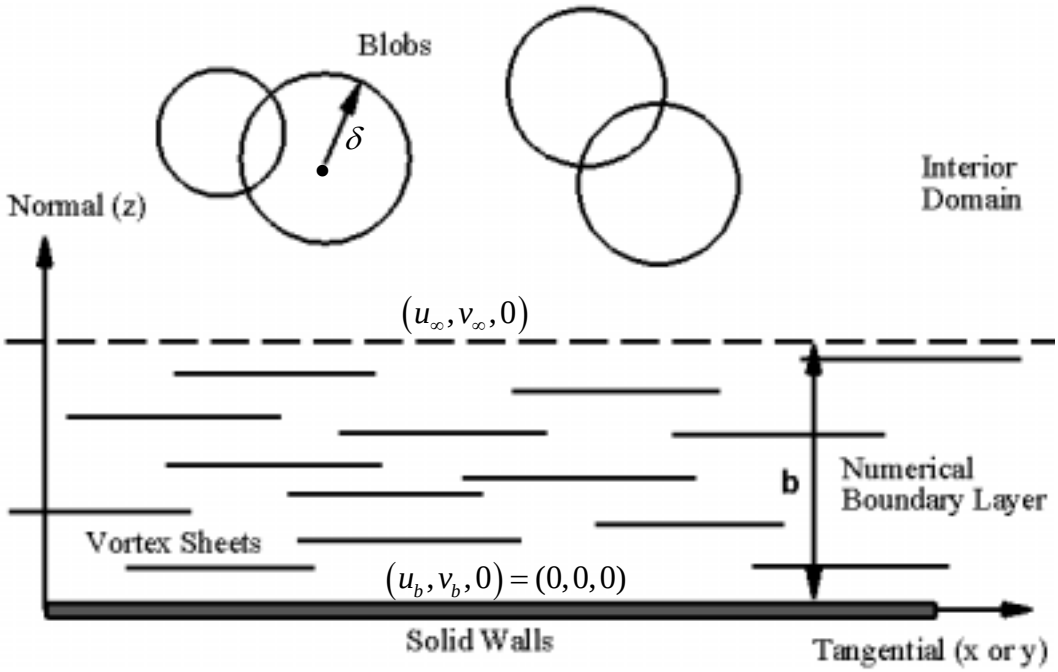


Fig. 1. Side View of a Wall Section. (x, y, z) : local coordinate system.

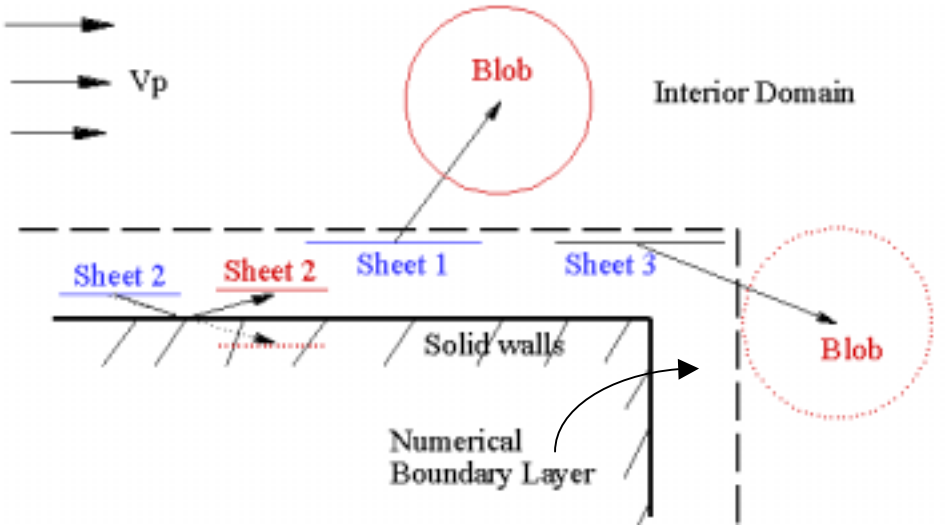


Fig. 2. The Evolution of Sheets. Blue: t , Red: $t + \Delta t$.

