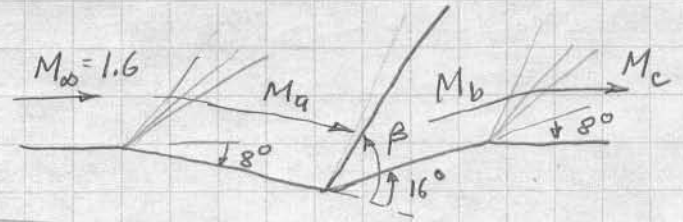


a) First corner has expansion fan.



$$M_1 = M_0 = 1.6, \quad \gamma_1 = 14.86^\circ$$

$$\gamma_2 = \gamma_1 + \theta = 14.86^\circ + 8^\circ = 22.86^\circ \rightarrow M_2 = M_a = 1.87$$

$$P_{01} = P_{00} = P_\infty \left[1 + \frac{\gamma-1}{2} M_0^2 \right]^{\frac{\gamma}{\gamma-1}} = 4.25, \quad P_{0a} = P_{01} = 4.25 \quad (\text{fan is isentropic})$$

$$P_a = P_{0a} \left[1 + \frac{\gamma-1}{2} M_a^2 \right]^{-\frac{\gamma}{\gamma-1}} = 0.664$$

b) Oblique shock, with $M_1 = M_a = 1.87$, $\theta = 16^\circ$, $\rightarrow \beta = 50.5^\circ$

$$M_{1n} = M_1 \sin \beta = 1.87 \cdot \sin(50.5^\circ) = 1.44$$

$$\text{From shock table, for } M_{1n} = 1.44 \rightarrow M_{2n} = 0.7235, \quad \frac{P_2}{P_1} = 2.253, \quad \frac{P_{02}}{P_{01}} = 0.9476$$

$$M_2 = M_b = \frac{M_{2n}}{\sin(\beta - \theta)} = \frac{0.7235}{\sin(50.5^\circ - 16^\circ)} = 1.2774$$

$$P_2 = P_b = P_a \cdot \left(\frac{P_2}{P_1} \right) = 0.664 \cdot 2.253 = 1.496$$

$$P_{02} = P_{0b} = P_{0a} \cdot \left(\frac{P_{02}}{P_{01}} \right) = 4.25 \cdot 0.9476 = 4.027$$

c) Expansion fan, with $M_1 = M_b = 1.2774$, $\theta = 8^\circ$, $\gamma_1 = 5.6^\circ$

$$\gamma_2 = \gamma_1 + \theta = 5.6^\circ + 8^\circ = 13.6^\circ, \quad \rightarrow M_2 = M_c = 1.56$$

$$P_{02} = P_{01} = P_{0b} = P_{0c} = 4.027$$

$$P_c = P_{0c} \left[1 + \frac{\gamma-1}{2} M_c^2 \right]^{-\frac{\gamma}{\gamma-1}} = 1.005$$