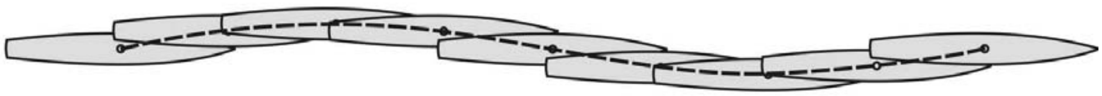
Test case 3a.6: Pure sway



Conditions

- Captive pure sway motion in still water
- Fixed (heave=5.855mm & pitch=-0.136°)
- Without rudders
- With bilge keels

Pre scribed PMM motions:

- Sway motion: $\eta_{PMM} = -2S_{mm} \sin\left(\frac{2\pi N}{60}t\right)$
- Sway velocity: $v_{PMM} = -2\left(\frac{2\pi N}{60}\right)S_{mm} \cos\left(\frac{2\pi N}{60}t\right)$
- Sway acceleration: $\dot{v}_{PMM} = 2\left(\frac{2\pi N}{60}\right)^2 S_{mm} \sin\left(\frac{2\pi N}{60}t\right)$
- Heading angle: $\psi = 0$
- Yaw rate: $r = 0$
- Yaw acceleration: $\dot{r} = 0$

F_n [-]	R_n [-]	U_C [m/s]	N [rpm]	S_{mm} [m]	$\beta^*_{\max}$ [deg]	$v'_{\max}$ [-]
0.280	4.643×10^6	**1.531**	**8.0210**	**0.1584**	10.0	0.174

$\beta^*_{\max}$: corresponding maximum drift angle

Items and Remarks

Figure Number	Items	Remarks
Fig. 3a.6-1	Axial velocity contours and cross flow vectors (x/L_{PP}=0.135)	4 PMM phases; 0°, 45°, 90°, 135° To be compared with experiment results pdf
Fig. 3a.6-2	Transverse velocity contours (x/L_{PP}=0.135)	
Fig. 3a.6-3	Vertical velocity contours (x/L_{PP}=0.135)	
Fig. 3a.6-4	Turbulent kinetic energe contours (x/L_{PP}=0.135)	
Fig. 3a.6-5	Axial vorticity contours (x/L_{PP}=0.135)	
Fig. 3a.6-6	Axial velocity contours and cross flow vectors (x/L_{PP}=0.935)	4 PMM phases; 0°, 45°, 90°, 135° To be compared with experiment results pdf
Fig. 3a.6-7	Transverse velocity contours (x/L_{PP}=0.935)	
Fig. 3a.6-8	Vertical velocity contours (x/L_{PP}=0.935)	
Fig. 3a.6-9	Turbulent kinetic energe contours (x/L_{PP}=0.935)	
Fig. 3a.6-10	Axial vorticity contours (x/L_{PP}=0.935)	

- Coordinate system for comparision is ship-fixed at FP on the undisturbed waterplane (x positive downstream, y positive starboard side, z positive upward).
- $F_n = \dfrac{U_C}{\sqrt{gL_{PP}}}$, $R_n = \dfrac{U_C \cdot L_{PP}}{\nu}$

  where, U_C is towing carriage speed, g is the gravitational acceleration and ν is the kinematic viscosity of water.
- All quantities are non-dimensionalized with water density (ρ), carriage speed (U_C),and the length between perpendiculars (L_{pp}).

$$U = \frac{\overline{U}}{U_C},\ V = \frac{\overline{V}}{U_C},\ W = \frac{\overline{W}}{U_C},\ k = \frac{1}{2}(uu + vv + ww)$$

where, $uu = \dfrac{\overline{uu}}{U_C^2}$, $vv = \dfrac{\overline{vv}}{U_C^2}$, $ww = \dfrac{\overline{ww}}{U_C^2}$