm <sup>2</sup>	Area	5.40043 cm <sup>2</sup>	Area	86.2497 cm <sup>2</sup>
sum FX	-0.01749 Newton	sum FX	-0.00824 Newton	sum FX	-0.12772 Newton
sum FY	-0.02859 Newton	sum FY	0.000504 Newton	sum FY	0.952052 Newton
sum FZ	0.129373 Newton	sum FZ	0.00425 Newton	sum FZ	-3.01739 Newton
BOUNDARY II	16	BOUNDARY	11	BOUNDARY II	13
-----		-----		-----	
Area	69.4513 cm <sup>2</sup>	Area	27.8701 cm <sup>2</sup>	Area	0.336276 cm <sup>2</sup>
sum FX	-0.03084 Newton	sum FX	-0.04755 Newton	sum FX	-0.05268 Newton
sum FY	-0.02335 Newton	sum FY	-0.00074 Newton	sum FY	-1.60E-05 Newton
sum FZ	0.111902 Newton	sum FZ	0.155306 Newton	sum FZ	-0.00739 Newton

BOUNDARY II	15	BOUNDARY	10	BOUNDARY II	12
-----		-----		-----	
Area	82.4906 cm <sup>2</sup>	Area	5.40095 cm <sup>2</sup>	Area	85.1978 cm <sup>2</sup>
sum FX	-0.03626 Newton	sum FX	-0.0109 Newton	sum FX	-0.15417 Newton
sum FY	-0.02076 Newton	sum FY	-0.00592 Newton	sum FY	-0.95212 Newton
sum FZ	0.101953 Newton	sum FZ	0.030208 Newton	sum FZ	-3.02097 Newton
BOUNDARY II	14	BOUNDARY	9	BOUNDARY II	11
-----		-----		-----	
Area	94.9539 cm <sup>2</sup>	Area	28.1897 cm <sup>2</sup>	Area	66.1363 cm <sup>2</sup>
sum FX	-0.03922 Newton	sum FX	-0.06767 Newton	sum FX	-0.15733 Newton
sum FY	-0.00911 Newton	sum FY	-0.04476 Newton	sum FY	-0.08804 Newton
sum FZ	0.044964 Newton	sum FZ	0.227105 Newton	sum FZ	-0.33191 Newton
BOUNDARY II	13	BOUNDARY	8	BOUNDARY II	9
-----		-----		-----	
Area	100.679 cm <sup>2</sup>	Area	52.5623 cm <sup>2</sup>	Area	10.4136 cm <sup>2</sup>
sum FX	-0.03819 Newton	sum FX	-0.11078 Newton	sum FX	-0.02697 Newton
sum FY	0.010922 Newton	sum FY	-0.04195 Newton	sum FY	0.02401 Newton
sum FZ	-0.05023 Newton	sum FZ	0.216491 Newton	sum FZ	0.118061 Newton
BOUNDARY II	12	BOUNDARY	7	BOUNDARY II	8
-----		-----		-----	
Area	97.9788 cm <sup>2</sup>	Area	72.1745 cm <sup>2</sup>	Area	31.8545 cm <sup>2</sup>
sum FX	-0.03396 Newton	sum FX	-0.11423 Newton	sum FX	-0.04182 Newton
sum FY	0.022241 Newton	sum FY	0.035867 Newton	sum FY	-0.00076 Newton
sum FZ	-0.08998 Newton	sum FZ	-0.15151 Newton	sum FZ	0.143573 Newton
BOUNDARY II	11	BOUNDARY	6	BOUNDARY II	7
-----		-----		-----	
Area	95.7626 cm <sup>2</sup>	Area	82.805 cm <sup>2</sup>	Area	31.8703 cm <sup>2</sup>
sum FX	-0.03461 Newton	sum FX	-0.11274 Newton	sum FX	-0.07673 Newton
sum FY	0.090056 Newton	sum FY	0.128446 Newton	sum FY	-0.00095 Newton
sum FZ	-0.29204 Newton	sum FZ	-0.50954 Newton	sum FZ	0.387015 Newton
BOUNDARY II	10	BOUNDARY	4	BOUNDARY II	6
-----		-----		-----	
Area	13.8053 cm <sup>2</sup>	Area	13.8053 cm <sup>2</sup>	Area	0.448064 cm <sup>2</sup>
sum FX	-0.12448 Newton	sum FX	-1.23329 Newton	sum FX	-0.07144 Newton
sum FY	0.00022 Newton	sum FY	0.001045 Newton	sum FY	1.85E-05 Newton
sum FZ	-0.02476 Newton	sum FZ	-0.26369 Newton	sum FZ	-0.00998 Newton
BOUNDARY II	9	BOUNDARY	3	BOUNDARY II	5
-----		-----		-----	
Area	28.8349 cm <sup>2</sup>	Area	40.7257 cm <sup>2</sup>	Area	76.9653 cm <sup>2</sup>
sum FX	-0.00416 Newton	sum FX	-0.06269 Newton	sum FX	-0.15146 Newton
sum FY	0.00025 Newton	sum FY	-0.0005 Newton	sum FY	-0.00055 Newton
sum FZ	0.086689 Newton	sum FZ	0.238528 Newton	sum FZ	0.116891 Newton