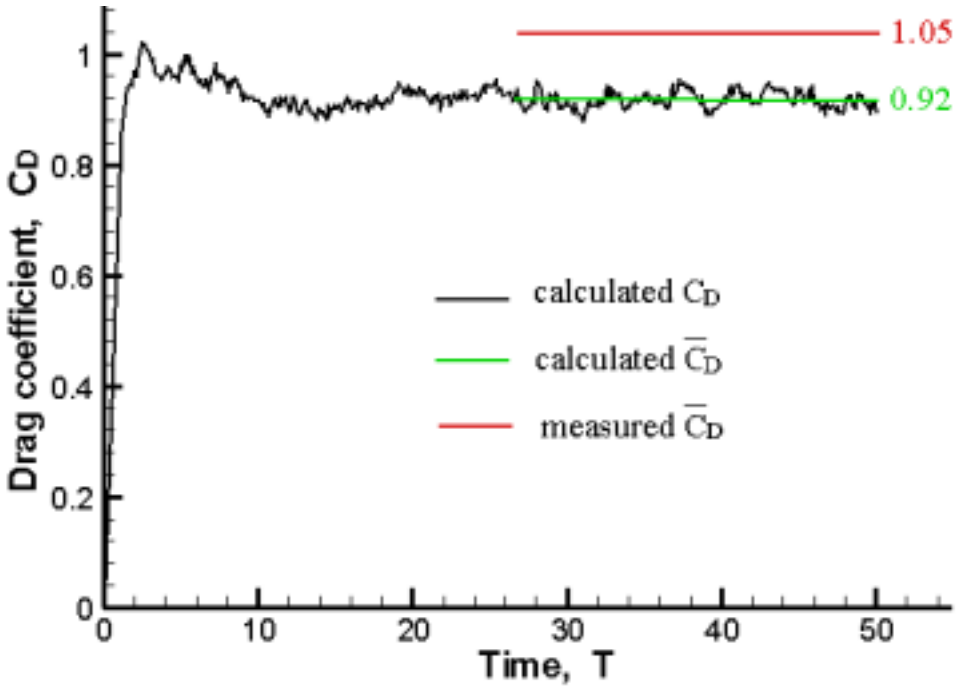


Fig. 3. Time histories of the drag coefficient of the cube. $\mathrm{Re} = 10^5$, $\Delta T = 0.05$.

