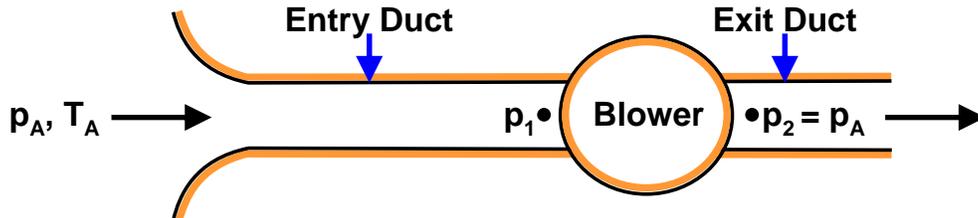


Problem 303A

An air blower takes air ($R = 280 \text{ m}^2/\text{s}^2 \text{ K}^\circ$, $\gamma = 1.4$) from the atmosphere (pressure, $p_A = 100,000 \text{ kg/m s}^2$, temperature, $T_A = 293^\circ \text{K}$) and ingests it through a smooth entry duct so that the losses are negligible. The cross-sectional area of the entry duct just upstream of the blower and that of the exit duct are both 0.01 m^2 .



The pressure ratio, p_2/p_1 , across the blower itself is 1.05 and the exit pressure is equal to the atmospheric pressure, p_A . The air is assumed to behave isentropically upstream of the blower. Find

1. The velocity of the air entering the blower (u_1).
2. The mass flow rate of air through the system.