Wind Power PRE Laboratory Questionnaire

Student's name_____ Student ID_____

1. How many degrees does a single blade of a fan need to rotate to complete one period?
    a. 0 degrees
    b. 90 degrees
    c. 180 degrees
    d. 270 degrees
    e. 360 degrees

2. What are the units of a period?
    a. Meters
    b. Meters/sec
    c. Seconds
    d. 1/sec = Hz
    e. Sec/meters

3. What are the units that frequency is measured in?
    a. Meters
    b. Meters/sec
    c. Sec
    d. 1/sec = Hz
    e. Sec/meters

4. What is the relation between period and frequency?
    a. Frequency = 1 / period ^{2}
    b. Frequency = 1 / period
    c. Frequency = period
    d. Frequency = period ^{2}
    e. Frequency = 2* period

5. What is meant by the term "wind speed profile" ?
    a. Variation of wind's temperature
    b. Variation of wind's frequency
    c. Variation of wind's speed
    d. Variation of wind's direction

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EE-80J: Renewable Energy Sources

Wind Turbine Laboratory Experiment

Oxana Pantchenko and Prof. Ali Shakouri

Student's name_____ Student ID_____ Grade _____ / _____

ABSTRACT

In this experiment, students will obtain knowledge about specific wind power, calculate the wind's frequency, and find out about different types of turbines and their advantages and disadvantages. The students will also build a wind turbine system and calculate the period and the frequency of the rotating turbine at different speeds.

INTRODUCTION

In the modern world, the interest in wind power has been growing more than ever. The energy produced by the rotating turbine from the wind is considered a renewable energy source. The goal of this lab is for the students to get familiar with the terms and obtain knowledge on the subject.

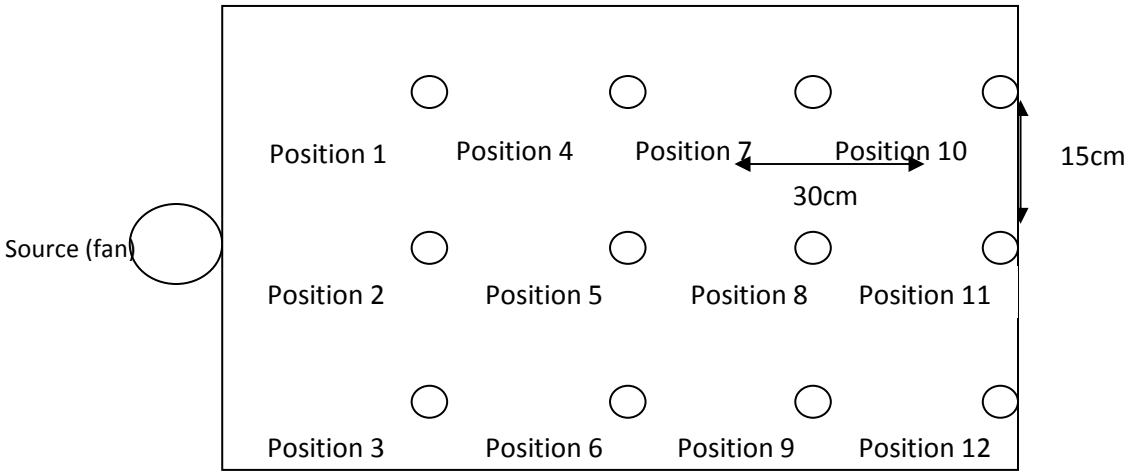
LIST OF MATERIALS

- ET-generator (1)
- 5-Blade fan [wind turbine](1)
- Thumb nut (1)
- Spacer (1)
- Rod Stand (1)
- LabView
- Alligator Clips (2)
- Wind Power Source (electric fan) (1)
- Plastic container (1)
- Ruler

Figure 1 Picture of all needed materials for wind turbine lab.

PROCEDURE

1. Turbine: place the spacer over the plastic shaft of the ET-generator. Place the 5 blade fan over the same plastic shaft of the ET-generator. Make sure that the 5 blade fan is facing the correct direction. Secure 5 blade fan with thumbnut.
2. Attach the assembled wind turbine to the rod stand.
3. Center the wind power source on the far left side of your table so that the wind's direction is across the center of your table.
4. Create a wind frequency profile measuring frequency at each position.



5. Open EE80J/ Wind Power Lab.

6. Record frequencies at each position. Hint: you can do so by recording dominating (tallest) frequency from the magnitude vs. frequency plot.

   Position 1 frequency _____

   Position 2 frequency _____

   Position 3 frequency_____

   Position 4 frequency_____

   Position 5 frequency _____

   Position 6 frequency _____

   Position 7 frequency _____

   Position 8 frequency _____

Position 9 frequency _____

Position 10 frequency _____

Position 11 frequency_____

Position 12 frequency _____

7. Measure the distance from the table to the center of your wind turbines 5-blade fan (the center of the thumbnut).

   Distance = _____ meters

14. At position 5, place the plastic container. Measure the frequencies at positions 7-12

    Position 7 frequency_____ _____

    Position 8 frequency _____

    Position 9 frequency _____

    Position 10 frequency _____

    Position 11 frequency _____

    Position 12 frequency _____

15. What is the most efficient position past the container?

    Position_____

16. Leave the plastic container at position 5 and move the wind turbine to the most efficient location past the container.

17. Leaving the rod stand stationary in that position, adjust the vertical height of the wind turbine until you have found the optimal vertical location for the wind turbine.

18. What was the optimal vertical location for the wind turbine? (The new distance from the table to the center of the thumbnut)
    Optimal vertical location =_____ m

Wind Power POST Laboratory Questionnaire

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    f. 90 degrees
    g. 180 degrees
    h. 270 degrees
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