Since the stagnation temperature at the outlet of impeller is same as that at the outlet of the diffuser, one can also write T_{0_2} in place of T_{0_3} in Eq. (7.6). Typical values of the power input factor lie in the region of 1.035 to 1.04. If we know η_c we will be able to calculate the stagnation pressure rise for a given impeller speed. The variation in stagnation pressure ratio across the impeller with the impeller speed is shown in Figure 7.2. For common materials, U_2 is limited to 450 m/s.

Figure 7.3 shows the inducing section of a compressor. The relative velocity V_{r1} at the eye tip has to be held low otherwise the Mach umber (based on V_{r1}) given by $M_{r1} = \frac{V_{r1}}{\sqrt{\gamma RT_1}}$ will be too high causing shock losses. Mach number M_{r1} should be in the range of 0.7-0.9. The typical inlet velocity triangles for large and medium or small eye tip diameter are shown in Figure 7.4(a) and (b) respectively.

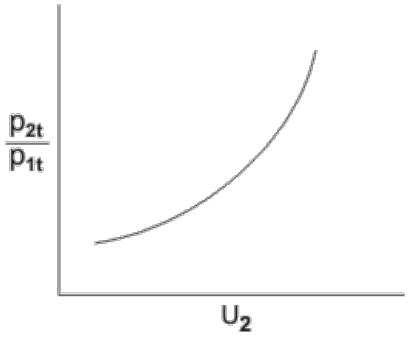

Figure 7.2 Variation in stagnation pressure ratio with impeller tip speed

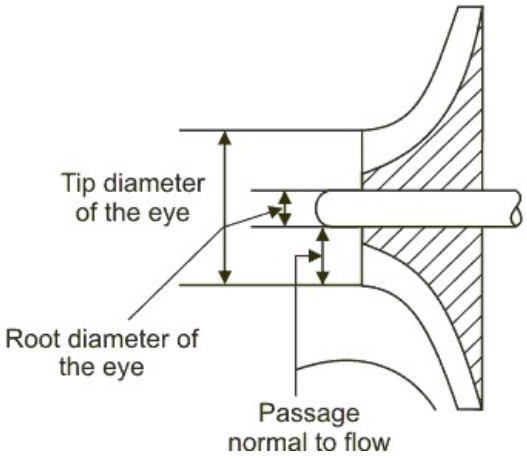

Figure 7.3 Inducing section of a centrifugal compressor

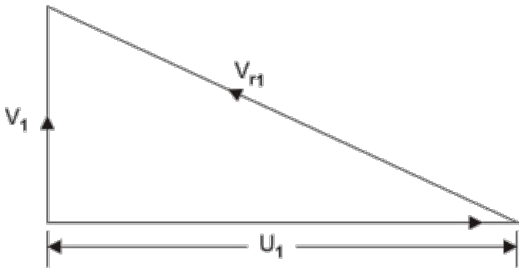

Figure 7.4 (a)

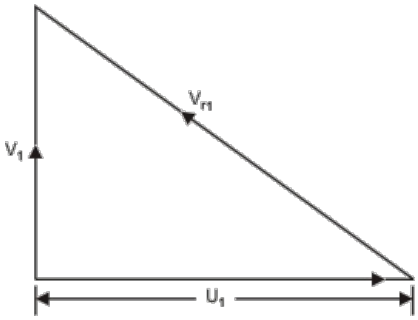

Figure 7.4(b)

Figure 7.4 Velocity triangles at the tip of eye