BOUNDARY II	8	BOUNDARY	2	BOUNDARY II	4
-----		-----		-----	
Area	42.0007 cm <sup>2</sup>	Area	41.7447 cm <sup>2</sup>	Area	34.5306 cm <sup>2</sup>
sum FX	-0.01056 Newton	sum FX	-0.05764 Newton	sum FX	-0.01247 Newton
sum FY	8.95E-07 Newton	sum FY	-0.0003 Newton	sum FY	0.000863 Newton
sum FZ	0.0882 Newton	sum FZ	0.112431 Newton	sum FZ	-1.11202 Newton
BOUNDARY II	7	BOUNDARY	1	BOUNDARY II	3
-----		-----		-----	
Area	40.7257 cm <sup>2</sup>	Area	40.7313 cm <sup>2</sup>	Area	13.8057 cm <sup>2</sup>
sum FX	-0.00988 Newton	sum FX	-0.04915 Newton	sum FX	-2.2738 Newton
sum FY	-2.47E-05 Newton	sum FY	-0.00041 Newton	sum FY	0.001425 Newton
sum FZ	0.045118 Newton	sum FZ	-0.05119 Newton	sum FZ	-0.52651 Newton
BOUNDARY II	6	Summary		BOUNDARY II	1
-----		-----		-----	
Area	41.7447 cm <sup>2</sup>	Total area	2159.96 cm <sup>2</sup>	Area	34.5306 cm <sup>2</sup>
sum FX	-0.01003 Newton	TOTAL FX	-3.86391 Newton	sum FX	-0.01259 Newton
sum FY	-2.07E-05 Newton	TOTAL FY	-0.01508 Newton	sum FY	-0.00063 Newton
sum FZ	0.020116 Newton	TOTAL FZ	-4.61342 Newton	sum FZ	-1.13422 Newton
BOUNDARY II	5			Summary	
-----				-----	
Area	40.7313 cm <sup>2</sup>			Total area	1417.65 cm <sup>2</sup>
sum FX	-0.00962 Newton			TOTAL FX	-3.58171 Newton
sum FY	-7.75E-05 Newton			TOTAL FY	0.078168 Newton
sum FZ	-0.00629 Newton			TOTAL FZ	-3.16107 Newton
BOUNDARY II	4				
-----					
Area	84.0498 cm <sup>2</sup>				
sum FX	-0.03117 Newton				
sum FY	-0.00035 Newton				
sum FZ	-0.15055 Newton				
BOUNDARY II	1				
-----					
Area	84.0475 cm <sup>2</sup>				
sum FX	-0.03052 Newton				
sum FY	-0.0002 Newton				
sum FZ	-0.15841 Newton				
Summary					
-----					
Total area	4266.38 cm <sup>2</sup>				
TOTAL FX	-1.35524 Newton				
TOTAL FY	-0.02266 Newton				
TOTAL FZ	-0.19974 Newton				

