Results of Resistance Tests

Project Name : 13K PC
Ship Model ID : KS2048
Test Date : 17-APR-23
Test Option : Fin
Test Draught : Scantling
Scale Ratio : 19.200

Water Temperature = 14.50 Deg C
Standard Temp = 15.00 Deg C
Density (Fresh) = 999.18 kg/m3
Density (Sea) = 1026.02 kg/m3
Viscosity (Fresh) = 1.15376e-6 m2/s
Viscosity (Sea) = 1.18919e-6 m2/s

Ship Particulars

Length BP	=	122.00 m
Length WL	=	125.50 m
Draught at FP	=	8.55 m
Draught at AP	=	8.55 m
Breadth	=	21.00 m
Wetted Surface Area	=	4030.8 m2
Displacement Volume	=	17134.0 m3
Bilge Keel Area	=	40.80 m2
T.Proj Area abv WL	=	342.00 m2
Hull Roughnness(e6)	=	150. m
Ca*1000	=	0.1400
Cas*1000	=	0.0000
Cair*1000	=	0.0848

Vs (kts)	Vm (m/s)	Fn	Rnm (e-6)	Rtm (N)	Ctm (e+3)	Cfm (e+3)	Cr (e+3)	Trim (deg)
11.00	1.291	0.161	7.317	35.23	3.867	3.170	0.697	0.135
12.00	1.409	0.176	7.982	41.49	3.827	3.121	0.706	0.167
13.00	1.526	0.191	8.647	48.22	3.789	3.077	0.712	0.203
13.50	1.585	0.198	8.979	52.07	3.794	3.057	0.738	0.222
14.00	1.644	0.205	9.312	56.56	3.833	3.037	0.795	0.242
15.00	1.761	0.220	9.977	69.03	4.075	3.001	1.074	0.287

Vs (kts)	Rns (e-9)	Cfs (e+3)	Cts (e+3)	Rts (kN)	PE (kW)	PE (PS)	Sinkage FP (m)	Sinkage AP
11.00	0.597	1.633	2.573	170	964	1311	0.293	0.007
12.00	0.651	1.615	2.564	202	1247	1696	0.359	0.004
13.00	0.706	1.599	2.553	236	1579	2147	0.432	0.001
13.50	0.733	1.591	2.571	256	1781	2422	0.472	-0.000
14.00	0.760	1.584	2.621	281	2025	2753	0.514	-0.002
15.00	0.814	1.570	2.886	355	2742	3728	0.606	-0.005

Trim by bow is defined to be positive.

Results of Self Propulsion Tests

Project Name : 13K PC
Ship Model ID : KS2048
Propeller ID : KP2015
Test Date : 17-APR-23
Test Option : Fin
Test Draught : Scantling
Scale Ratio : 19.200

Ship Particulars

Length BP	=	122.00 m
Length WL	=	125.50 m
Draught at FP	=	8.55 m
Draught at AP	=	8.55 m
Breadth	=	21.00 m
Wetted Surface Area	=	4030.8 m2
Displacement Volume	=	17134.0 m3
Bilge Keel Area	=	40.80 m2
T.Proj Area abv WL	=	342.00 m2

	Temp (DegC)	Density (kg/m3)	Viscosity (m2/s)
Res	14.5	999.2	1.15376e-6
S-P	14.5	999.2	1.15376e-6
Sea	15.0	1026.0	1.18919e-6

Model-Ship Correlation

Prop Roughness = 30.e-6 m
Hull Roughness = 150.e-6 m

Propeller Particulars

Number of Propeller	=	1
Number of Blades	=	4
Propeller Diameter	=	4.80 m
Pitch/Dia at 0.7r	=	0.776
Chord Length at 0.7r	=	1.358 m
Blade thickness 0.7r	=	0.055 m
Rn(model) at 0.7r	=	6.03e+5
Expanded Area Ratio	=	0.500
Section Type	:	NACA66
Test Date	:	10-Nov-22

Ship Speed (kts)	Model Speed (m/s)	Rtm S-P (N)	SFC (N)	S-P Adv (J)	Rate Revs (rps)	Thrust (N)	Torque (N-m)	Model Propeller Open Water Character (J)	(10kt)	(100kq)
11.00	1.291	35.23	12.72	0.531	6.56	28.13	0.933	0.000	3.758	4.045
12.00	1.409	41.49	14.81	0.533	7.17	33.44	1.107	0.050	3.592	3.908
13.00	1.526	48.22	17.03	0.534	7.76	39.18	1.297	0.100	3.414	3.759
13.50	1.585	52.07	18.19	0.533	8.08	42.62	1.409	0.150	3.227	3.601
14.00	1.644	56.56	19.38	0.529	8.43	46.82	1.544	0.200	3.034	3.437
15.00	1.761	69.03	21.87	0.511	9.30	59.55	1.939	0.250	2.836	3.268
								0.300	2.635	3.094
								0.350	2.432	2.917
								0.400	2.228	2.737
								0.450	2.020	2.551
								0.500	1.810	2.358
								0.550	1.595	2.156
								0.600	1.373	1.943
								0.650	1.143	1.714
								0.700	0.901	1.465
								0.750	0.643	1.192
								0.800	0.365	0.888
								0.850	0.063	0.548
								0.860	0.000	0.476

