Analysis of Cost Effective Vertical Axis Wind Turbine(CEVAWT)

Anil B.Shinde[1],Heena A. Shaikh[2], Ashwini N.Arjun[3]
1.SVERI's COE P'Pur, Mechanical Engineering Department, Pandharpur, Maharashtra.
2.SVERI's COE P'Pur, Mechanical Engineering Department, Pandharpur, Maharashtra.
3.SVERI's COE P'Pur, Mechanical Engineering Department, Pandharpur, Maharashtra..

Introduction: Rising sea levels and increasing pollution levels has generated worldwide interest and has given rise to new wind turbines designs. Our work is related with Cost Effective Vertical Axis Wind Turbine which generate the energy with available resources and in less cost.

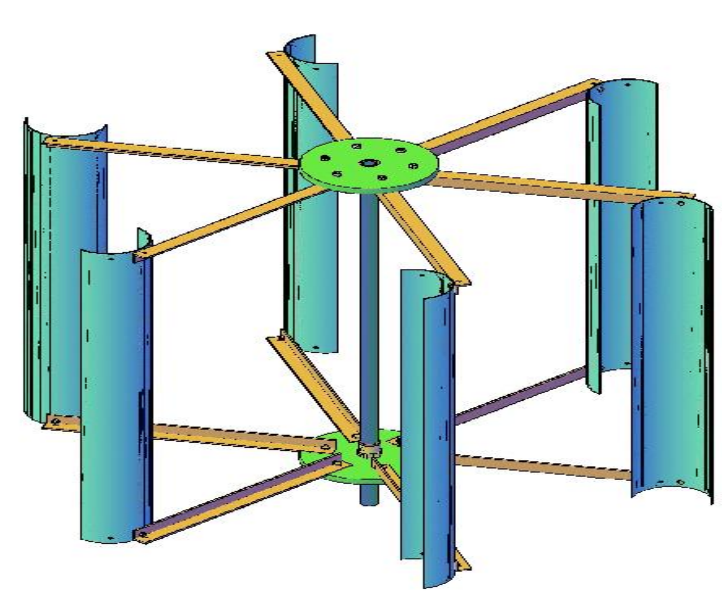

Figure 1. CEVAWT

Computational Methods: We have approached to the problem with fluid structure interaction. For the fluid first and for fluid solid interface boundary we got the equations as follows.

$$\rho\frac{\partial \mathbf{u}_{fluid}}{\partial t} + \rho(\mathbf{u}_{fluid}\cdot\nabla)\mathbf{u}_{fluid} =$$

$$\nabla\cdot\left[-p\mathbf{I} + \mu\left(\nabla\mathbf{u}_{fluid} + (\nabla\mathbf{u}_{fluid})^T\right) - \frac{2}{3}\mu(\nabla\cdot\mathbf{u}_{flui}\right.$$

$$\frac{\partial\rho}{\partial t} + \nabla\cdot(\rho\mathbf{u}_{fluid}) = 0$$

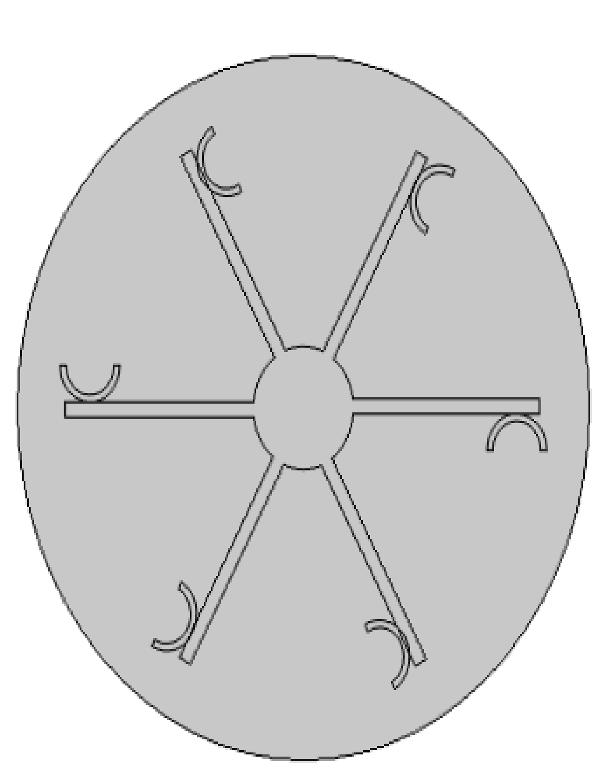

Figure 2. CEVAWT

Results: Through the simulation work we got the result of flow velocity and stress(fsi) on surface one and two and the maximum and minimum pressure.