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Trim 1		Trim 2		Trim 3	
BOUNDARY	15	BOUNDARY	12	BOUNDARY	12
-----					
Area	96.5054 cm <sup>2</sup>	Area	5.40049 cm <sup>2</sup>	Area	85.1978 cm <sup>2</sup>
sum FX	-0.02859 Newton	sum FX	-0.00408 Newton	sum FX	-0.15225 Newton
sum FY	0.042493 Newton	sum FY	-0.00976 Newton	sum FY	-0.94516 Newton
sum FZ	-0.16715 Newton	sum FZ	-0.04617 Newton	sum FZ	-2.9989 Newton
BOUNDARY	14	BOUNDARY	11	BOUNDARY	11
-----					
Area	98.5462 cm <sup>2</sup>	Area	27.8701 cm <sup>2</sup>	Area	66.1363 cm <sup>2</sup>
sum FX	-0.02795 Newton	sum FX	-0.0324 Newton	sum FX	-0.15455 Newton
sum FY	0.075492 Newton	sum FY	-0.00059 Newton	sum FY	-0.09014 Newton
sum FZ	-0.26134 Newton	sum FZ	-0.13557 Newton	sum FZ	-0.34007 Newton
BOUNDARY	13	BOUNDARY	10	BOUNDARY	10
-----					
Area	0.073772 cm <sup>2</sup>	Area	5.40101 cm <sup>2</sup>	Area	42.4106 cm <sup>2</sup>
sum FX	-9.71E-06 Newton	sum FX	-0.00506 Newton	sum FX	-0.13196 Newton
sum FY	0.000183 Newton	sum FY	0.006651 Newton	sum FY	0.079806 Newton
sum FZ	-0.00062 Newton	sum FZ	-0.03087 Newton	sum FZ	0.379651 Newton
BOUNDARY	12	BOUNDARY	9	BOUNDARY	9
-----					
Area	10.4504 cm <sup>2</sup>	Area	28.1897 cm <sup>2</sup>	Area	10.4136 cm <sup>2</sup>
sum FX	-0.0037 Newton	sum FX	-0.0544 Newton	sum FX	-0.02628 Newton
sum FY	-6.61E-06 Newton	sum FY	-0.04734 Newton	sum FY	0.022424 Newton
sum FZ	0.136783 Newton	sum FZ	0.237702 Newton	sum FZ	0.110446 Newton
BOUNDARY	11	BOUNDARY	8	BOUNDARY	8
-----					
Area	56.5152 cm <sup>2</sup>	Area	52.562 cm <sup>2</sup>	Area	31.8545 cm <sup>2</sup>
sum FX	-0.02823 Newton	sum FX	-0.09992 Newton	sum FX	-0.04075 Newton
sum FY	-0.00241 Newton	sum FY	-0.03418 Newton	sum FY	-0.00076 Newton
sum FZ	-0.12335 Newton	sum FZ	0.178068 Newton	sum FZ	0.131452 Newton
BOUNDARY	10	BOUNDARY	7	BOUNDARY	7
-----					
Area	72.8445 cm <sup>2</sup>	Area	72.1723 cm <sup>2</sup>	Area	31.8703 cm <sup>2</sup>
sum FX	-0.02528 Newton	sum FX	-0.11886 Newton	sum FX	-0.07508 Newton
sum FY	2.81E-05 Newton	sum FY	0.072355 Newton	sum FY	-0.00091 Newton
sum FZ	-0.2296 Newton	sum FZ	-0.31999 Newton	sum FZ	0.368484 Newton