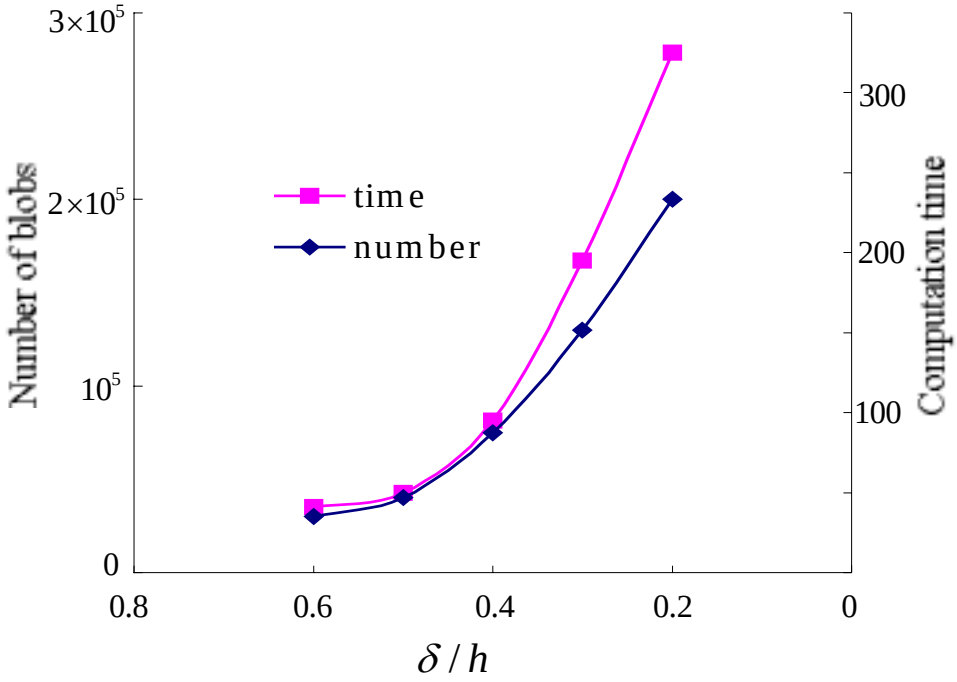


Fig. 4. Number of blobs and computation time versus core radius. Flow over a cube under conditions of $\mathrm{Re} = 10^5$, $\Delta T = 0.05$.

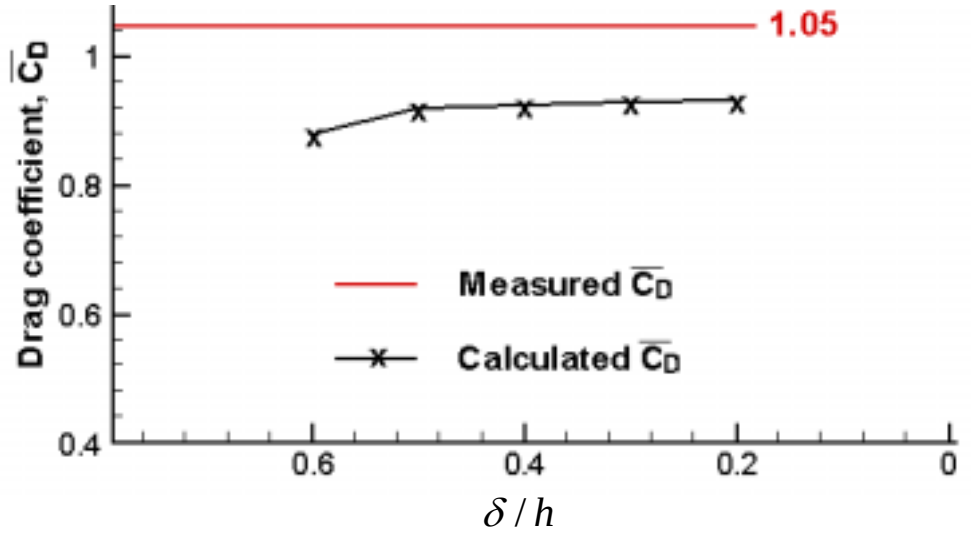


Fig. 5. Drag coefficient versus core radius. Flow over a cube under conditions of $\mathrm{Re} = 10^5$, $\Delta T = 0.05$.

