EES Ver. 10.444: #0301: for use by Mechanical and Aerospace Engineering, Ohio State University - Columbus, OH

```
"Turbo"
"Zhaoyi Jiang (.1364)"
"HW4"
"P3"
va=12[m/s]
r=20[m]
lambda=4
cp = 0.3
rho= 1.225[kg/m<sup>3</sup>]
W_dot=0.5*rho*(pi*r^2)*va^3
lambda=w*r/va
omega=w/2/pi
"cp=4*a*(1-a)^2"
a=0.091
vd=(1-a)*va
vb=(1-2*a)*va
pa=1[bar]
pa*convert(bar,pa)/rho+0.5*va^2=p1*convert(bar,pa)/rho+0.5*vd^2
```

## **SOLUTION**

## Unit Settings: SI C bar kJ mass deg

a = 0.091  

$$\lambda = 4$$
  
p1 = 1 [bar]  
r = 20 [m]  
va = 12 [m/s]  
vd = 10.91 [m/s]  
 $\dot{W}$  = 1.330E+06 [W]

 $\begin{array}{l} cp &= 0.3 \\ \hline \omega &= 0.382 \ [rpm] \\ pa &= 1 \ \ [bar] \\ \rho &= 1.225 \ [kg/m^3] \\ vb &= 9.816 \ [m/s] \\ w &= 2.4 \ \ [rad/s] \end{array}$ 

<sup>1</sup> potential unit problem was detected.