BOUNDARY	9	BOUNDARY	6	BOUNDARY	6
-----		-----		-----	
Area	41.1011 cm <sup>2</sup>	Area	82.8033 cm <sup>2</sup>	Area	0.448064 cm <sup>2</sup>
sum FX	-0.01191 Newton	sum FX	-0.12151 Newton	sum FX	-0.07007 Newton
sum FY	-0.00021 Newton	sum FY	0.148217 Newton	sum FY	1.79E-05 Newton
sum FZ	-0.02926 Newton	sum FZ	-0.59114 Newton	sum FZ	-0.0098 Newton
BOUNDARY	8	BOUNDARY	5	BOUNDARY	5
-----		-----		-----	
Area	37.0881 cm <sup>2</sup>	Area	91.324 cm <sup>2</sup>	Area	76.9653 cm <sup>2</sup>
sum FX	-0.01029 Newton	sum FX	-0.12425 Newton	sum FX	-0.14939 Newton
sum FY	-0.0002 Newton	sum FY	0.601596 Newton	sum FY	-0.00087 Newton
sum FZ	-0.05177 Newton	sum FZ	-1.94211 Newton	sum FZ	0.106578 Newton
BOUNDARY	7	BOUNDARY	4	BOUNDARY	4
-----		-----		-----	
Area	33.6421 cm <sup>2</sup>	Area	13.8059 cm <sup>2</sup>	Area	34.5306 cm <sup>2</sup>
sum FX	-0.00776 Newton	sum FX	-1.04631 Newton	sum FX	-0.01462 Newton
sum FY	-0.00016 Newton	sum FY	0.001076 Newton	sum FY	0.000973 Newton
sum FZ	-0.13335 Newton	sum FZ	-0.22311 Newton	sum FZ	-1.08419 Newton
BOUNDARY	6	BOUNDARY	3	BOUNDARY	3
-----		-----		-----	
Area	14.9923 cm <sup>2</sup>	Area	40.7257 cm <sup>2</sup>	Area	13.8057 cm <sup>2</sup>
sum FX	-0.20113 Newton	sum FX	-0.05984 Newton	sum FX	-2.24229 Newton
sum FY	0.000144 Newton	sum FY	-0.00079 Newton	sum FY	0.001389 Newton
sum FZ	-0.03961 Newton	sum FZ	0.248099 Newton	sum FZ	-0.51924 Newton
BOUNDARY	5	BOUNDARY	2	BOUNDARY	1
-----		-----		-----	
Area	0.000761 cm <sup>2</sup>	Area	41.7447 cm <sup>2</sup>	Area	34.5306 cm <sup>2</sup>
sum FX	-8.25E-06 Newton	sum FX	-0.05331 Newton	sum FX	-0.01358 Newton
sum FY	-6.87E-08 Newton	sum FY	-0.00035 Newton	sum FY	-0.00081 Newton
sum FZ	-9.48E-07 Newton	sum FZ	0.070394 Newton	sum FZ	-1.11336 Newton
BOUNDARY	4	BOUNDARY	1		
-----		-----			
Area	14.9877 cm <sup>2</sup>	Area	40.7313 cm <sup>2</sup>	Summary	
sum FX	-0.23688 Newton	sum FX	-0.04169 Newton	-----	
sum FY	-0.00024 Newton	sum FY	-0.00032 Newton	Total area	1417.65 cm <sup>2</sup>
sum FZ	-0.0466 Newton	sum FZ	-0.16642 Newton	TOTAL FX	-3.55197 Newton
BOUNDARY	3			TOTAL FY	0.084965 Newton
				TOTAL FZ	-2.94238 Newton

BOUNDARY 3 | TOTAL FZ -2.94238 Newton

-----		Summary	
Area	0.000762 cm^2	-----	
sum FX	-9.44E-06 Newton	Total area	2231.86 cm^2
sum FY	1.46E-07 Newton	TOTAL FX	-3.73187 Newton
sum FZ	-7.78E-07 Newton	TOTAL FY	-0.00487 Newton
		TOTAL FZ	-7.10772 Newton

BOUNDARY 2

-----

Area	0.400033 cm^2
sum FX	-0.00486 Newton
sum FY	8.46E-07 Newton
sum FZ	-0.00051 Newton

BOUNDARY 1

-----

Area	0.416977 cm^2
sum FX	-0.00615 Newton
sum FY	-1.71E-06 Newton
sum FZ	-0.00064 Newton

Summary

-----

Total area	4179.5 cm^2
TOTAL FX	-1.36543 Newton
TOTAL FY	-0.07703 Newton
TOTAL FZ	-3.14042 Newton

