DAFTAR PUSTAKA

[1] Kusuma Bagus Aditya, Heri Supomo, Buana Ma'ruf. "Studi Teknis dan Ekonomis Dimensi Konstruksi Kapal Kayu Berdasarkan BKI". Jurnal, Teknik Produksi dan Material Kelautan, Fakultas Teknologi Kelautan, Institut Teknologi Sepuluh Nopember. 2020

[2] H. Schneekluth, V. Bertram, V. *Ship Design for Efficiency and Economy,Ed. 2*. Oxford Boston, Butterworth-Heineman, 1998.

[3] Muhammad, Andi Haris, & Hasan, H. "Desain Kriteria *Propeller Clearance* Kapal Tradisonal Tipe Pinisi Terhadap Efisiensi Propulsi". *Jurnal JPE. Vol.20, No. 1: 28-31,* 2016.

[4] Harvald SV.ta.1992. Tahanan dan Propulsi kapal, terjemahan Indonesia oleh Ir. Sutomo Jusuf.Jurnal Airlangga University press. Surabaya.

[5] Suryo W. Adji, M.Sc CEng. FIMarEST, Engine *Propeller* Machting, Indonesia, 2005.

[6] Holtrop, J. 1984 *A Statistical Re-analysis of Resistance and Propulsion Data*, International Shipbuilding Progress.

[7] Kristensen Hans Otto. 2013.Prediction of Resistance and Propulsion Power Ships. Denmark. Technical University

[8] Muhammad, A.H. Propulsi Kapal Cepat. Buku Ajar, Departemen Teknik Sistem Perkapalan, Fakultas Teknik, Universitas Hasanuddin, Makassar, 2013.

[9] Yuana, Budi Rolly, Siti Sadiah, Kristian Hadi Siswanto. "Studi Eksperimental Penggunaan *Boss Cap Fins* untuk Meningkatkan Efisiensi Pada *Propeller*". Balai Teknologi Hidrodinamika, BPPT, Vol.19, No.2: 181-195. 2018.

[10] Ardhianto , Kurniawan. 2011. Desain dan Analisis Propeller pada

Unmanned Aerial Vehicle (UAV). AAU Journal of Defense Science and Technology Volume 2, Number 1, 1 July 2011, 125 – 133.

[11] Jusman. *Pengaruh Perubahan Propeller Clearance Model Kapal Tadisional Tipe Phinisi.* Skripsi, Departemen Teknik Sistem Perkapalan, Fakultas Teknik, Universitas Hasanuddin, Makassar, 2013.

[12] Bensow, R. E., Gustafsson, R. "Effect of *Propeller* Tip *Clearance* on Hull Pressure Pulses Effect of *Propeller* Tip *Clearance* on Hull Pressure Pulses". *Fifth International Symposium on Marine Propulsors smp'17*, 2017.

[13] Yasir, M. *Pengaruh Geometri Propeler Terhadap* Efisiensi *Propeler Kapal Perikanan 30 GT*. Skripsi, Departemen Teknik Sistem Perkapalan, Fakultas Teknik, Universitas Hasanuddin, Makassar, 2018.

[14] Subhas, S.2012. CFD Analysis of a *Propeller* Flow and cavitation.International Journal of Computer application. Volume 55-No.16:26-33

[15] I Ketut Aria Pria Utama. 2012. Modul Computational Fluid Dynamics (CFD) Dengan Ansys CFX. Institut Teknologi Sepuluh November: Surabaya.

[16] Nashruddin, Ahmad Haidar. 2012. Studi Numerik Karakteristik Aliran 3 Dimensi di Sekitar Bodi Modifikasi Sapuangin Urban Concept dengan Rasio Ground Clearance terhadap Panjang Model (C/L) 0,048. Surabaya: Institut Teknologi Sepuluh Nopember.

[17] Ahmad fauzan.2006.Rancangan Bangun Circular Hovercraf dan Analisa Aliran pada Bag Yang Mempengaruh Cushion Pressure Dengan Computational Fluid Dynamic. Jakarta.

[18] Bardina, J. E., Huang, P. G & Coakley, T. J. (1997). T*urbulence Modelling, Validation, Testing and Development,* NASA Technical Memorandum 110446.

[19] ANSYS CFX Tutorials,2010

[20] Mitchell, R. R. & Webb, M. B. (2008). A Study Of The Base Pressure Distribution Of A Slender Body Of Square Cross-Sectrion. AIAA Aerospace Sciences Meeting and Exhibit. Pp 1-8.

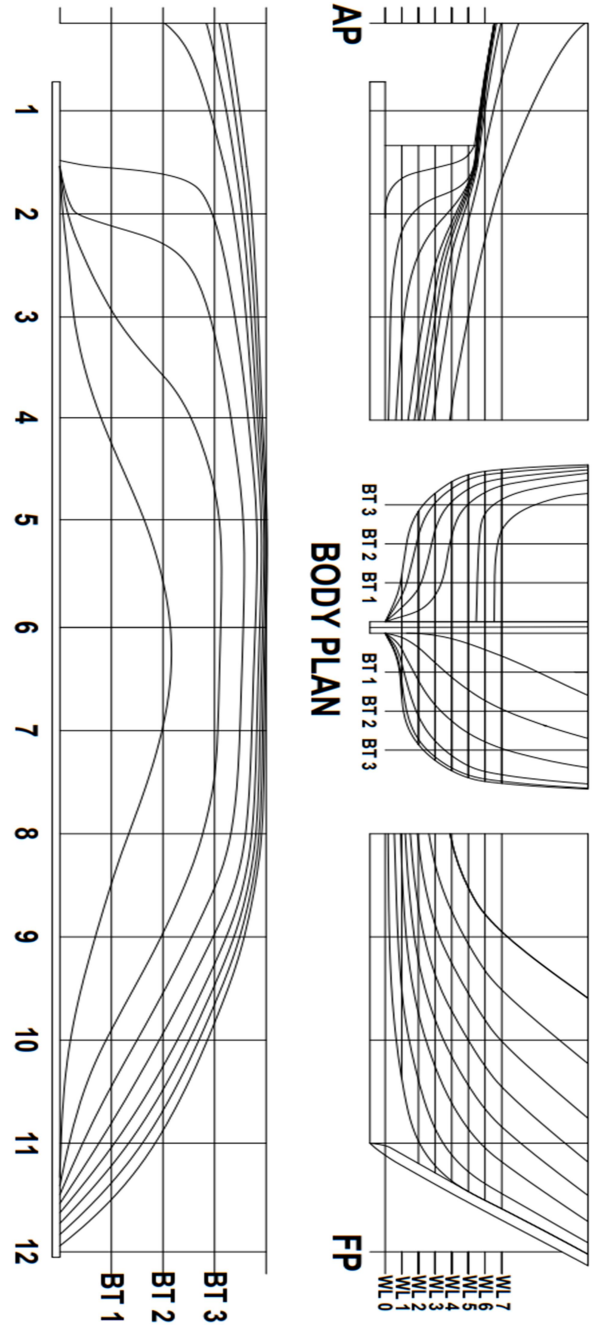
[21] Leksono S, Muryadin, D Kartikasari. 2018. Comparative study of Ship Resistance between Model Test and Empirical Calculation of 60 GT Fishing Vessel. International Jounrnal of Science and Research Volume 7, No.12 : 1077- 1082.