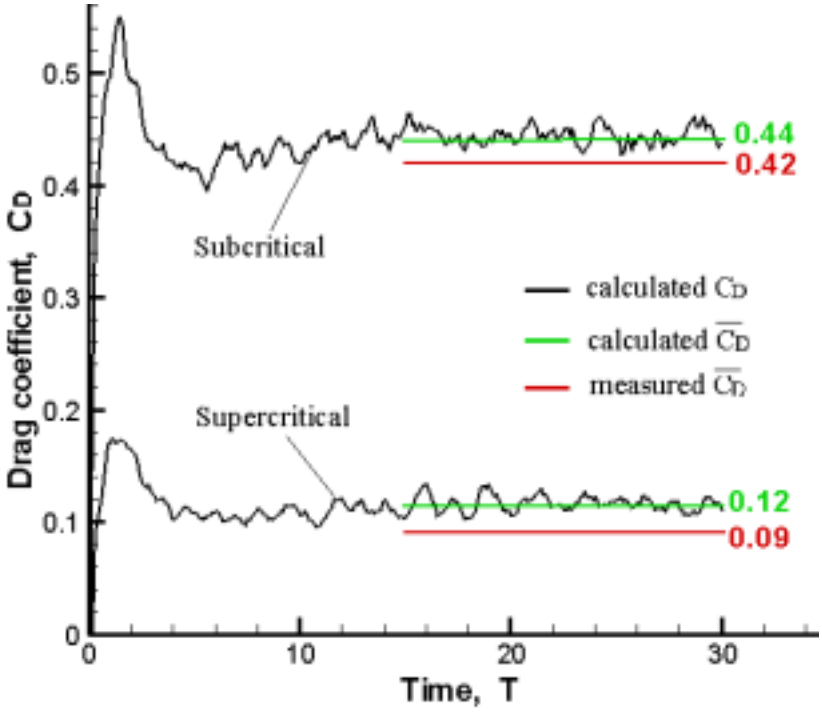


Fig. 6. Time histories of the drag coefficients of a sphere. $\Delta T = 0.01$.

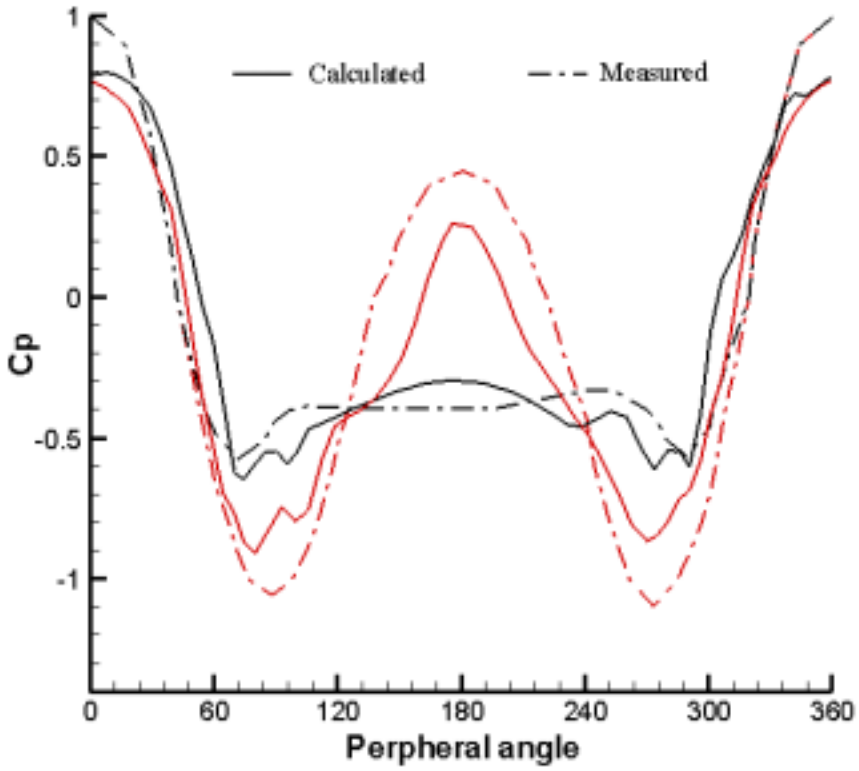


Fig. 7. Pressure distribution on a sphere surface. $\Delta T = 0.01$, Black: subcritical, Red: supercritical