Dua stepped V

Trim 1		Trim 2		Trim 3	
BOUNDARY	15	BOUNDARY	13	BOUNDARY	12
-----		-----		-----	
Area	3.54181 cm <sup>2</sup>	Area	2.49031 cm <sup>2</sup>	Area	10.2762 cm <sup>2</sup>
sum FX	-0.01806 Newton	sum FX	0.001317 Newton	sum FX	-1.90845 Newton
sum FY	0.021624 Newton	sum FY	-0.00927 Newton	sum FY	0.000827 Newton
sum FZ	-0.00056 Newton	sum FZ	-0.06439 Newton	sum FZ	-0.44205 Newton
BOUNDARY	14	BOUNDARY	12	BOUNDARY	11
-----		-----		-----	
Area	18.0491 cm <sup>2</sup>	Area	26.4662 cm <sup>2</sup>	Area	39.8646 cm <sup>2</sup>
sum FX	-0.00265 Newton	sum FX	-0.03807 Newton	sum FX	-0.02989 Newton
sum FY	0.000771 Newton	sum FY	-0.03247 Newton	sum FY	0.00127 Newton
sum FZ	0.02241 Newton	sum FZ	-0.15309 Newton	sum FZ	-1.03735 Newton
BOUNDARY	13	BOUNDARY	11	BOUNDARY	10
-----		-----		-----	
Area	42.0007 cm <sup>2</sup>	Area	15.7018 cm <sup>2</sup>	Area	39.9513 cm <sup>2</sup>
sum FX	-0.01088 Newton	sum FX	-0.02869 Newton	sum FX	-0.08768 Newton
sum FY	0.00052 Newton	sum FY	0.015446 Newton	sum FY	-0.00081 Newton
sum FZ	0.065528 Newton	sum FZ	0.078637 Newton	sum FZ	0.256219 Newton
BOUNDARY	12	BOUNDARY	10	BOUNDARY	9
-----		-----		-----	
Area	39.7764 cm <sup>2</sup>	Area	0.290029 cm <sup>2</sup>	Area	39.6664 cm <sup>2</sup>
sum FX	-0.00907 Newton	sum FX	-0.00016 Newton	sum FX	-0.0355 Newton
sum FY	0.000132 Newton	sum FY	-0.00065 Newton	sum FY	0.000134 Newton
sum FZ	-0.06005 Newton	sum FZ	-0.00298 Newton	sum FZ	-0.08277 Newton
BOUNDARY	11	BOUNDARY	9	BOUNDARY	8
-----		-----		-----	
Area	2.34342 cm <sup>2</sup>	Area	6.79877 cm <sup>2</sup>	Area	39.6664 cm <sup>2</sup>
sum FX	-0.00033 Newton	sum FX	-0.01272 Newton	sum FX	-0.04391 Newton
sum FY	-5.70E-06 Newton	sum FY	-0.00017 Newton	sum FY	-0.00047 Newton
sum FZ	-0.006 Newton	sum FZ	0.07296 Newton	sum FZ	-0.00568 Newton
BOUNDARY	10	BOUNDARY	8	BOUNDARY	7
-----		-----		-----	
Area	39.9513 cm <sup>2</sup>	Area	42.0007 cm <sup>2</sup>	Area	39.9513 cm <sup>2</sup>
sum FX	-0.00662 Newton	sum FX	-0.05855 Newton	sum FX	-0.08901 Newton
sum FY	0.000323 Newton	sum FY	-0.00084 Newton	sum FY	0.001151 Newton
sum FZ	-0.0318 Newton	sum FZ	0.121596 Newton	sum FZ	0.245741 Newton