[22] Mehdi Nakisa, Mohammad Javad Abbasi, and Ahmad Mobasher Amini, (2010), "Assessment of Marine Propeller Hydrodynamic Performance in Open Water via CFD", Proceedings of MARTEC, The International Conference on Marine Technology, BUET, Dhaka, Banglades.

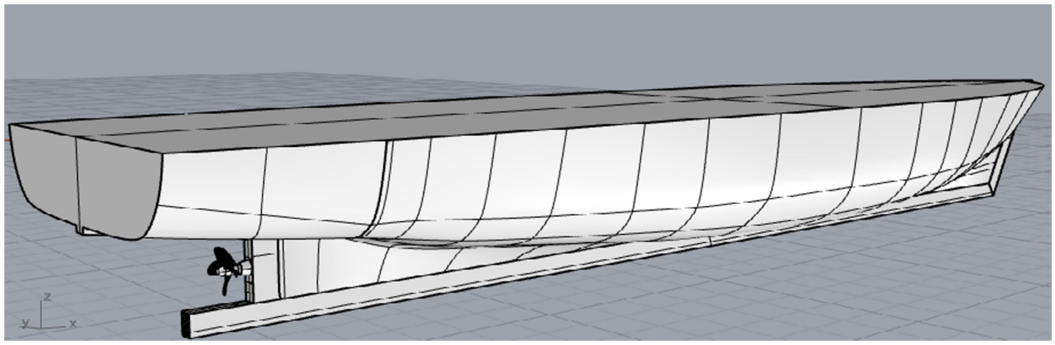
LAMPIRAN

Lampiran 1 data kapal

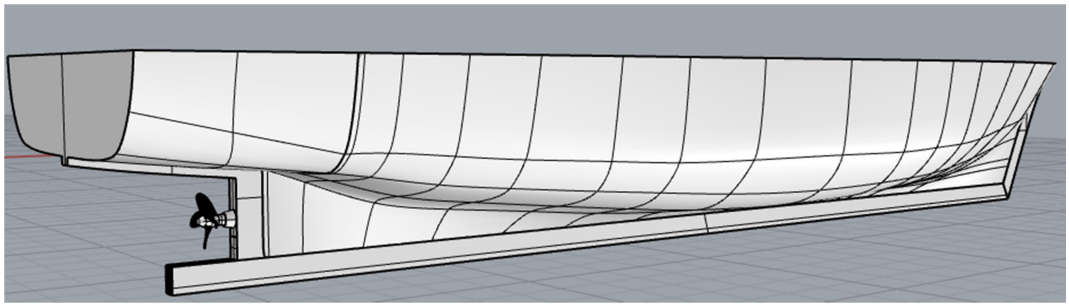
1. **gambar lines plan**



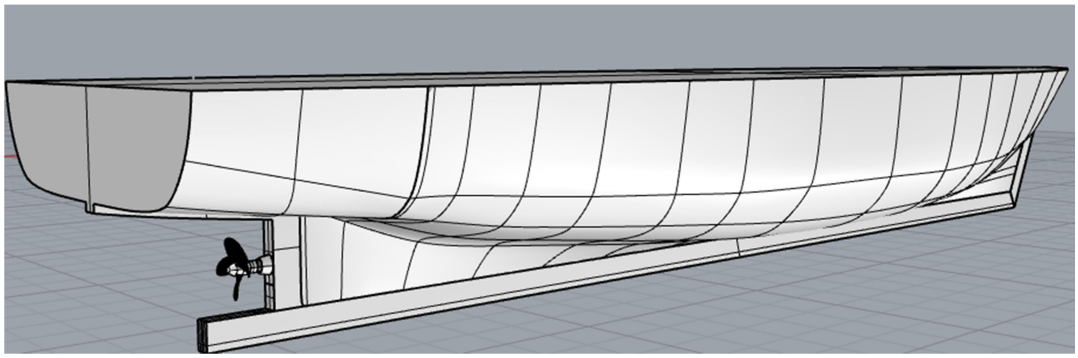
Lampiran 2 gambar konfigurasi peletakan *Propeller*



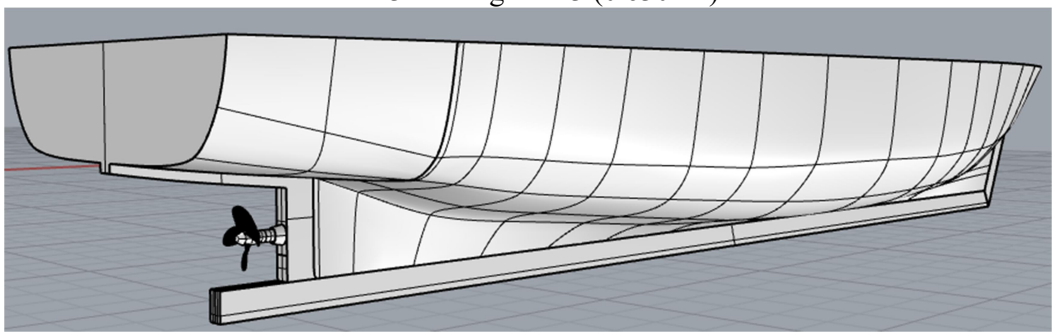
Gambar 1 konfigurasi 1 (0.430 m)



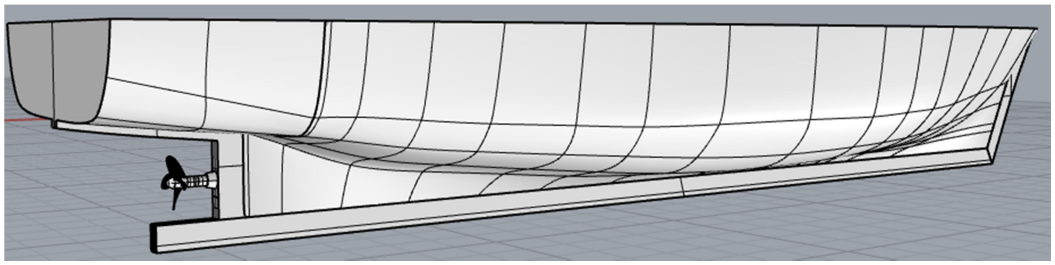
Gambar 2. Konfigurasi 2 (0.530 m)