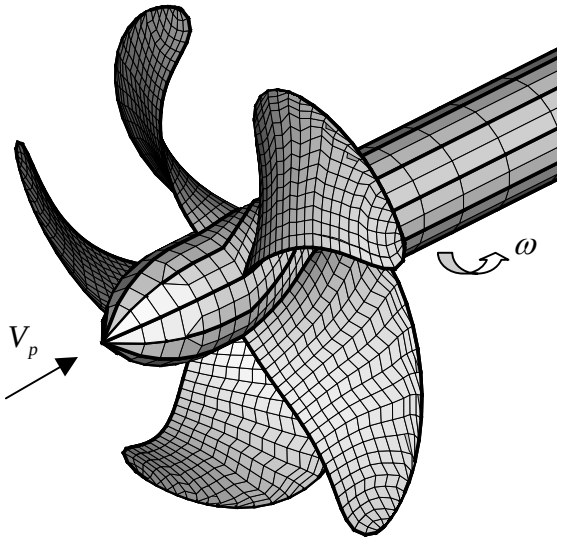


Fig. 8. Schematic of Test Propeller

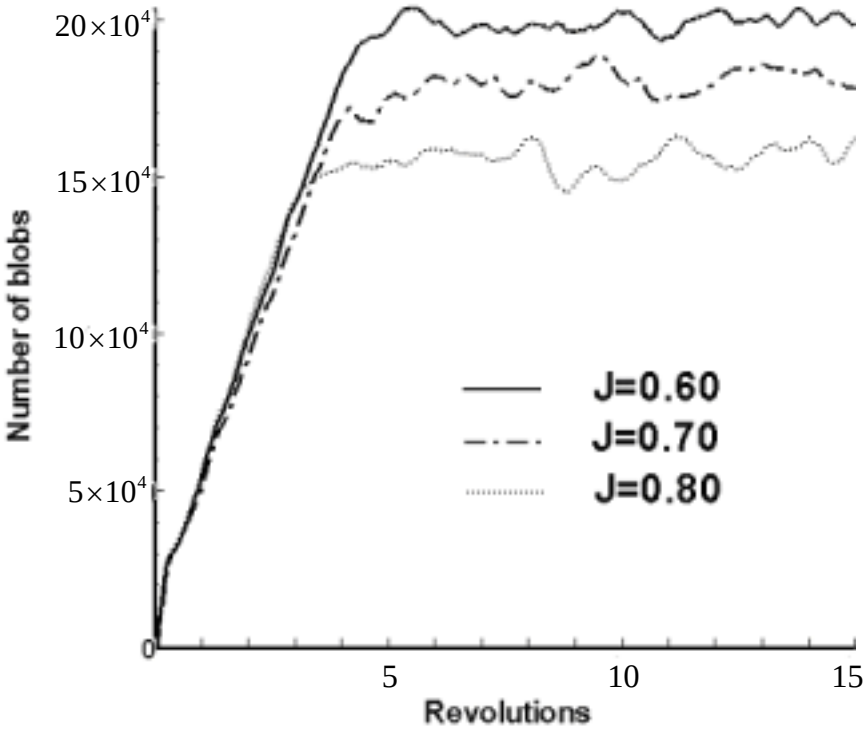


Fig. 9. Time histories of total number of vortex blobs for flow over a propeller

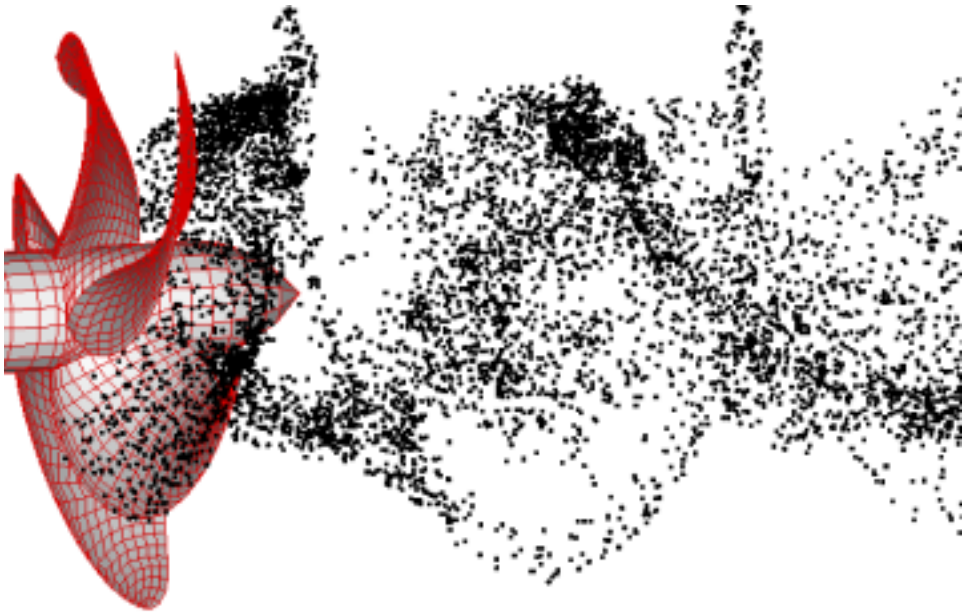