BOUNDARY	9	BOUNDARY	7	BOUNDARY	6
-----		-----		-----	
Area	39.8646 cm^2	Area	39.7764 cm^2	Area	39.8646 cm^2
sum FX	-0.00523 Newton	sum FX	-0.04021 Newton	sum FX	-0.02584 Newton
sum FY	-0.00031 Newton	sum FY	-0.00068 Newton	sum FY	-0.00104 Newton
sum FZ	-0.12386 Newton	sum FZ	-0.21928 Newton	sum FZ	-1.08744 Newton
BOUNDARY	8	BOUNDARY	6	BOUNDARY	4
-----		-----		-----	
Area	10.276 cm^2	Area	2.34342 cm^2	Area	0.417467 cm^2
sum FX	-0.1269 Newton	sum FX	-0.0009 Newton	sum FX	-0.04624 Newton
sum FY	0.000135 Newton	sum FY	-6.97E-05 Newton	sum FY	-0.04791 Newton
sum FZ	-0.02506 Newton	sum FZ	-0.04041 Newton	sum FZ	-0.00228 Newton
BOUNDARY	7	BOUNDARY	5	BOUNDARY	3
-----		-----		-----	
Area	10.276 cm^2	Area	39.9513 cm^2	Area	5.53554 cm^2
sum FX	-0.11884 Newton	sum FX	-0.02972 Newton	sum FX	-0.01528 Newton
sum FY	-0.00011 Newton	sum FY	0.000889 Newton	sum FY	-6.95E-05 Newton
sum FZ	-0.02351 Newton	sum FZ	-0.11913 Newton	sum FZ	0.206431 Newton
BOUNDARY	6	BOUNDARY	4	BOUNDARY	2
-----		-----		-----	
Area	39.8646 cm^2	Area	39.8646 cm^2	Area	5.53554 cm^2
sum FX	-0.00518 Newton	sum FX	-0.01254 Newton	sum FX	-0.01149 Newton
sum FY	0.000321 Newton	sum FY	-0.00117 Newton	sum FY	8.94E-05 Newton
sum FZ	-0.12254 Newton	sum FZ	-0.66817 Newton	sum FZ	0.137277 Newton
BOUNDARY	5	BOUNDARY	3	BOUNDARY	1
-----		-----		-----	
Area	94.7495 cm^2	Area	10.276 cm^2	Area	0.417467 cm^2
sum FX	-0.03177 Newton	sum FX	-0.73198 Newton	sum FX	-0.03992 Newton
sum FY	3.88E-05 Newton	sum FY	0.000426 Newton	sum FY	0.041369 Newton
sum FZ	-0.20092 Newton	sum FZ	-0.15694 Newton	sum FZ	-0.00201 Newton
BOUNDARY	4	BOUNDARY	2	Summary	
-----		-----		-----	
Area	58.6776 cm^2	Area	10.276 cm^2	Total area	583.975 cm^2
sum FX	-0.02887 Newton	sum FX	-0.72606 Newton	TOTAL FX	-3.21327 Newton
sum FY	-0.00314 Newton	sum FY	-0.00049 Newton	TOTAL FY	0.031835 Newton
sum FZ	-0.09665 Newton	sum FZ	-0.15573 Newton	TOTAL FZ	-4.78671 Newton



BOUNDARY	3	BOUNDARY	1
-----		-----	
Area	58.6825 cm^2	Area	39.8646 cm^2
sum FX	-0.02894 Newton	sum FX	-0.01323 Newton
sum FY	0.00526 Newton	sum FY	0.001285 Newton
sum FZ	-0.10652 Newton	sum FZ	-0.67009 Newton
BOUNDARY	2	Summary	
-----		-----	
Area	1.07131 cm^2	Total area	2218.83 cm^2
sum FX	-0.0119 Newton	TOTAL FX	-3.35213 Newton
sum FY	0.01423 Newton	TOTAL FY	-0.00223 Newton
sum FZ	-0.00029 Newton	TOTAL FZ	3.35774 Newton
BOUNDARY	1		
-----			
Area	94.7496 cm^2		
sum FX	-0.03187 Newton		
sum FY	6.47E-05 Newton		
sum FZ	-0.20347 Newton		
Summary			
-----			
Total area	3974.2 cm^2		
TOTAL FX	-1.18762 Newton		
TOTAL FY	0.006207 Newton		
TOTAL FZ	-3.21519 Newton		

