Measurement of Infrasound Emissions from Wind Turbines

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Abstract

Infrasound has been suspected by many medical researchers as a source of many physiological and psychological health problems. In recent years, the popularity of green energy has made wind turbine technology a suitable candidate for pollution-free energy. With its great clean energy features, it also brought some of its drawbacks especially with its noise emissions that received many complaints from the residents living near the large wind turbine poles. Many scientists and researchers believe that it is not the regular noise that is creating the problem to the residents, but the infrasound wave related to that noise. Infrasound is a low frequency sound wave of below 20Hz. The infrasound wave is not defined in any noise regulations because its frequency is well below the noise level range of 35Hz.

This project is concerned with the measurement of infrasound emissions from the wind turbine. The goal is to measure this infrasound wave using a new methodology so that we can better understand it. We have chosen a state of the art barometric sensor from Paroscientific Inc (Model No. 600-16B) for sensing the sound pressure emitted from the wind turbine. We have deployed two of the sensors near the wind turbine with one of them added with a wind filtering instruments and one of them without wind filtering for reference. The data will be collected and processed in the laptop using the software made by Prof. Dave Pepyne. We analyzed the data using Power spectral density of the signal coming from the wind turbine.

Progress

- We have built a system that can measure the infrasound waves coming from the wind turbine using the barometer sensors (Paroscientific Inc, Model No. 600-16B).
- Spiral soaker is used as a method for wind noise filtration.
- A weather station is also used to measure the wind speed around experiment al location.
- The software are developed by CASA members using C and Matlab (Fig 2).
- The data collected by the sensors are analyzed using the power spectral density (Fig 4).

Research Objectives

- To develop a methodology for measuring wind turbine infrasound emissions so that they can be better characterized and their potential impacts better understood.
- To analyze the infrasound emission from the wind turbine using its power spectral density.

Fig 1. The low frequency noises from wind turbines are thought to be due to the interaction of the blade wake and the supporting tower

Fig 2. Software Schematics

Fig 3. Instrument set up

Hardware

The system was developed keeping in mind for its portability to carry the experiment in the field. We used the laptop to record the data instead of using the huge data logger instrument. The barometers and the server ports are powered by the on board 9V lantern battery. Two barometer are used for this experiment. One barometer is connected with a spiral hose which act a wind filter and the other barometer is held without any wind filtration for reference. A weather station is added to the system to know the wind speed during the experiment and to predict the possible wind noise created by it. Wind noise is still the biggest hurdle for getting the accurate data. Therefore, future work might include making a better wind filtration system. GPS is used to know the distance from the wind turbine.

Fig 4. Power spectral density

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