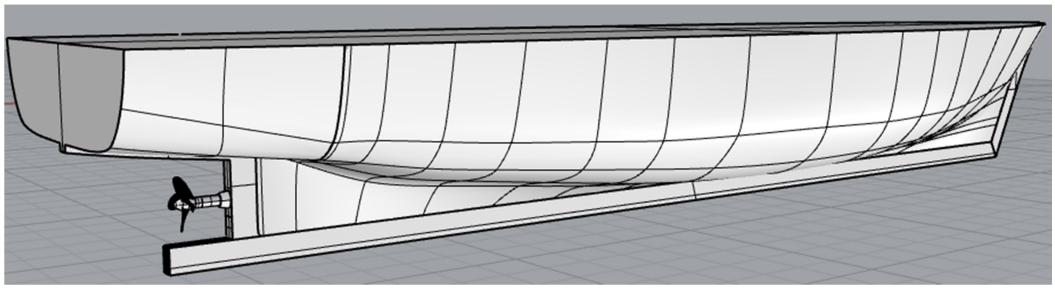
Gambar 3. Konfigurasi 3 (0.630 m)



Gambar 4. Konfigurasi 4 (0.730 m)



Gambar 5. Konfigurasi 5 (0.830 m)



Gambar 6. Konfigurasi 6 (0.930 m)

Lampiran 3 Perhitungan Tahanan Kapal

	Speed (kn)	Froude No. LWL	Froude No. Vol.	Holtrop Resist. (N)	Holtrop Power (W)
1	9,000	0,263	0,573	15007,05	157915,11
2	9,100	0,265	0,579	15611,76	166103,60
3	9,200	0,268	0,586	16259,53	174896,69
4	9,300	0,271	0,592	16952,97	184337,92
5	9,400	0,274	0,598	17693,63	194460,10
6	9,500	0,277	0,605	18481,66	205281,82
7	9,600	0,280	0,611	19315,73	216804,49
8	9,700	0,283	0,617	20192,85	229010,37
9	9,800	0,286	0,624	21108,42	241862,02
10	9,900	0,289	0,630	22056,45	255303,45
11	10,000	0,292	0,636	23029,83	269262,96
12	10,100	0,295	0,643	24020,80	283657,72
13	10,200	0,298	0,649	25021,43	298399,56
14	10,300	0,300	0,656	26024,23	313401,38
15	10,400	0,303	0,662	27022,58	328583,70
16	10,500	0,306	0,668	28011,25	343880,48
17	10,600	0,309	0,675	28986,63	359243,86
18	10,700	0,312	0,681	29946,99	374647,42
19	10,800	0,315	0,687	30892,49	390087,89
20	10,900	0,318	0,694	31825,12	405585,37
21	11,000	0,321	0,700	32748,52	421182,34
22	11,100	0,324	0,707	33667,80	436941,74
23	11,200	0,327	0,713	34589,26	452944,57
24	11,300	0,330	0,719	35520,13	469287,23
25	11,400	0,333	0,726	36468,36	486079,02
26	11,500	0,335	0,732	37442,42	503439,82
27	11,600	0,338	0,738	38451,13	521498,26
28	11,700	0,341	0,745	39503,53	540390,28
29	11,800	0,344	0,751	40608,82	560258,18
30	11,900	0,347	0,757	41776,32	581250,03
31	12,000	0,350	0,764	43015,43	603519,47
32	12,100	0,353	0,770	44335,61	627225,73
33	12,200	0,356	0,777	45746,45	652533,88
34	12,300	0,359	0,783	47257,65	679615,11
35	12,400	0,362	0,789	48879,03	708647,15
36	12,500	0,365	0,796	50620,57	739814,57
37	12,600	0,368	0,802	52492,44	773309,07
38	12,700	0,370	0,808	54504,94	809329,59
39	12,800	0,373	0,815	56668,57	848082,32
40	12,900	0,376	0,821	58993,94	889780,51
41	13,000	0,379	0,827	61491,78	934644,02

Lampiran 4 penentuan *Propeller*

1. Perhitungan daya

Untuk SHP dengan metode Holtrop harus ditentukan efisiensi prupulsinya terlebih dahulu.

DHP = EHP/P_C

Setelah masing-masing efisiensi propulsi diketahui maka nilai koefisien propulsi dapat diketahui.

P_C = ηH x ηrr x ηO

= 0,991 x 1,0 x 0,443

= 0,439

Setelah diketahui P_C maka SHP dapat dihitung dengan cara :

DHP = EHP/ P_C

= 810,59 HP atau 604,46 kW

SHP = DHP / ηS

= 810,59 / 0,98

= 827,13 HP atau 616,79 kW

Perhitungan BHP (Brake Horse Power)

Pada perhitungan BHP yang perlu diketahui yaitu nilai BHPscr akan tetapi untuk faktor keamanan maka nilai BHPscr ditambahkan antara 15% sampai 20%, sebagaimana persamaan berikut :

