

Circular Motion Test (CMT) and PMM Test Program for KVLCC1 and KVLCC2 in deep water at NMRI]

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Hull, Propeller and Rudder Geometry: In agreement with the definitions

(stimulator: Studs at S.S. 9 1/2 and bulb, 2.5 mm height and 10.0 mm pitch)

Model Length: 2.9091 m (L_{pp}) (Scale Ratio: 1 / 110.0=2.9091/320.0)

Towing Speed: 0.760(m/s) (15.5kt for the full-scale ship)

Propeller Revolution: model-scale propulsion point at towing speed, 0.760m/s)

Center of captive motion: Horizontal: midship of center line of model

Heave, Pitch, Roll: Free

Water Depth: 1.20 m (Draft/Depth Ratio: 1 / 6.35)

Data Correction:

Effects of mass in the measuring system (0.434kg for surge direction and 0.764kg for sway direction) affecting on the measured forces are subtracted corresponding to the centrifugal acceleration.

Measured Item:

Towing speed, Oblique angle, Yaw rate,
Surge force, Sway force, Yaw moment (measured at midship),
Rudder angle, Rudder normal force,
Propeller revolution, Propeller thrust

Test Conditions:

for each ship model

(1) Resistance & Self Propulsion Test

HPR condition	Towing Speed: U (m/s)	Prop. Revolution: n (rps)	Yaw Rate: $r' = r(L/U)$ (non-dim.)	Drift Angle: β (degree)	Rudder Angle: δ (degree)
HR	0.600	N/A	0.0	0	0
	0.700				
	0.760				
	0.800				
HPR	0.600	MSPP	0.0	0	0
	0.700				
	0.760				
	0.800				

(2) Rudder Angle Test

HPR condition	Towing Speed: U (m/s)	Prop. Revolution: n (rps)	Yaw Rate: $r' = r(L/U)$ (non-dim.)	Drift Angle: β (degree)	Rudder Angle: δ (degree)
HR	0.760	N/A	0.0	0	-20, -15, -10, -5, 0, 5, 10, 15, 20
HPR	0.760	Under Load	0.0	0	-20, -15, -10, -5, 0, 5, 10, 15, 20
		MSPP			-35, -30, -25, -20, -15, -10, -5, 0, 5, 10, 15, 20, 25, 30
		Over Load			-20, -15, -10, -5, 0, 5, 10, 15, 20

(3) Circular Motion Test

HPR condition	Towing Speed: U (m/s)	Prop. Revolution: n (rps)	Yaw Rate: $r' = r(L/U)$ (non-dim.)	Drift Angle: β (degree)	Rudder Angle: δ (degree)
H	0.760	N/A	0.0	-16, -8, -4, 0, 4, 8, 16	0
			-0.8, -0.4, 0.4, 0.8	0	0
HR	0.760	N/A	0.0	-16, -8, -4, 0, 4, 8, 16	0
			-0.8, -0.4, 0.4, 0.8	0	0
HPR	0.760	MSPP	-0.8	0	0, 12
				-12, 8	0
			-0.6	0	-30, -20, -10, 0, 10, 20
				-12, 12	0
			-0.4	0	-8, 0
			-0.2	0	-4, 0
				-12, 12	0
			-0.1	0	-4, 0
			0	-20	-10, 0
				-16	-25, -15, -8, 0, 8, 15, 25
				-12	-8, 0
				-8	-20, -10, -5, 0, 10, 20
				-4	-4, 0
				-6, -2, 0, 2, 6	0
				4	0, 4
				8	-20, -15, -10, 0, 5, 10, 20
12	0, 8				
16	-20, -15, -10, 0, 5, 10, 20				
20	0, 10				
0.1	0	0, 4			

			0.2	0	0, 4
				-12, 0, 2, 4, 6, 8, 12, 16,	0
			0.4	0	0, 6
			0.6	0	-20, -10, 0, 8, 15, 25
				-12, 2, 4, 6, 8, 12, 16	0
			0.8	0	0, 12
-12, 2, 4, 6, 8, 12, 16	0				

(4) PMM Test

HPR condition	Towing Speed: U (m/s)	Prop. Revolution: n (rps)	Mode	Period: T (sec)	Oblique Amplitude: β_a (degree)	Yaw Rate Amplitude $r_a = r_a(L/U)$	Rudder Angle: δ (degree)
H	0.760	N/A	Pure Sway	12.0	8	0.0	0
				6.0	8	0.0	0
			Pure Yaw	12.0	0	0.4	0
				6.0	0	0.4	0
			Combined	12.0	8	0.2797	0
				6.0	4	0.2797	0
HR	0.760	N/A	Pure Sway	12.0	8	0.0	0
				6.0	8	0.0	0
			Pure Yaw	12.0	0	0.4	0
				6.0	0	0.4	0
			Combined	12.0	8	0.2797	0
				6.0	4	0.2797	0
HPR	0.760	MSPP	Pure Sway	12.0	8	0.0	0
				6.0	8	0.0	0
			Pure Yaw	12.0	0	0.4	0
				6.0	0	0.4	0
			Combined	12.0	8	0.2797	0
				6.0	4	0.2797	0