

Bladeless Windmill Using Piezo-electric Plates

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Keywords:

VIV : vortex induced vibration

Introduction:

Currently wind energy is mostly harvested using conventional windmill. Conventional Windmills work on a simple principle, instead of using electricity to make wind like a fan windmill use wind to make electricity. These windmill uses huge blades to convert wind energy into mechanical energy when Wind turns the propeller-like blades of a turbine around a rotor, which spins a generator, thus creating electricity. But the conventional windmill has various problems

- A conventional windmill requires a huge area of land to build and the area of installation is 60 acres per megawatt.
- The cost of building a conventional windmill is about 3lakhs to 5lakhs per kilowatt.
- As the parts of conventional windmills are huge and bulky they are difficult to transport.
- The production of energy from these conventional windmills completely depends on the angle of wind flow.

So in order to eliminate all these problems we need to reduce the size of windmill , cost of building one, and also it should have very less moving parts. All these can be done by using bladeless windmill.

Objectives:

The main objective of this project is to create a wind turbine without blades. Due to the absence of blades, these type of windmills can be used in variety of location such as building roof top, sea shores, etc. The main advantage of these type of wind turbine is that it will eliminate most of the existing problem in conventional wind turbine like need of larger area, unidirectional rotation, etc.

Methodology:

In bladeless windmill using piezoelectric plate the linear motion of the shaft is transferred into stress on the piezoelectric plates to convert it into electric energy. This is the basic principle of our bladeless windmill.

- As the shaft is subjected to the constant wind the shaft tends to oscillate this oscillation of the shaft makes the spring to compression and expansion, which is placed above the piezoelectric plate to move in up and down motion with the shaft which produces stress in the piezoelectric plates.
- The piezoelectric plates have the property to produce electric current when it is subjected to varying or constant stress. Because of same property the stress in the piezoelectric plate produces the AC output.
- The output of the piezo-electric plates are feed to a rectifier. This rectifier converts the AC input into DC and gives it as output.

Results and Conclusions:

The bladeless wind turbine model generates energy at lower wind speed than that of conventional wind turbine and also having very low cost with less space. Currently our prototype of bladeless windmill can produce a voltage of around 60-80 milli volts.

Scope for future work:

Using of renewable energy for Power generation is a new method of power generation which is picking up speed from past few years. The motivation behind this project is to provide as another option for the conventional windmill. As we have utilized piezoelectric plates instead of alternator and generator, the expense of this windmill is very less compared to conventional windmills Similarly we kept the size of this windmill small so that we may create energy with less area by installing it in places like households, schools, and any provincial region. Another advantage of our windmill is that it has fewer moving components, which means lower operating costs. By using these compact bladeless windmill. We can provide electricity to some of the most remote areas with less maintenance cost. We can also save around 12 lakhs birds annually by using bladeless windmill.