Fig. 10. Instantaneous distribution of vortex blobs. $J = 0.75$, $T = 12$

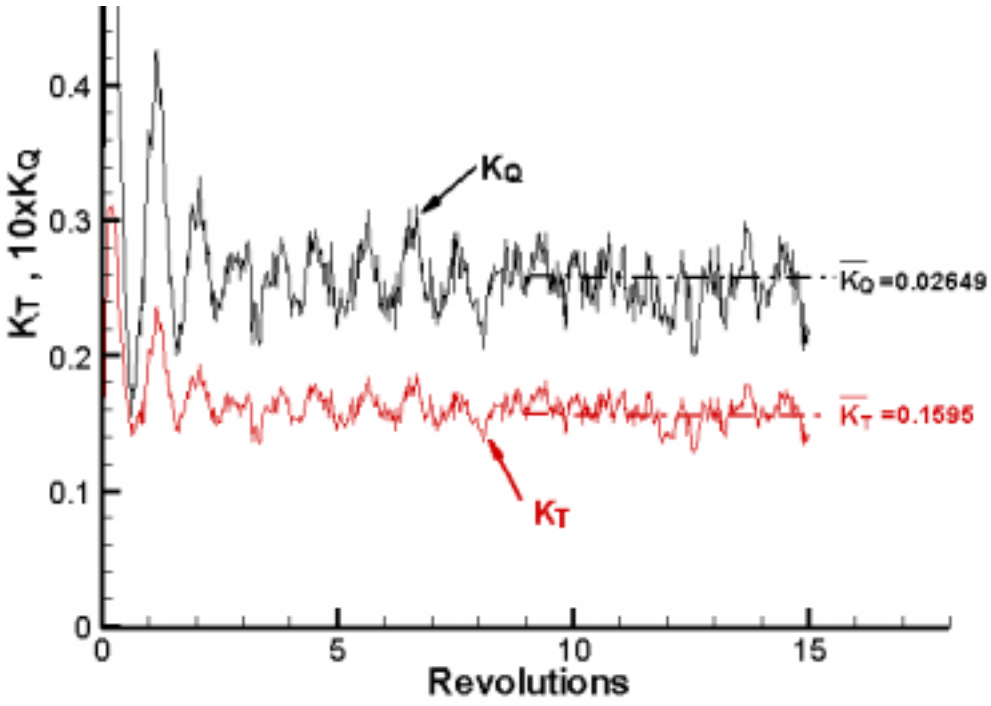


Fig.11. Time histories of thrust and torque coefficient. $J = 0.75$

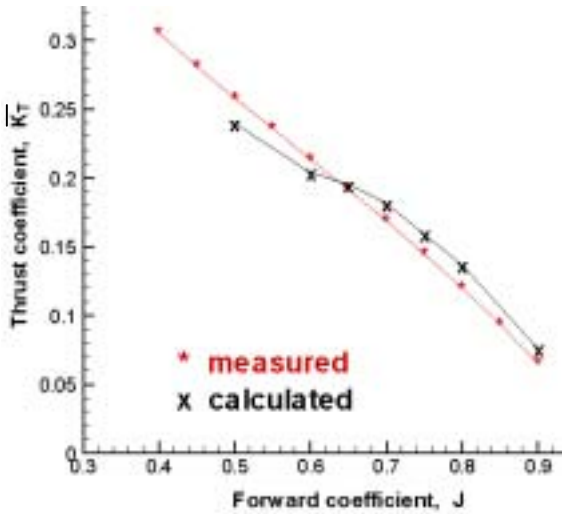


