

"Turbo"

"Zhaoyi Jiang (.1364)"

"HW4"

"P2"

H=150[m]

Q=4.5[m^3/s]

r2=0.6[m]

rpm=450

alpha_2=72[degree]

c2=53.3[m/s]

g=9.81[m/s^2]

c2_th=(2*g*H)^0.5

phi=c2/c2_th

u1=450/60[s]*r2^2*pi

c2u=c2*sin(alpha_2)

w2u=c2u-u1

w2r=c2*cos(alpha_2)

beta_2=arctan(w2u/w2r)

W_dot=1000[kg/m^3]*Q*g*H*phi

omega=450/60[s]*2*pi

T=W_dot/omega

SOLUTION

Unit Settings: SI C kPa kJ mass deg

 $\alpha_2 = 72$ [Degree]

c2 = 53.3 [m/s]

c2th = 54.25 [m/s]

H = 150 [m]

 $\phi = 0.9825$

r2 = 0.6 [m]

T = 138059 [N*m]

w2r = 16.47 [m/s]

 $\dot{W} = 6.506\text{E}+06$ [W] $\beta_2 = 53.69$ [degree]

c2u = 50.69 [m/s]

g = 9.81 [m/s^2]

 $\omega = 47.12$ [rad/s]

Q = 4.5 [m^3/s]

rpm = 450

u1 = 28.27 [m/s]

w2u = 22.42 [m/s]

No unit problems were detected.