Tiga stepped W

Trim 1		Trim 2		Trim 3	
BOUNDARY	12	BOUNDARY	12	BOUNDARY	12
-----					
Area	4.98698 cm <sup>2</sup>	Area	0.141207 cm <sup>2</sup>	Area	89.8978 cm <sup>2</sup>
sum FX	-0.01056 Newton	sum FX	-0.00188 Newton	sum FX	-0.16784 Newton
sum FY	0.024331 Newton	sum FY	0.003781 Newton	sum FY	-0.00213 Newton
sum FZ	-0.00049 Newton	sum FZ	-0.00012 Newton	sum FZ	-1.32816 Newton
BOUNDARY	11	BOUNDARY	11	BOUNDARY	10
-----					
Area	61.1006 cm <sup>2</sup>	Area	0.305873 cm <sup>2</sup>	Area	25.1361 cm <sup>2</sup>
sum FX	-0.03999 Newton	sum FX	-0.02163 Newton	sum FX	-0.08096 Newton
sum FY	0.017583 Newton	sum FY	-1.19E-05 Newton	sum FY	-0.01832 Newton
sum FZ	-0.07778 Newton	sum FZ	-0.00258 Newton	sum FZ	0.091028 Newton
BOUNDARY	10	BOUNDARY	10	BOUNDARY	9
-----					
Area	61.101 cm <sup>2</sup>	Area	43.4758 cm <sup>2</sup>	Area	2.8125 cm <sup>2</sup>
sum FX	-0.03525 Newton	sum FX	-0.04261 Newton	sum FX	-0.07728 Newton
sum FY	-0.00819 Newton	sum FY	-0.04913 Newton	sum FY	-0.16495 Newton
sum FZ	-0.09271 Newton	sum FZ	-0.1865 Newton	sum FZ	-0.00478 Newton
BOUNDARY	9	BOUNDARY	9	BOUNDARY	8
-----					
Area	4.98704 cm <sup>2</sup>	Area	16.8244 cm <sup>2</sup>	Area	2.47366 cm <sup>2</sup>
sum FX	-0.01106 Newton	sum FX	-0.01217 Newton	sum FX	-0.04596 Newton
sum FY	-0.02542 Newton	sum FY	-0.00715 Newton	sum FY	-0.09829 Newton
sum FZ	-0.00049 Newton	sum FZ	-0.02743 Newton	sum FZ	-0.0029 Newton
BOUNDARY	8	BOUNDARY	8	BOUNDARY	7
-----					
Area	0.341485 cm <sup>2</sup>	Area	4.92754 cm <sup>2</sup>	Area	2.47365 cm <sup>2</sup>
sum FX	-0.00114 Newton	sum FX	-0.05668 Newton	sum FX	-0.05919 Newton
sum FY	-0.00261 Newton	sum FY	0.120612 Newton	sum FY	0.126622 Newton
sum FZ	-4.54E-05 Newton	sum FZ	-0.00413 Newton	sum FZ	-0.00399 Newton
BOUNDARY	7	BOUNDARY	7	BOUNDARY	6
-----					
Area	103.782 cm <sup>2</sup>	Area	0.284699 cm <sup>2</sup>	Area	2.82672 cm <sup>2</sup>
sum FX	-0.03299 Newton	sum FX	-0.00398 Newton	sum FX	-0.06763 Newton
sum FY	0.001746 Newton	sum FY	-0.00805 Newton	sum FY	0.144893 Newton
sum FZ	0.037981 Newton	sum FZ	-0.00027 Newton	sum FZ	-0.0051 Newton

BOUNDARY	6	BOUNDARY	6	BOUNDARY	3
-----		-----		-----	
Area	2.30343 cm <sup>2</sup>	Area	0.803923 cm <sup>2</sup>	Area	25.2164 cm <sup>2</sup>
sum FX	-0.00059 Newton	sum FX	-0.01139 Newton	sum FX	-0.07398 Newton
sum FY	0.00034 Newton	sum FY	-0.02288 Newton	sum FY	-0.00706 Newton
sum FZ	-0.00157 Newton	sum FZ	-0.00083 Newton	sum FZ	-0.02354 Newton
BOUNDARY	5	BOUNDARY	5	BOUNDARY	2
-----		-----		-----	
Area	7.71805 cm <sup>2</sup>	Area	3.97752 cm <sup>2</sup>	Area	20.1697 cm <sup>2</sup>
sum FX	6.97E-05 Newton	sum FX	-0.05903 Newton	sum FX	-0.05851 Newton
sum FY	-0.00017 Newton	sum FY	-0.12626 Newton	sum FY	-0.00042 Newton
sum FZ	-0.05689 Newton	sum FZ	-0.00275 Newton	sum FZ	0.026066 Newton
BOUNDARY	4	BOUNDARY	4	BOUNDARY	1
-----		-----		-----	
Area	5.63569 cm <sup>2</sup>	Area	1.06862 cm <sup>2</sup>	Area	20.1697 cm <sup>2</sup>
sum FX	-0.02783 Newton	sum FX	-0.0802 Newton	sum FX	-0.00826 Newton
sum FY	0.063645 Newton	sum FY	-5.00E-06 Newton	sum FY	-0.00323 Newton
sum FZ	-0.00088 Newton	sum FZ	-0.00334 Newton	sum FZ	-0.37215 Newton
BOUNDARY	3	BOUNDARY	3	Summary	
-----		-----		-----	
Area	64.0653 cm <sup>2</sup>	Area	85.3781 cm <sup>2</sup>	Total area	429.391 cm <sup>2</sup>
sum FX	-0.02326 Newton	sum FX	-0.07975 Newton	TOTAL FX	-1.8588 Newton
sum FY	0.000652 Newton	sum FY	-0.02229 Newton	TOTAL FY	-0.05362 Newton
sum FZ	-0.19298 Newton	sum FZ	-0.17577 Newton	Center of Fc	12.2376 0.0234
BOUNDARY	2	BOUNDARY	2		
-----		-----			
Area	64.0648 cm <sup>2</sup>	Area	5.05866 cm <sup>2</sup>		
sum FX	-0.02052 Newton	sum FX	-0.37513 Newton		
sum FY	-0.00071 Newton	sum FY	-0.00025 Newton		
sum FZ	-0.19013 Newton	sum FZ	-0.08003 Newton		
BOUNDARY	1	BOUNDARY	1		
-----		-----			
Area	5.64142 cm <sup>2</sup>	Area	3.9769 cm <sup>2</sup>		
sum FX	-0.02666 Newton	sum FX	-0.05992 Newton		
sum FY	-0.06105 Newton	sum FY	0.128241 Newton		
sum FZ	-0.00087 Newton	sum FZ	-0.00287 Newton		
Summary		Summary			
-----		-----			
Total area	3733.6 cm <sup>2</sup>	Total area	1240.53 cm <sup>2</sup>		
TOTAL FX	-1.10658 Newton	TOTAL FX	-1.8747 Newton		
TOTAL FY	0.049763 Newton	TOTAL FY	0.008355 Newton		
TOTAL FZ	0.783394 Newton	TOTAL FZ	-0.15148 Newton		
Center of Fc	-0.05764 2.34761	Center of Fc	-0.04106 2.55053 cm		
Center of Fc	110.843 2.59882	Center of Fc	32.9298 2.51493 cm		
Center of Fc	48.7707 -0.42097	Center of Fc	834.459 2.37282 cm		