BHPscr = SHP / 0,98

= 827,13 / 0,98

= 844,01 HP atau 629,38 kW

BHPmcr = BHPscr / 0,85

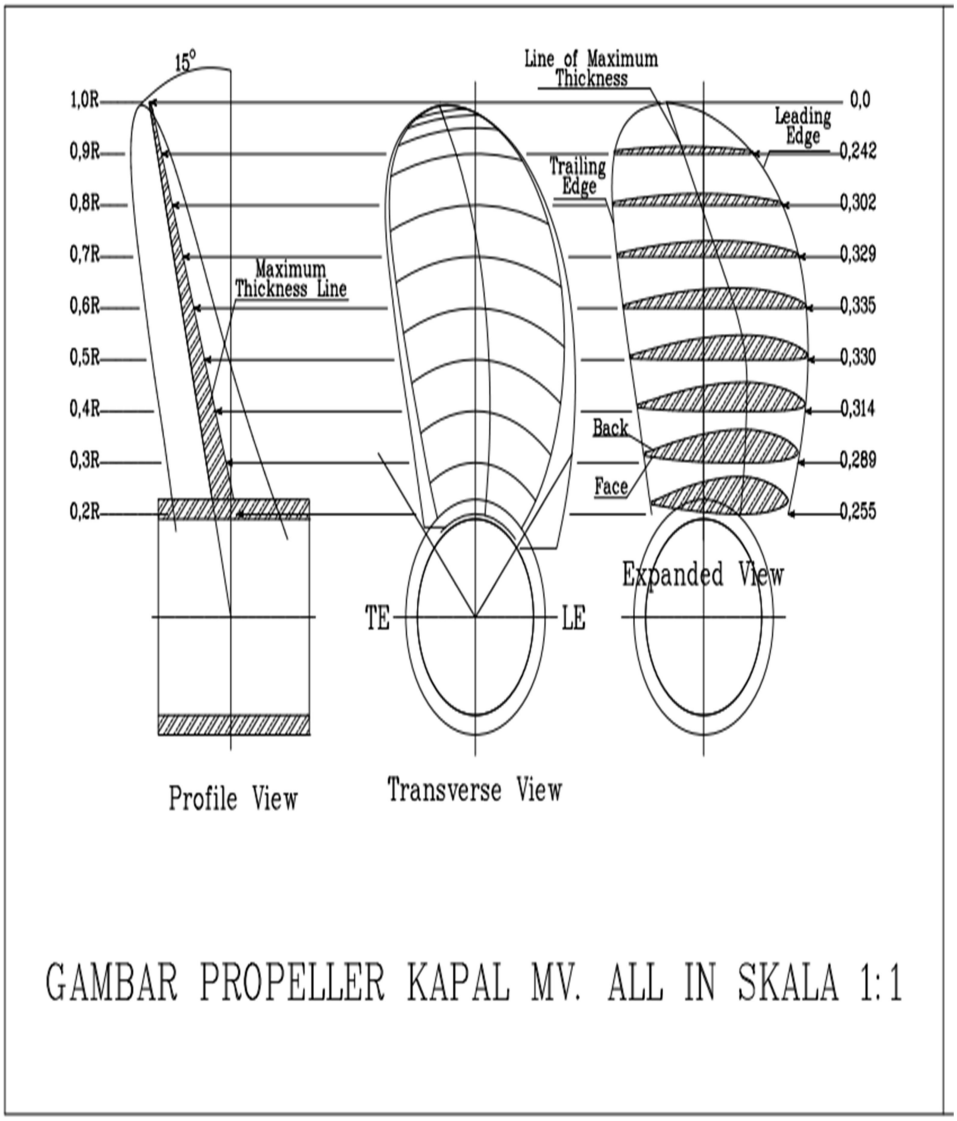
= 992,96 HP atau 740,45

2. Penentuan *Propeller*

Data *Propeller* B4-55 D 1,05 m

Parameter	**Dimensi**
Ae/Ao	0,55
P/d	0,9
rps	13,33
rpm	800
Q	8,605
T, kN	58,696
P_D	720,523
KT	0,265
KQ	0,037
J	0,380
ηO	0,43

