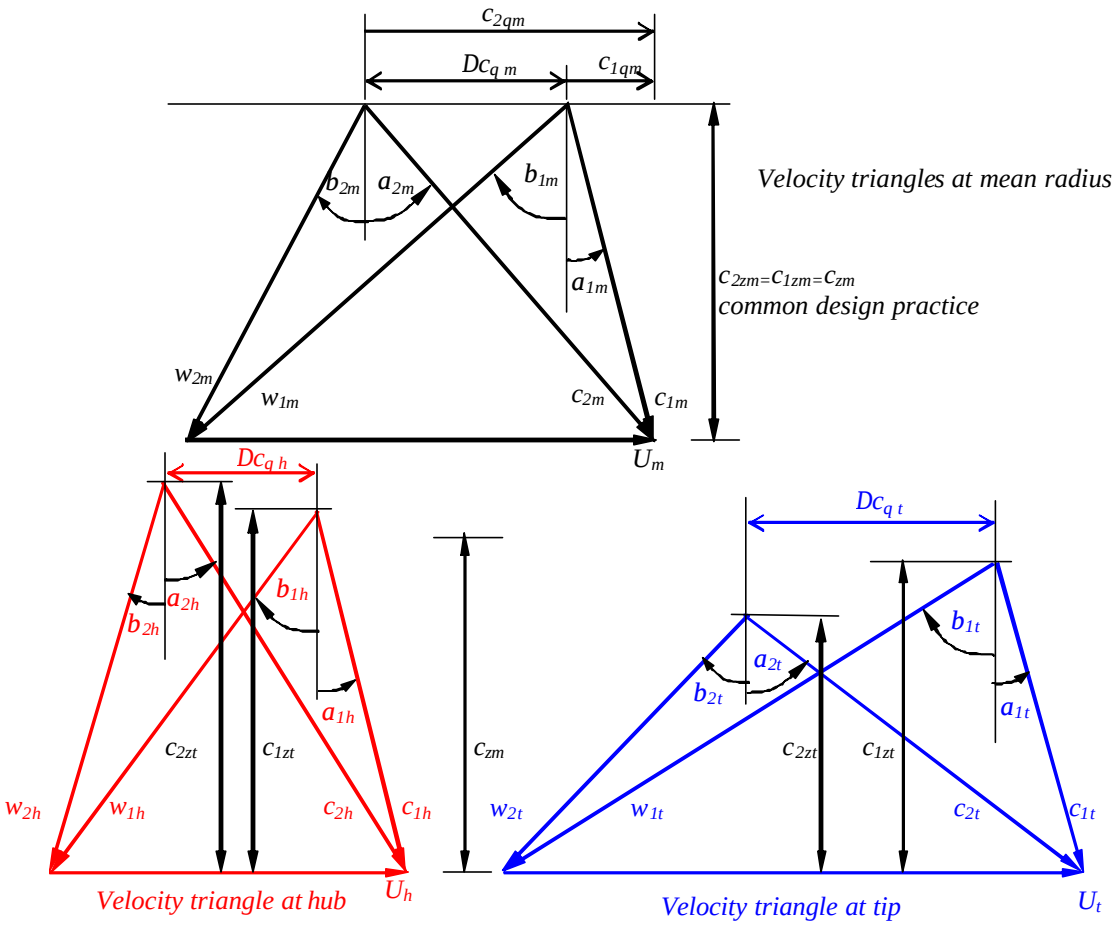
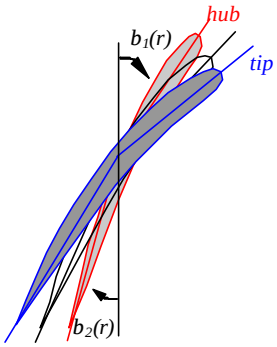
Variation in the shape of the velocity triangles with radius

The desired radial variation in degree of reaction *R'(r)* and enthalpy change $Dh_o(r)$ (i.e. work input w(r)) for a given stage determines the radial variation of the required flow turning angles, and hence, determines the blade twist. The details of the airfoil shape require aerodynamic analysis. Experience provides a good starting point; experiments and (increasingly) computational fluid dynamics are used to optimize the shape. Except in the free-vortex design c_z must vary with radius to maintain radial equilibrium, even if one designs for c_z=*const* at the mean radius. Generally c_{2z} decreases from hub to tip, c_{1z} is more nearly constant and could show a maximum somewhere along the blade height.





Schematic illustration of how flow angles determine rotor blade twist. Similarly, the angles $a_2(r)$ and $a_3(r)$ (= $a_1(r)$ for next stage) determine the stator blade twist. The airfoil shape has to be determined by blade aerodynamics.