

Body-of-revolution Geometry

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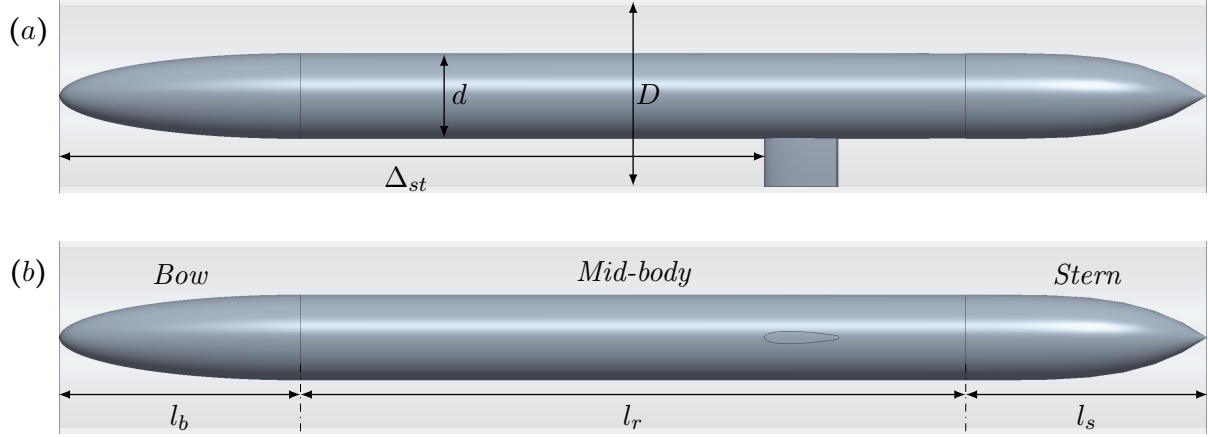


Figure 1: Geometry of the body of revolution and the sting in (a) side view and (b) bottom view. The sting configuration is for when PIV measurements were in the **bow** section. Flow is from left to right. Dimensions are given in table ??.

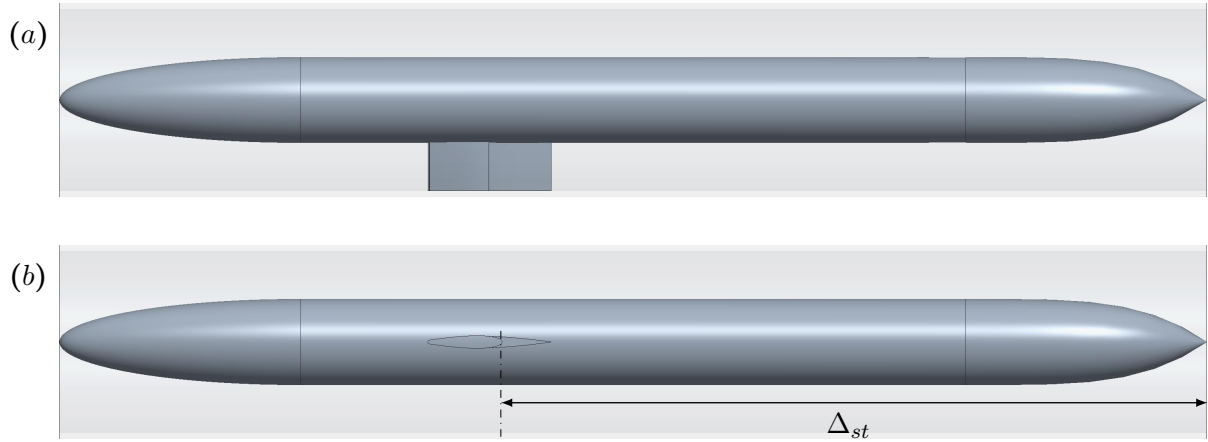


Figure 2: Geometry of the body of revolution and the sting in (a) side view and (b) bottom view. The sting configuration is for when PIV measurements were in the **stern** section and the **wake**. The same sting as that shown in figure ?? is reversed in this case, and a teardrop fitting is attached to the downstream side to prevent separation. Flow is from left to right. Note that the distance between the downstream edge of the sting (without the fitting) and the trailing point of the stern is Δ_{st} , the same distance as that shown in figure ?? between the leading point of the bow and the leading edge of the sting.

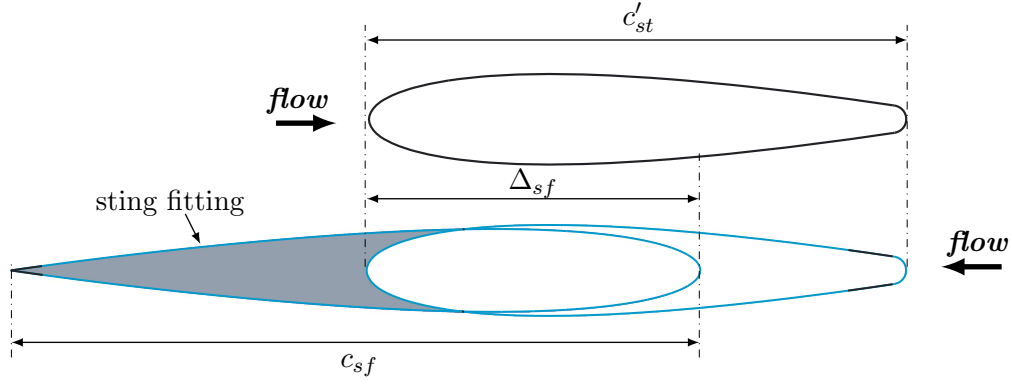


Figure 3: Sting configurations for measurements in the bow section (top) and in the stern section and the wake (bottom). Dimensions and profiles are given in table ??.

Description	Notation	Value
pipe diameter	D	38.1 mm (1.5") in the experiment
area blockage ratio	γ	1/9, 2/9, 3/9
body diameter	d	$\sqrt{\gamma}D$
bow length	l_b	$\frac{4}{3}D$
mid-body/recovery length	l_r	$\frac{11}{3}D$
stern length	l_s	$\frac{4}{3}D$
sting leading edge location	Δ_{st}	$4.01D$ (relative to the bow tip)
sting chord (without rounded trailing edge)	c_{st}	$0.462D$
sting chord (with rounded trailing edge)	c'_{st}	$0.411D$
sting trailing edge radius of curvature	r_{te}	$0.01D$
sting fitting chord	c_{sf}	$0.525D$
sting fitting location (see figure ??)	Δ_{sf}	$0.254D$
Profile equations		
bow (spheroid)	$\frac{x^2}{l_b^2} + \frac{r^2}{(d/2)^2} = 1, x \in [-l_b, 0]$	
stern (power function)	$r = \pm \frac{d}{2} \left(1 - \frac{x^4}{l_s^4}\right), x \in [0, l_s]$	
sting	NACA0015 (zero-thickness trailing edge)	
sting fitting	NACA0012 (zero-thickness trailing edge)	

Table 1: Dimensions and body profiles.