Gambar propeller Diameter 1,05 meter



3. Engine Propeller Matching

   a. Tahanan kapal dan kecepatan service

      Rt = 43 kN

      Vs = 12 knot atau 6,1728 m/s

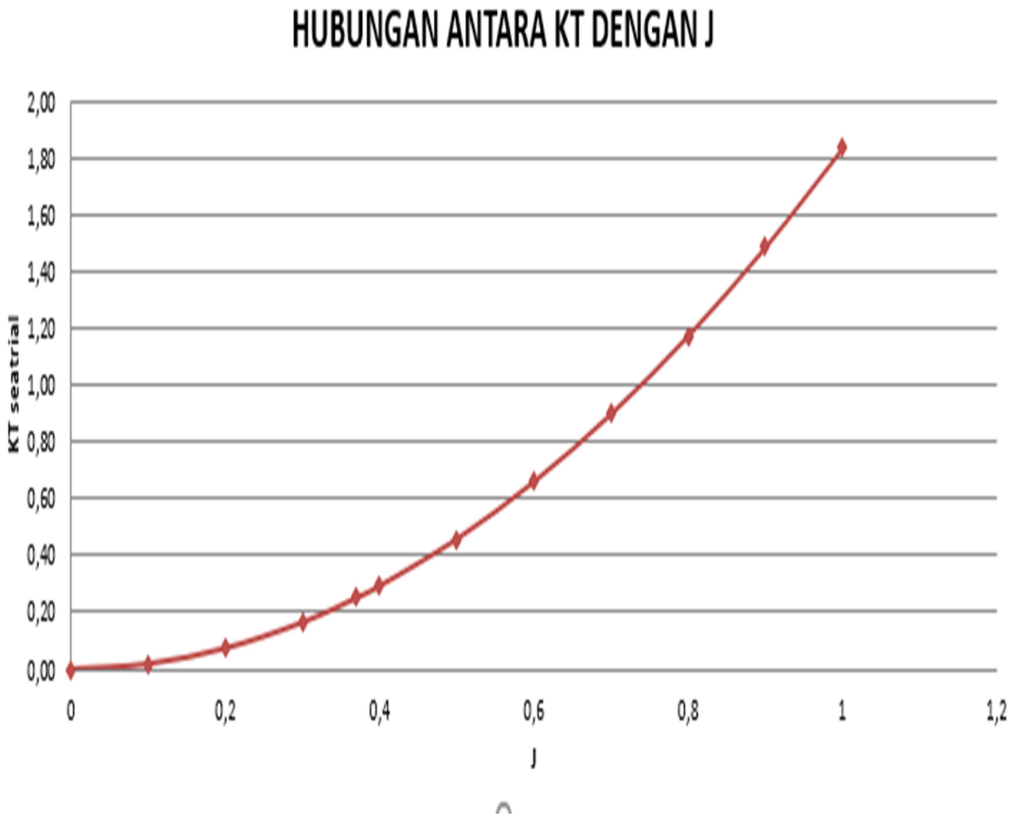
   b. Perhitungan KT/J²

      $KT = \beta \; x \; J2$

      Dimana $\beta = \frac{\alpha}{(1-t)\,(1-w)^2 \rho D^2}$

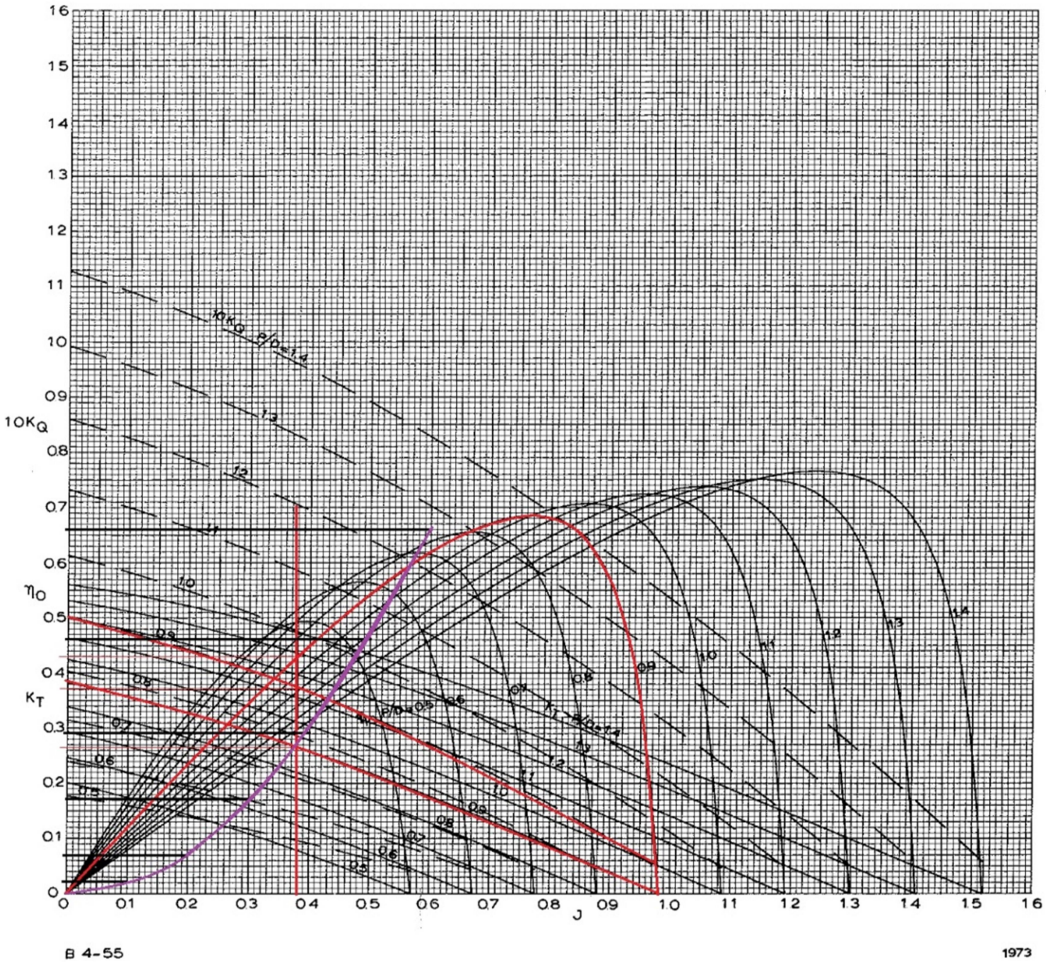
      Adapun nilai KT yang didapatkan yaitu KT= 1,834508 x $J2$ dimana nilai J pada penelitian ini berkisar antara 0-1,0. Setelah itu dibuat table berikut:

J	J²	KT
0	0	0,00
0,1	0,01	0,02
0,2	0,04	0,07
0,3	0,09	0,17
0,4	0,16	0,29
0,5	0,25	0,46
0,6	0,36	0,66
0,7	0,49	0,90
0,8	0,64	1,17
0,9	0,81	1,49
1	1	1,83


HUBUNGAN ANTARA KT DENGAN J
KT seatrial
2,00
1,80
1,60
1,40
1,20
1,00
0,80
0,60
0,40
0,20
0,00
0
0,2
0,4
0,6
0,8
1
1,2
J

c. Penentuan karakteristik propeller

Grafik wegeningen open water test B4-55, dengan P/Db 0,90



C. Tabel nilai dari grafik wegeningen open water test b4-55

J	KT	10KQ	ηO
0	0,387	0,5	0
0,1	0,357	0,469	0,12
0,2	0,328	0,436	0,23
0,3	0,293	0,402	0,34
0,4	0,256	0,363	0,45
0,5	0,215	0,318	0,55
0,6	0,174	0,269	0,63
0,7	0,123	0,215	0,67
0,8	0,073	0,157	0,64
0,9	0,022	0,096	0,44
0,95	0	0,065	0

d. Karakteristik propeller kapal

Parameter	**Blade Area Ratio (Ae/Ao)**
	0,55
D, m	1,05
P/D	0,9
Rps	13,33
Rpm	800
Q	8,605
T, kN	58,696
P_D	720,523
KT	0,265
KQ	0,037
J	0,380
ηO	0,43

Lampiran 5 Perhitungan Efisiensi Propulsi

$$\text{Ηpropulsi} = \frac{T\ X\ VS}{2\pi\ Q\ D\ n} = \frac{KT}{KQ}\ x\ \frac{Js}{2\pi}$$

$$Js = \frac{va}{n\ x\ D}$$

Dimana :

Va = Vs x (1 - w)

= 6.618 x (1 – 0.148)

= 5.25 m/s

n = 13.33 put/s

D = 1.05 m

$$Js = \frac{5.25\ m/s}{13.33\ put/s\ x\ \ 1.05\ m}$$

= 0.375

Tabel 1 KT dan KQ

Konfigurasi	Jarak (M)	KT	KQ
1	0.430	0.253	0.0352
2	0.530	0.259	0.0361
3	0.630	0.265	0.0347
4	0.730	0.269	0.0374
5	0.830	0.251	0.0331
6	0.930	0.249	0.0334