Fig. 12. Thrust coefficient

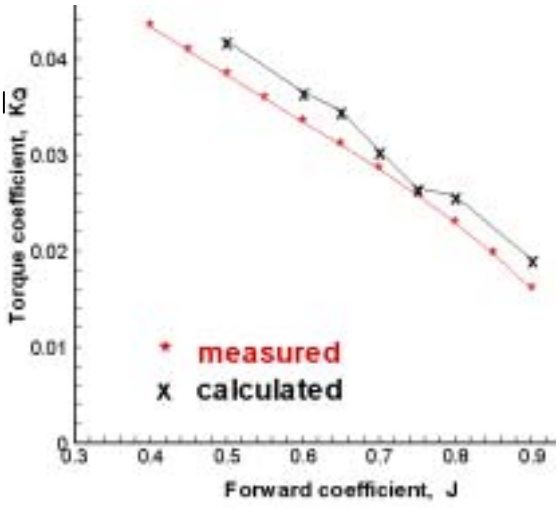


Fig. 13. Torque coefficient

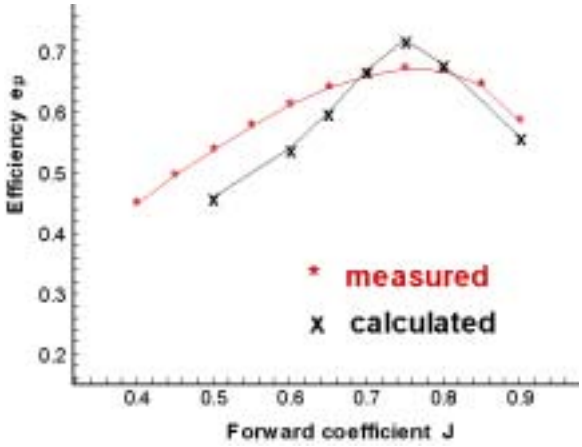
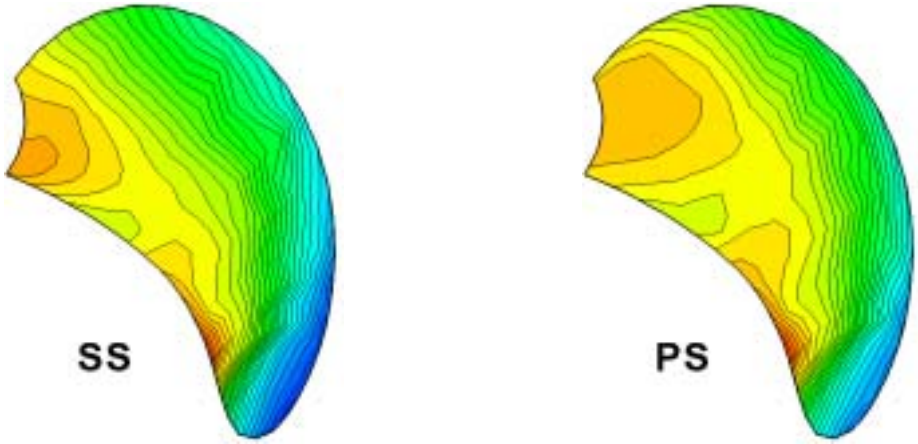
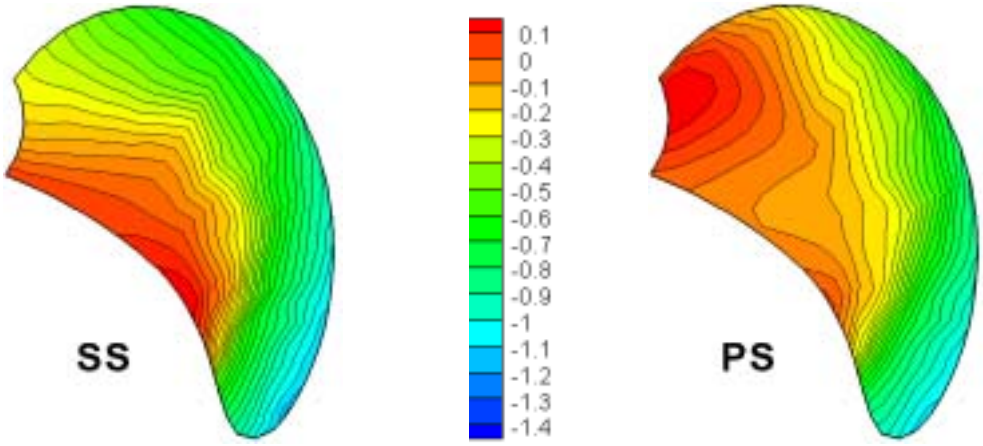


