

An electrically-driven propulsor unit is operating inside a constant-area wind tunnel of cross-sectional area A as shown. The upstream velocity and pressure are some known V_1 , p_1 . The propulsor unit has a known thrust T . The density ρ can be assumed to be constant everywhere (low speed flow). Assume the channel walls are effectively frictionless, with $\tau = 0$.

- a) The exit station 2 is sufficiently far behind the propulsor so that the propulsor's high-velocity slipstream jet can mix out, making the exit velocity V_2 effectively uniform. Determine this V_2 .
- b) Determine the pressure difference $p_2 - p_1$, and also the total pressure difference $p_{o2} - p_{o1}$. Hint: First identify the overall resultant force vector \vec{R} .