2. Efisiensi propulsi konfigurasi 1

$$\text{Ηpropulsi} = \frac{0.253}{0.0352}\ x\ \frac{0.375}{2x\ 3.14}$$

= 0.4230

3. Efisiensi propulsi konfigurasi 2

$$\text{Ηpropulsi} = \frac{0.259}{0.0361} \; x \; \frac{0.375}{2x\ 3.14}$$

$$= 0.424$$

4. Efisiensi propulsi konfigurasi 3

$$\text{Ηpropulsi} = \frac{0.265}{0.0347} \; x \; \frac{0.375}{2x\ 3.14}$$

$$= 0.451$$

5. Efisiensi propulsi konfigurasi 4

$$\text{Ηpropulsi} = \frac{0.269}{0.0374} \; x \; \frac{0.375}{2x\ 3.14}$$

$$= 0.4233$$

6. Efisiensi propulsi konfigurasi 5

$$\text{Ηpropulsi} = \frac{0.251}{0.0331} \; x \; \frac{0.375}{2x\ 3.14}$$

$$= 0.44$$

7. Efisiensi propulsi konfigurasi 6

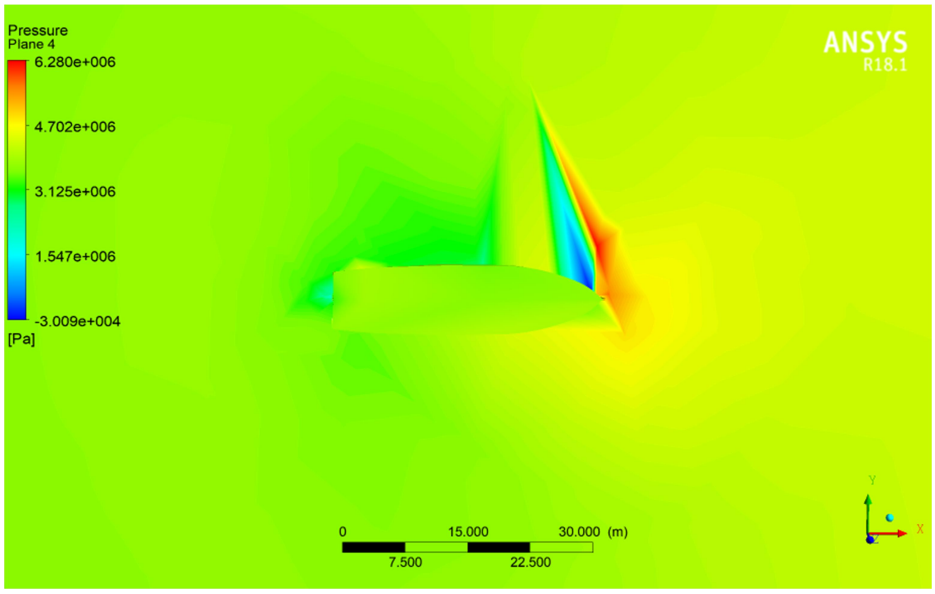
$$\text{Ηpropulsi} = \frac{0.249}{0.0334} \; x \; \frac{0.375}{2x\ 3.14}$$