#### Lampiran 4. Nilai Residual

Tanpa Stepped	Residual in	Residual out
Trim 1	16.228	2.609E-08
Trim 2	1.3202	3.899E-08
Trim 3	1.516	2.31E-08
1 stepped U	Residual in	Residual out
Trim 1	16.228	1.329E-08
Trim 2	6.232	1.722E-08
Trim 3	10.579	2.212E-08
1 stepped 2-U	Residual in	Residual out
Trim 1	6.36	2.432E-08
Trim 2	6.359	1.735E-08
Trim 3	1.0663	2.211E-08
2 Stepped V	Residual in	Residual out
Trim 1	17.35	1.806E-08
Trim 2	6.3602	1.873E-08
Trim 3	1.562	1.609E-08
3 Stepped W	Residual in	Residual out
Trim 1	16.89	1.8665E-07
Trim 2	6.4202	1.363E-08
Trim 3	1.881	2.083E-08

## Lampiran 5. Penentuan Skala model.

Penentuan Skala dilakukan untuk menghindari terjadinya ombak pada dinding tangka atau yang di sebut *blockage effect* dimana ukuran model harus disesuaikan dengan ukuran tangki serta tinggi air dalam tangka dengan sarat model. Menurut harvald, penentuan lebar model ( $B_m$ ) adalah sebagai berikut :

$$B_m < 1/10 B \text{ Tangki}$$

Diketahui

$$\begin{aligned} B \text{ tangki} &= 3,75 \text{ m} \\ - &= \frac{1}{10} \times 3,75 \text{ m} \\ &= 0,375 \text{ m} \end{aligned}$$

Maka lebar model yang digunakan supaya tidak menimbulkan *blockage effect* dan dapat digunakan untuk pengujian model di towing tank yaitu:

$$B_m < 0,375 \text{ m}$$

Berdasarkan perhitungan dari persamaan diatas , maka penentuan skala model kapal dapat ditentukan melalui table berikut:

<b>Bs (m)</b>	<b>Skala</b>	<b>Bm (m)</b>
4.5	1:10	0.45
4.5	1:15	0.30
4.5	1:20	0.23
4.5	1:25	0.18

Dari table diatas ukuran lebar model kapal maksimal yang memenuhi Kriteria yaitu 0,30 m sehingga skala yang digunakan untuk ukuran model kapal yaitu 1 : 15.