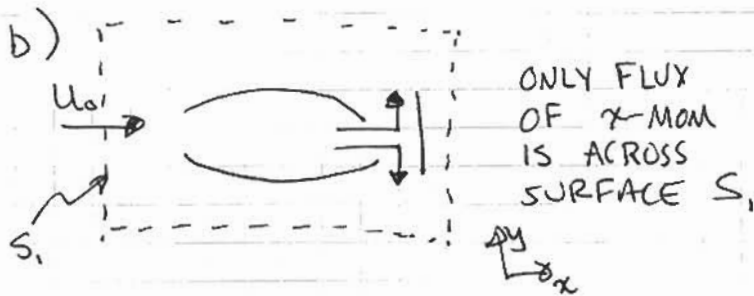


a) $T = \dot{m}(u_e - u_o) = 150(200 - 60) = \boxed{21 \text{ kN}}$



$T = \dot{m}(0 - u_o)$
 $= 150(-60) = \boxed{9 \text{ kN}}$

c) WHEN AIRPLANE COMES TO REST, THERE IS NO NET FORCE IN THE X-DIR. YOU CAN SEE THIS BY DRAWING THE CONTROL VOLUME LARGE RELATIVE TO THE ENGINE

$T = 0 \text{ kN}$



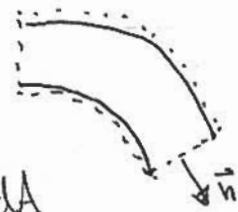
d) INTEGRAL MOMENTUM THEOREM IN FRAME ATTACHED TO VEHICLE:

$$\sum_i F_y - \frac{d}{dt} \int_V \rho u_y dV = \int_{S'} \rho u_y (\vec{u} \cdot \vec{n}) dA$$

assume no accel. of coord. frame

assume steady

$$\sum_i F_y = \int_{\text{inlet}} \rho u_y (\vec{u} \cdot \vec{n}) dA + \int_{\text{exit}} \rho u_y (\vec{u} \cdot \vec{n}) dA$$



$$= \rho (U_e \sin \alpha) \cdot U_e \cdot A_e$$

$F_y = -\rho A_e U_e^2 \sin \alpha$