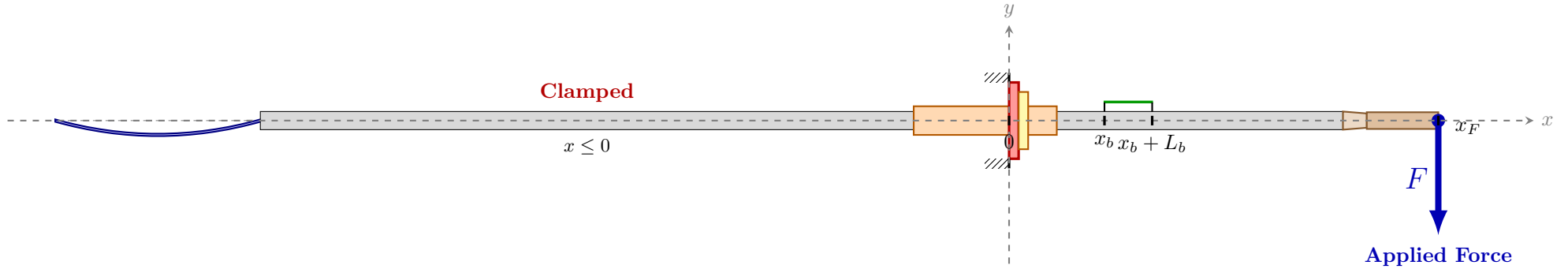


Theory 1: Boundary Conditions

Force at Handle, Clamped at Oarlock



Boundary Conditions - Theory 1

Description

A vertical force F is applied at the handle end ($x = x_F = 900$ mm). The oar is clamped at the oarlock position for all $x \leq 0$.

Mathematical Formulation

Location	Condition	Description
$x = x_F$	$V(x_F) = -F$	Applied force (shear force)
$x = x_F$	$M(x_F) = 0$	Free end (no moment)
$x = 0$	$w(0) = 0$	No vertical displacement
$x = 0$	$\theta(0) = 0$	No rotation (clamped)
$x \leq 0$	Fixed	Clamped region

where:

- F = applied vertical force at handle [N]
- $V(x)$ = shear force at position x [N]
- $M(x)$ = bending moment at position x [N·mm]
- $w(x)$ = vertical deflection at position x [mm]
- $\theta(x)$ = rotation angle at position x [rad]
- $x_F = 900$ mm = handle position

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