Propulsion Performance of Full Scale Ship

Project Name : 13K PC
Ship Model ID : KS2048
Propeller ID : KP2015
Test Date : 17-APR-23
Test Option : Fin
Test Draught : Scantling
Scale Ratio : 19.200

Ship Particulars

Length BP	=	122.00 m
Length WL	=	125.50 m
Draught at FP	=	8.55 m
Draught at AP	=	8.55 m
Breadth	=	21.00 m
Wetted Surface Area	=	4030.8 m2
Displacement Volume	=	17134.0 m3
Bilge Keel Area	=	40.80 m2
T.Proj Area abv WL	=	342.00 m2

ITTC Standard Prediction

Ship Speed (kts)	Fn	PE (kW)	PD (kW)	S-P Adv (J)	Rate Revs (rpm)	Thrust (kN)	Torque (kN-m)	Model Wake (Wtm)	Ship Wake (Wts)
11.00	0.161	964	1314	0.542	92.92	213	135	0.326	0.288
12.00	0.176	1247	1701	0.543	101.40	253	160	0.322	0.287
13.00	0.191	1579	2155	0.543	109.77	297	187	0.321	0.288
13.50	0.198	1781	2436	0.541	114.23	323	204	0.321	0.288
14.00	0.205	2025	2782	0.537	119.12	354	223	0.322	0.289
15.00	0.220	2742	3842	0.520	131.29	449	279	0.325	0.292

Ship Speed (kts)	Thrust Deduct (Thdf)	Hull Effi (EtaH)	Relative Rotative Effi (EtaR)	Prop Effi (EtaO)	Behind Effi (EtaB)	Total Effi (EtaD)
11.00	0.200	1.124	1.004	0.650	0.653	0.734
12.00	0.202	1.119	1.007	0.651	0.655	0.733
13.00	0.204	1.117	1.008	0.651	0.656	0.733
13.50	0.205	1.117	1.008	0.650	0.655	0.731
14.00	0.206	1.117	1.008	0.646	0.652	0.728
15.00	0.208	1.118	1.008	0.633	0.638	0.714

Full Scale Propeller Open Water Character (J)	(10Kt)	(100Kq)
0.000	3.761	4.017
0.050	3.595	3.880
0.100	3.417	3.731
0.150	3.230	3.574
0.200	3.037	3.410
0.250	2.839	3.241
0.300	2.638	3.067
0.350	2.435	2.890
0.400	2.231	2.710
0.450	2.023	2.524
0.500	1.813	2.331
0.550	1.598	2.129
0.600	1.375	1.916
0.650	1.145	1.687
0.700	0.903	1.438
0.750	0.645	1.166
0.800	0.367	0.862
0.850	0.065	0.522
0.860	0.002	0.450

Prediction of Powering Performance

Project Name	: 13K PC	Ship Particulars	
Ship Model ID	: KS2048		
Propeller ID	: KP2015	Length BP	= 122.00 m
Test Date	: 17-APR-23	Length WL	= 125.50 m
Test Option	: Fin	Draught at FP	= 8.55 m
Test Draught	: Scantling	Draught at AP	= 8.55 m
Scale Ratio	: 19.200	Breadth	= 21.00 m
		Wetted Surface Area	= 4030.8 m2
		Displacement Volume	= 17134.0 m3
		Bilge Keel Area	= 40.80 m2
		T.Proj Area abv WL	= 342.00 m2

Ship Trial Prediction with
Ca*1000 = 0.1400, EtaT =0.970

Ship Speed (kts)	Brake Horsepower (kW)	Brake Horsepower (PS)	Rate of Revs. (rps)	Rate of Revs. (rpm)
11.00	1355	1842	1.549	92.92
12.00	1753	2384	1.690	101.40
13.00	2222	3020	1.829	109.77
13.50	2511	3415	1.904	114.23
14.00	2869	3900	1.985	119.12
15.00	3961	5386	2.188	131.29

[Trials] Vs = 14.13 kts, Ns = 120.5 rpm at Pb = 2970 kW

[Service] Vs = 13.61 kts with Sea Margin = 15.0 %

[Notes]
- For the explanation of abbreviations, see the list of symbols.
- Analysis method : Based on 1978 ITTC performance prediction method
- Frictional resistance determinced according to the ITTC-1957 formula.
- Reynolds and Froude number based on Lwl=125.50.
- A model-ship correlation allowance(2-D), Ca=0.00014.
- w/o CP-CN correction.
- A resistance of above water part through the air, Cair=.0000848.
- The results are valid for unrestricted deep water of 15.0 deg C and a mass density of 1026.0 kg/m3, clean surfaces of hull and propeller blades and no effects of wind and waves.