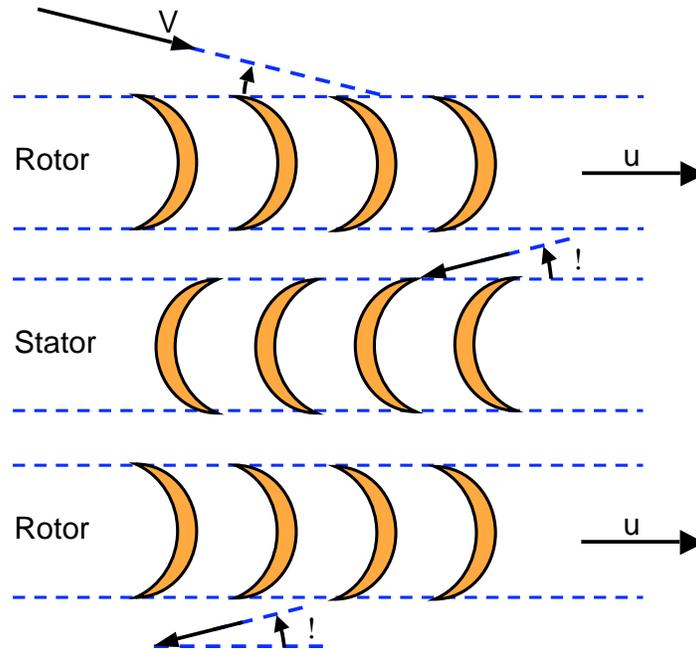


Problem 225A

A two-stage turbine consists of a rotor followed by a stator followed by a second rotor:



It will be assumed that all the angles α and β are sufficiently small so that $\cos \alpha$ and $\cos \beta$ can be approximated by unity. It is also assumed that frictional effects in both the rotors and the stator can be included using the same constant, C , for all three rows of blades where C is defined as follows: Relative velocity leaving blades = $-c \times$ Relative velocity entering blades.

Evaluate the blade efficiency of the two-stage impulse turbine as a function of u/V where u is the blade velocity of both rotors and V is the velocity of the initial jet.

What is the result for a 3-stage impulse turbine under the same conditions? At what value of u/V will the 3-stage turbine have its maximum blade efficiency if $C = 0.9$?