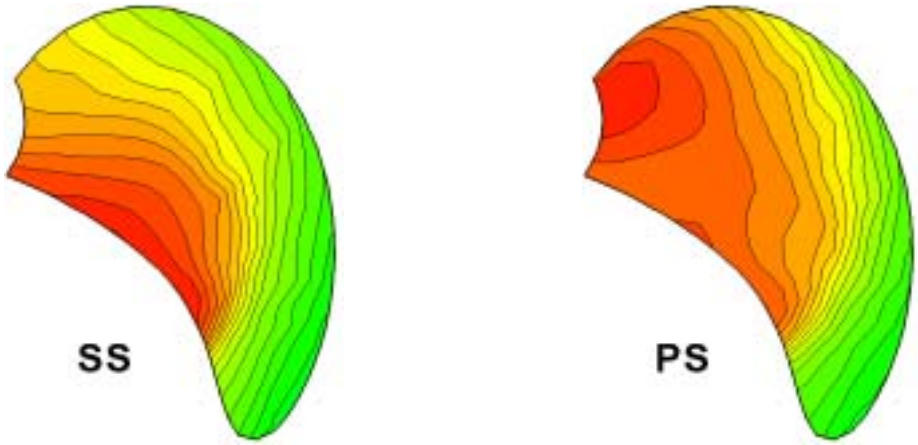
Fig. 14. Efficiency



(a) J=0.60



(b) J=0.70



(c) J=0.80

Fig. 15. Time-averaged pressure distribution ($\overline{C_p}$) on the propeller surface

Table 1 Test Propeller Geometry

Parameters	Symbols	Values
Hub diameter	D_1	50 mm
Tip diameter	D_2	250 mm
Number of blades	Z	5
Rotational speed	n	12 s^{-1}

Table 2 Measured and Calculated Results

Parameters		Values						
Forward coefficient (J)		0.50	0.60	0.65	0.70	0.75	0.80	0.90
Thrust coefficient (K_T)	Measured	0.2581	0.2136	0.1914	0.1686	0.1450	0.1202	0.0654
	Calculated	0.2394	0.2041	0.1950	0.1815	0.1595	0.1365	0.0761
	Error (%)	7.25	4.46	1.88	7.65	10.00	13.56	16.27
Torque coefficient (K_Q)	Measured	0.03827	0.03341	0.03097	0.02846	0.02579	0.02290	0.01604
	Calculated	0.04189	0.03651	0.03450	0.03037	0.02649	0.02565	0.01913
	Error (%)	9.46	9.28	11.40	6.71	5.04	12.01	19.26
Efficiency (e_p)	Measured	0.54	0.61	0.64	0.66	0.67	0.67	0.58
	Calculated	0.46	0.54	0.60	0.67	0.72	0.68	0.56
	Error (%)	15.72	11.58	6.25	1.51	7.46	1.49	3.45