$$= 0.40$$

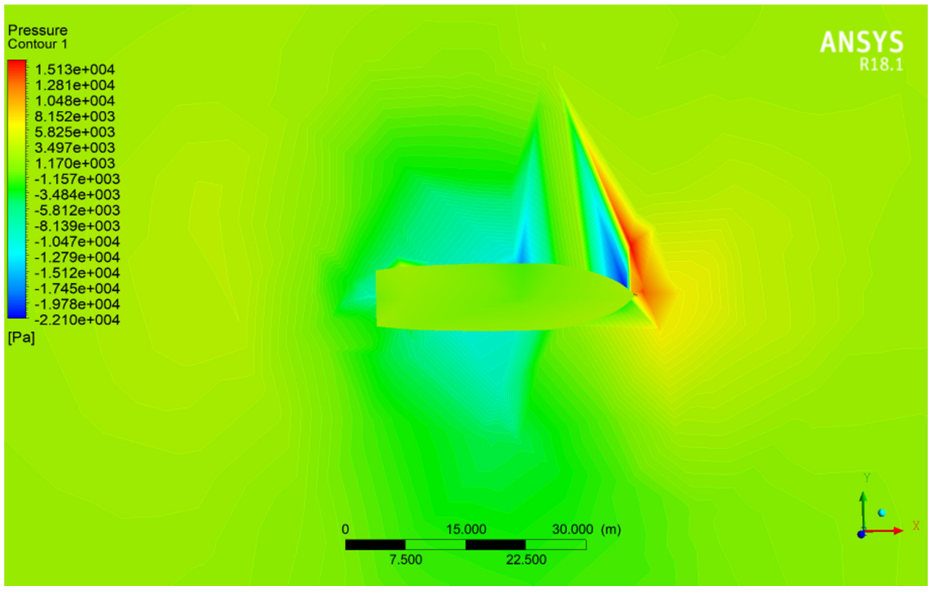
Lampiran 5 Visualisasi aliran

1. Tahanan kapal

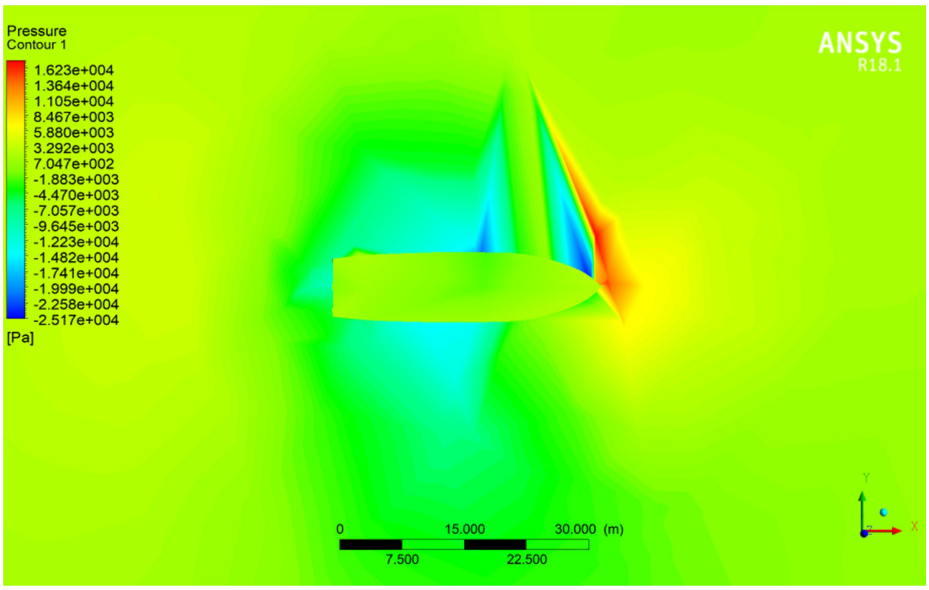
- **Gambar Kecepatan 9 knot**



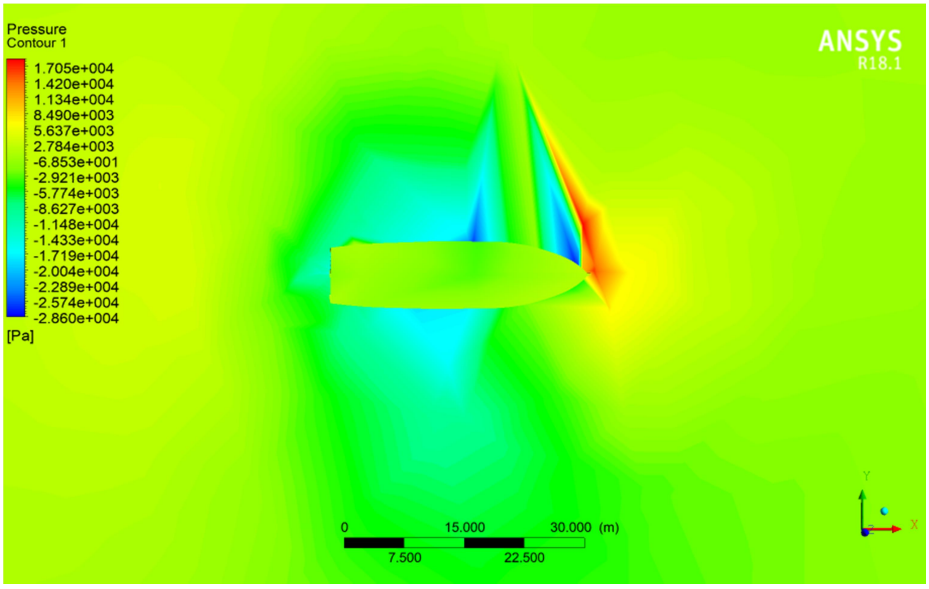
- **Gambar kecepatan 10 knot**



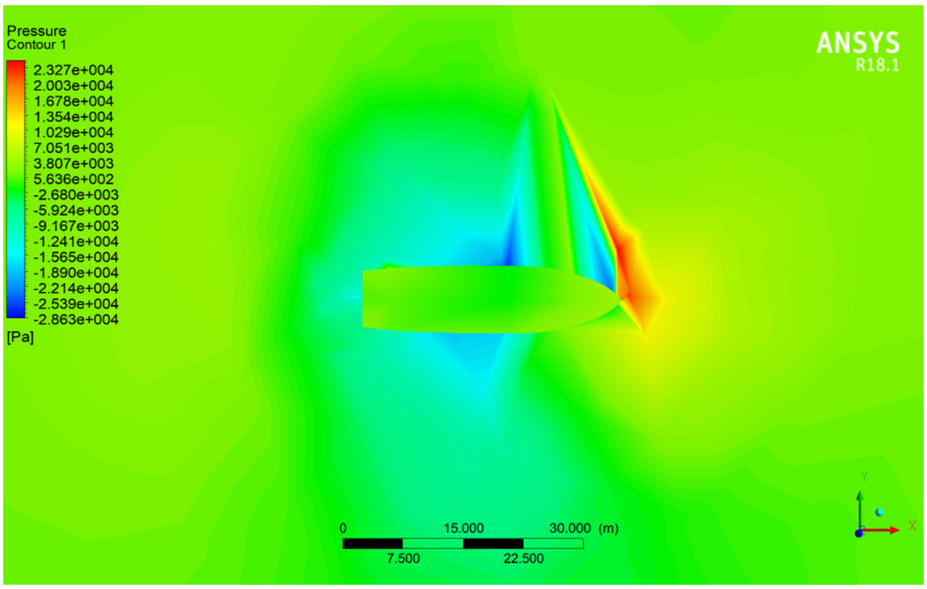
- **Gambar kecepatan 11 knot**



- **Gambar kecepatan 12 knot**

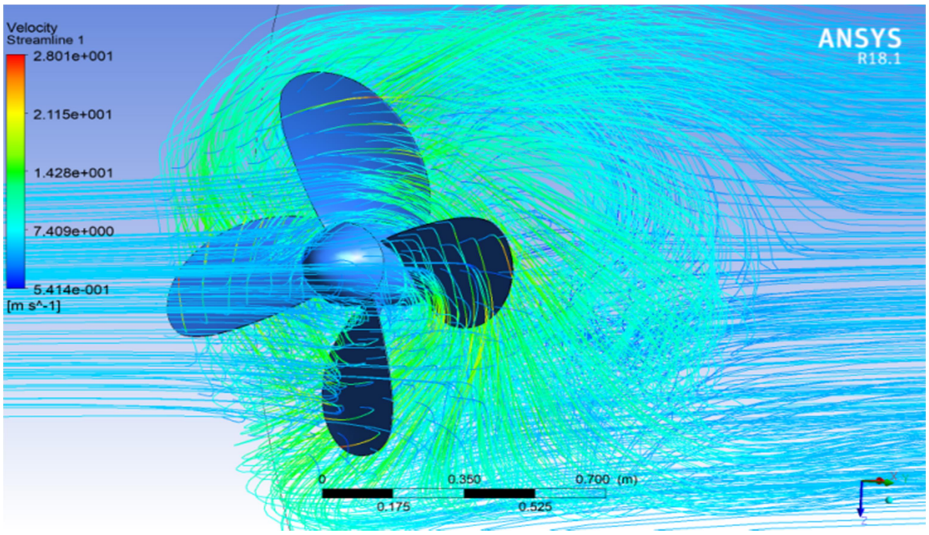


- **Gambar kecepatan 13 knot**



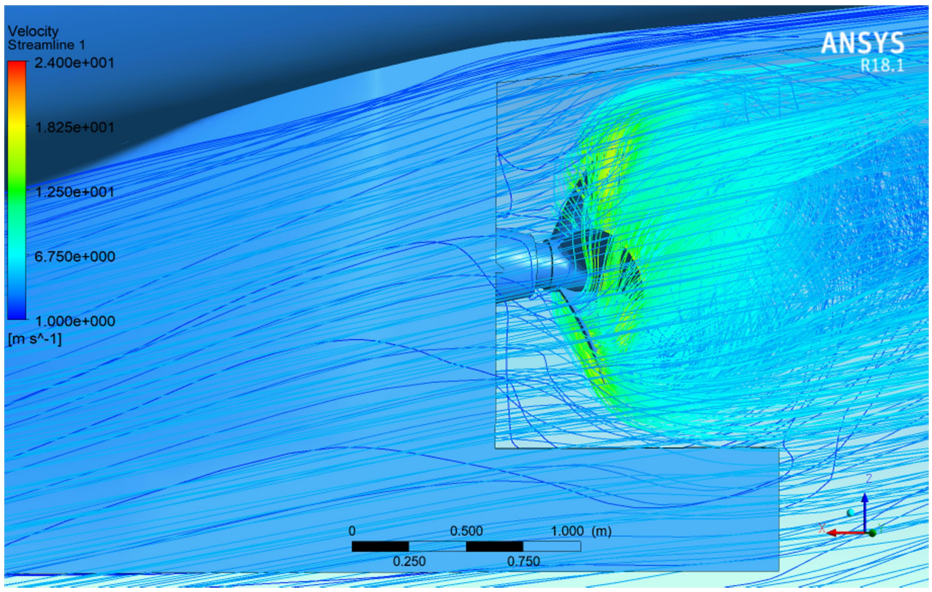
