## Degree of reaction

Another useful dimensionless parameter is the "degree for reaction" or simply the "reaction" R. It may be defined for a turbine as the fraction of overall enthalpy drop (or pressure drop) occurring in the rotor

Thus, $$R = \frac{h_2 - h_3}{h_{o1} - h_{o3}} \qquad (14.1)$$

or, $$\frac{T_2 - T_3}{T_{o1} - T_{o3}}$$

Turbine stage in which the entire pressure drop occurs in the nozzle are called "impulse stages". Stages in which a portion of the pressure drop occurs in the nozzle and the rest in the rotor are called reaction stages. In a 50% reaction turbine, the enthalpy drop in the rotor would be half of the total for the stage.

An impulse turbine stage is shown in Fig14.1, along with the velocity diagram for the common case of constant axial velocity. Since no enthalpy change occurs within the rotor, the energy equation within the rotor requires that $|V_{r_2}| = |V_{r_3}|$. If the axial velocity is held constant, then this requirement is satisfied by

$$\beta_3 = -\beta_2$$

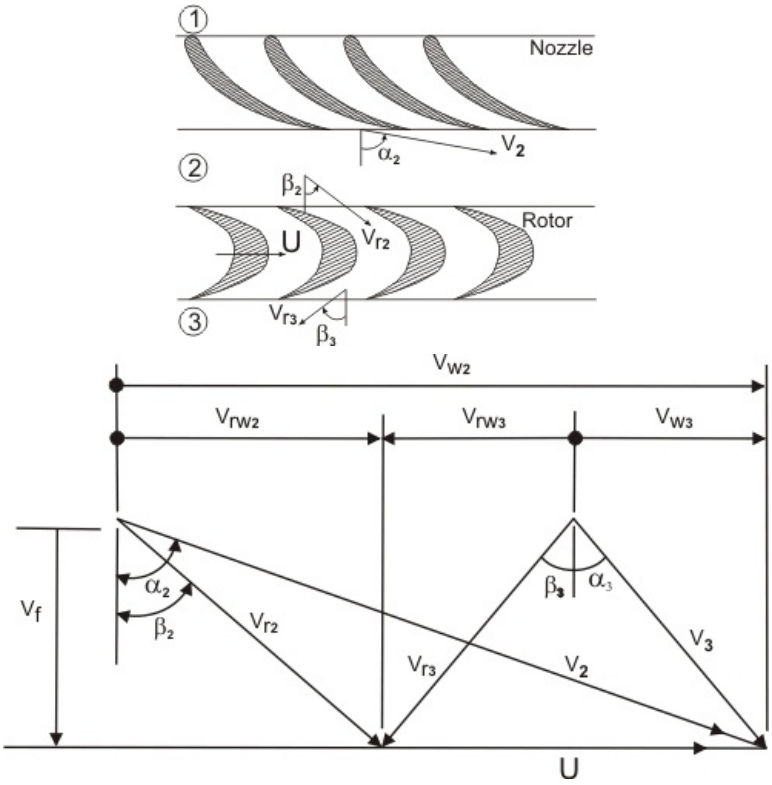


**Figure 14.1 Impulse turbine stage with constant axial velocity**