TYPICAL SAVONIOUS TURBINE

Verifying theoretical analysis to predict the maximum rotational speed and output of turbine using experimental values:

Given:

A Savonious Wind Turbine with a 25% blade overlap

Wind Velocity	=	14 ft/s	
$Diameter_{(1)}$	=	0.75 ft	
$Radius_{(1)}$	=	0.37 ft	
$Area_{(1)}$	=	1.5 ft^2	
$\bar{A}_{(1)}$	=	1.06 ft^2	
$\bar{R}_{(1)}$	=	0.26 ft	
Density	=	0.07 lb/ft^3	
C_{Tf}	=	7.3	(Total force measured for 1/2 a revolution)
$\bar{C}_{Tf}$	=	5.2	
$C_{d(2,3)}$	=	0.63	(As determined from experimental testing)

Find:

1. The maximum rotational speed ω.
2. The work being done and maximum theoretical horsepower.
3. The energy in the wind and the efficiency of this turbine.

Notes:

- Assume that blade (V_2) **does** affect the turbine (create negative work)
- Assume values for area and radius change as the turbine rotates (RMS theorem)