2. Open Water Test

Gambar simulasi open water test

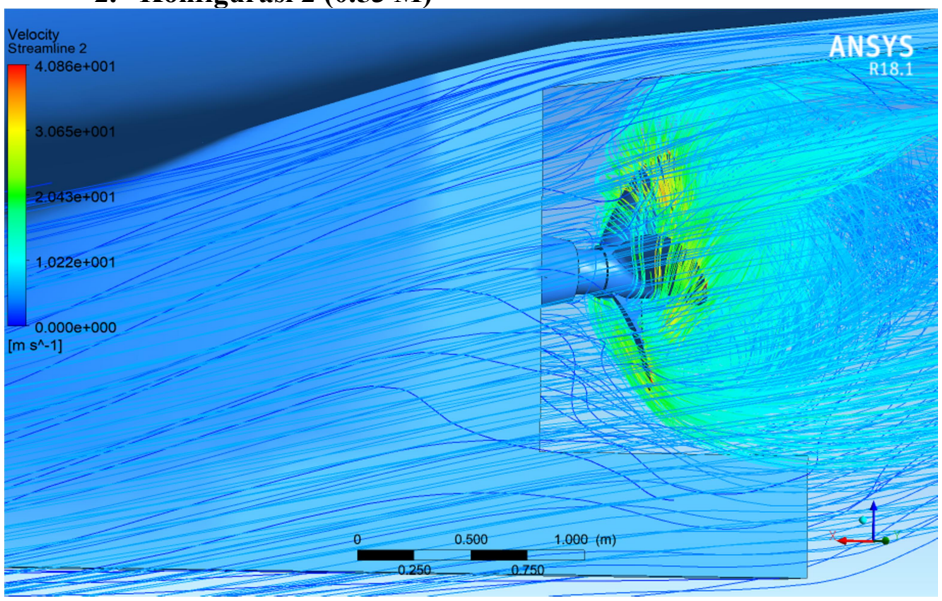


3. Konfigurasi Peletakan *Propeller*

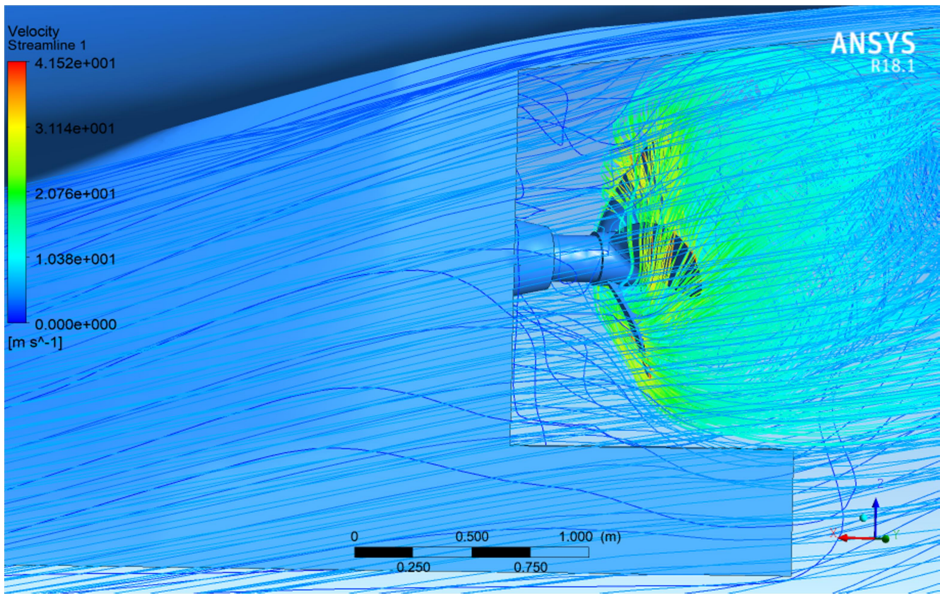
1. Konfigurasi 1 (0.43 M)



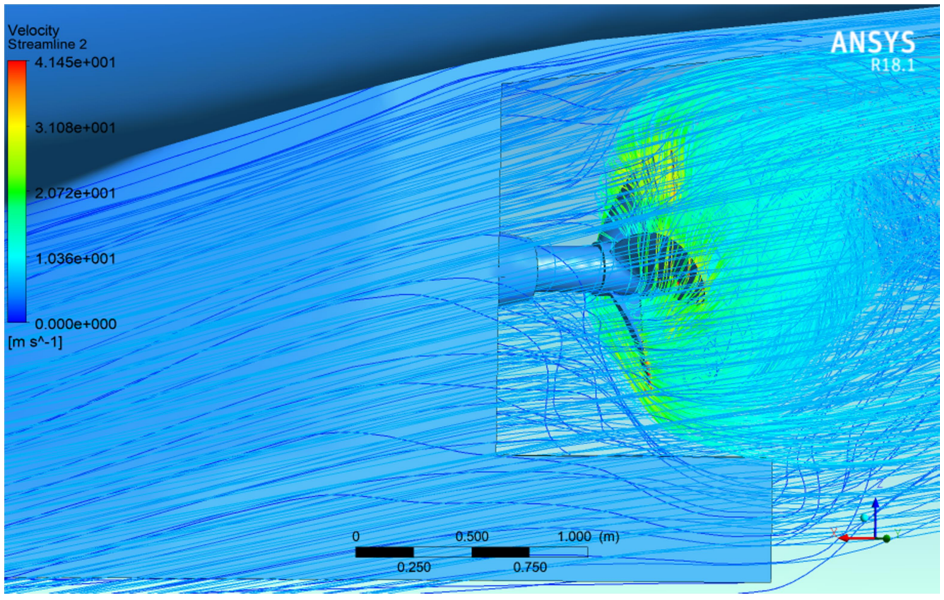
2. Konfigurasi 2 (0.53 M)



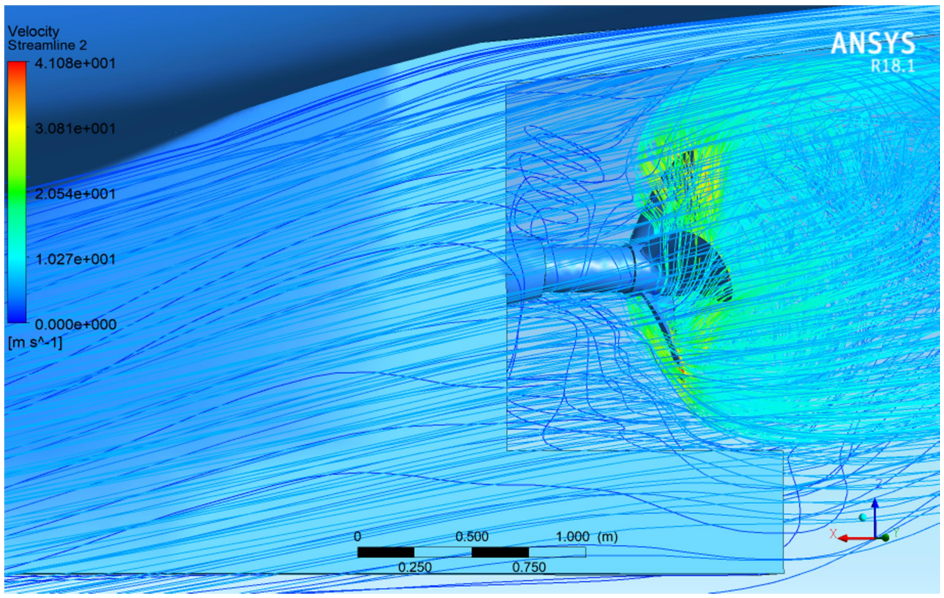
3. **Konfigurasi 3 (0.63 M)**



4. **Konfigurasi 4 (0.73 M)**



5. **Konfigurasi 5 (0.83 M)**



6. **Konfigurasi 6 (0.93 M)**