KRISO Container Ship (KCS)

Program for appended hull PMM tests in deep water at CEHIPAR

PMM tests shall be conducted in deep water (i.e. h/T > 5) with an appended model i.e. equipped with stock propeller and rudder. The model shall be free in heave and pitch. Tests shall include static heel tests i.e. 4 DOF.

The used model is the one built at SVA with a size of **L_{pp} = 4.37 m**, i.e. a scale of **1:52.67**.

Approach speed is **Fn = 0.26** corresponding to full scale speed of **24.0 kn** (U_0). The nominal rate of revolutions at this speed is **X rpm** (N_0).

The scope of the tests shall cover the parameters given in Table 1 in the stated combinations. Values highlighted in grey are base cases that will be used for comparison with CFD.

Table 1: Scope of appended hull PMM tests in deep water, KCS

	Speed U/U_0 (non-dim.)	Prop. Revs. (non-dim.)	Rudder Angle δ (deg)	Drift Angle β (deg)	Heel Angle ϕ (deg)	Sway Vel. v' (non-dim)	Yaw Vel. r' (non-dim)
STATIC TESTS							
static rudder	1.00	1.00	± 0, 10, 20, 30, 35	0	0	-	-
	0.775	(*)	± 0, 10, 20, 30, 35	0	0	-	-
	0.60	(*)	± 0, 10, 20, 30, 35	0	0	-	-
	0.35	(*)	± 0, 10, 20, 30, 35	0	0	-	-
static drift	1.00	1.00	0	±0, 0.5, 1, 2, 4, 8	0	-	-
	0.775	(*)	0	± 0, 4, 8, 12	0	-	-
	0.60	(*)	0	± 0, 4, 8, 12, 16	0	-	-
	0.35	(*)	0	± 0, 4, 8, 12, 16, 20	0	-	-
drift & rudder	0.775	(*)	± 0, 10, 20, 30, 35	± 4	0	-	-
	0.60	(*)	± 0, 10, 20, 30, 35	± 12	0	-	-
	0.35	(*)	± 0, 10, 20, 30, 35	± 20	0	-	-
static heel	1.00	1.00	0	0	4	-	-
	0.775	(*)	0	0	8		
	0.60	(*)	0	0	12	-	-
heel & drift	0.775	(*)	0	-4, -8, -12	4	-	-
	0.775	(*)	0	4, 8, 12	-4		
	0.60	(*)	0	-8,-12,-16	8	-	-

Table 1: Scope of appended hull PMM tests in deep water, KCS (cont.)

DYNAMIC TESTS							
pure sway	1.00	1.00	-	-	-	0.035	-
	0.775	(*)	-	-	-	0.07, 0.14, 0.21	-
pure yaw	1.00	1.00	-	-	-	-	0.05, 0.10, 0.15, 0.20
	0.775	(*)	-	-	-	-	0.40
	0.60	(*)	-	-	-	-	0.60
	0.35	(*)	-	-	-	-	0.80
yaw & drift	0.775	(*)	-	± 8	-	-	0.40
	0.60	(*)	-	± 12	-	-	0.60
	0.35	(*)	-	± 20	-	-	0.80
yaw & rudder	0.775	(*)	± 10	-	-	-	0.40
	0.60	(*)	± 20	-	-	-	0.60
	0.35	(*)	± 30	-	-	-	0.80

(*) Note about propeller revolutions

To allow direct comparison of the results with the results from the CFD calculations (at model scale) two conditions should be fulfilled:

1) The rate of revolutions should be adjusted to the model scale self-propulsion point.
2) At speed fractions below the nominal approach speed, corresponding to a certain point in the manoeuvre (e.g. a turning circle), the rate of revolutions shall be reduced to maintain the correct loading on the propeller. This reduction should follow a constant torque strategy for a fixed pitch propeller. Initial speed tests (at zero rudder and drift angles) shall be conducted to determine these rates of revolutions.