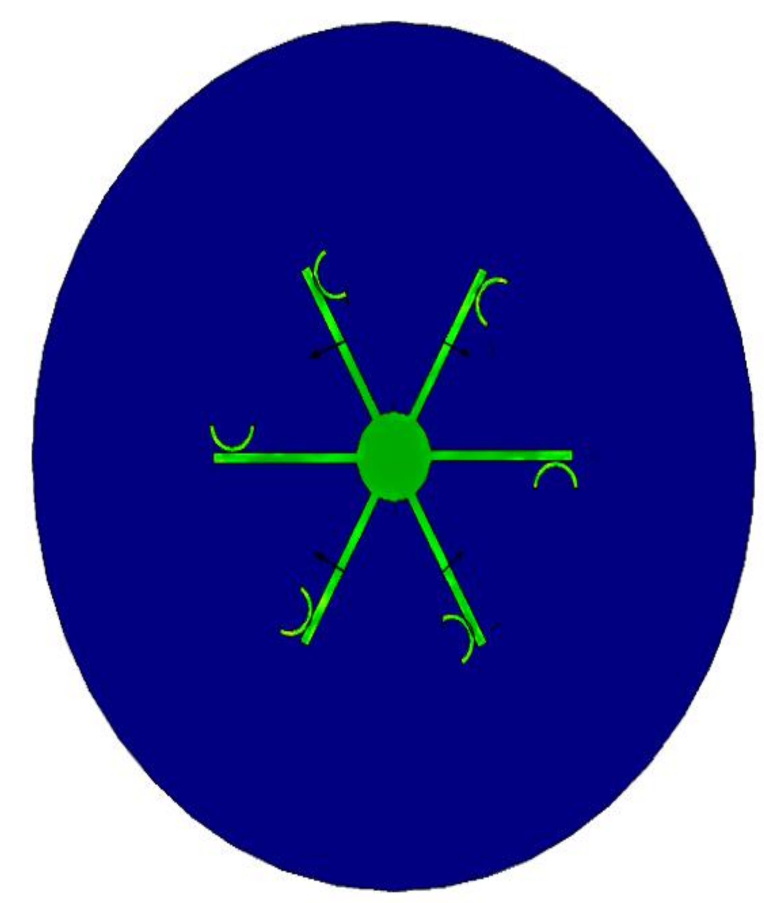

Figure 3. Title of the figure

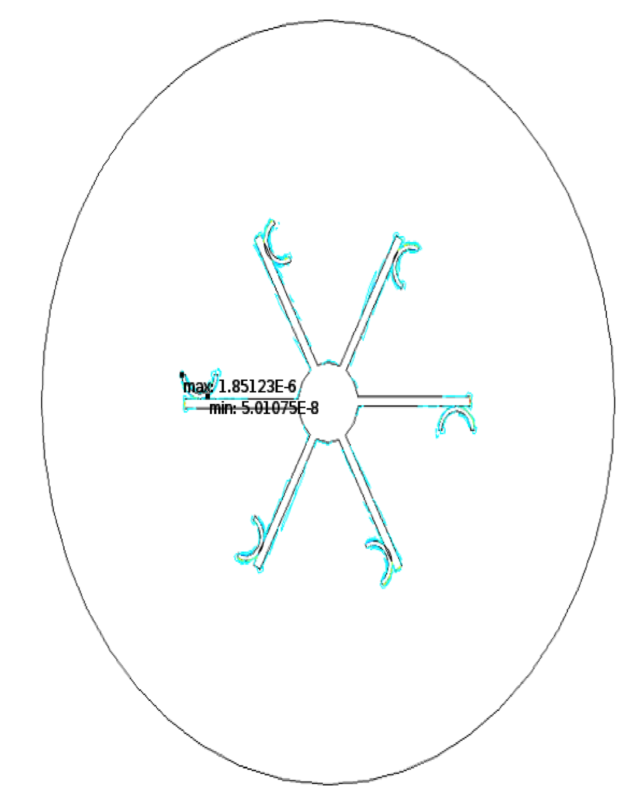

Figure 4. showing maxi. And mini. pressure

Wind Speed (m/s)	Blade Angle	Shaft Speed (RPM)	LED Glow
1	45˚	3	NO
2	45˚	7	NO
3	45˚	10	YES
5	45˚	12	YES
7	45˚	18	YES
9	45˚	20	YES
10	45˚	26	YES
12	45˚	31	YES

Table 1. Observation table for 45˚ (anticlockwise) blade angle

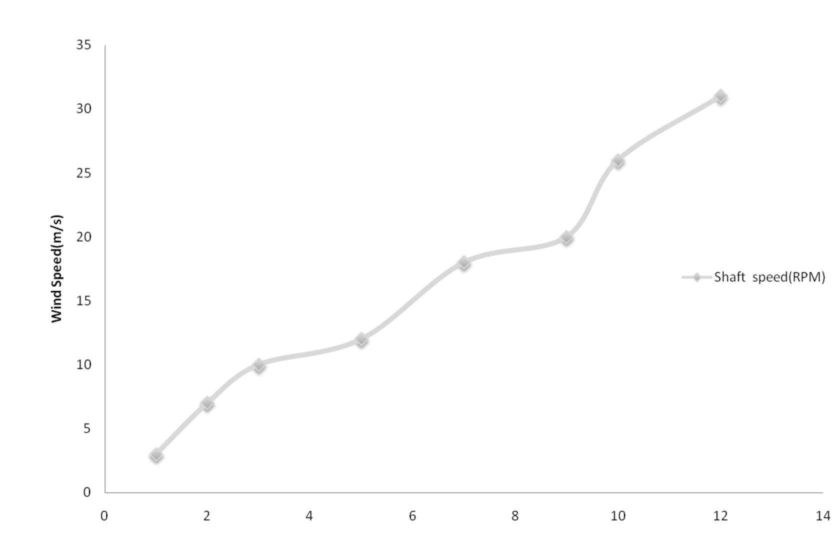

Figure 5. Graph for 45˚ (anticlockwise) blade angle

Conclusions: Our work and the results obtained so far are very encouraging and reinforce the conviction that vertical axis wind energy conversion systems are practical and potentially contribute to the production of clean renewable electricity from the wind even under less than ideal conditions.

References:
1. Milne-Thomson, Theoretical Hydrodynamics, Dover,30 (2000)
2. Brad Hunter, Savonius Wind Turbine Design,67(2011)

R. E. Walters, Aerodynamic Tests of Darrieus Turbine Blades,35(2009).