Production and development of the device for a wind tunnel
Sendai Daisan Senior High School
Team 05

1.Background

We want to do some experiments about wind…but, the device to do it ,the wind tunnel, is very expensive!! most of students cannot buy it. So we want to make a device that is cheaper and more accurate for anyone who wants to do experiments by using wind tunnels.

2.Purpose

Wind tunnels are very expensive. So we want to make one that of as cheap as possible.

3.Materials and methods

The first device
Materials
・straw ・ plastic plate ・ gum tape ・ smoke generator
・ vacuum cleaner
How to make prototype 1 and wind tunnel 1
A plastic plate was rolled into a cylindrical shape,
and as a rectifier, a large number of small straws were collected and attached in a cylindrical shape. When we made prototype 1, we made it so that the length of the plastic plate and straw fall apart, because we wanted to make it quickly. Next, we made wind tunnel 1 so that length of the plastic plate and straw were uniform.
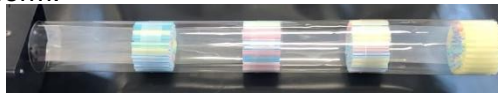
The second device
Materials
・plastic bottles   ・straws→Mesh   ・gum tape
Equipment used in the experiment
・vacuum cleaner   ・smoke generator

Experiment method
The smoke generated from the generator was collected in a bag, and the bag was connected to the end of the wind tunnel device. Then, using a vacuum cleaner to measure the wind speed with an anemometer, we let the smoke flow into the wind tunnel device, and checked whether the wind speed was constant while visualizing the air flow

・Material
We designed three types of devices.
1.Device made of straw,2. 1.Device made of mesh,3.Device without rectifiers.
Each device that connects six plastic tubes, a rectifier(6mm diameter straw, mesh),wire with thread.

・Experimental method
We put a wire in the device, hung three threads, and verified how much the thread moved by the wind.
We prepared straw device, mesh device, device without anything. We verified which rectifiers are the most conditioned and which locations are most appropriate.
This experiment was conducted in two ways; a state where rectifiers were placed at all locations and a state where rectifiers were placed only at the observation positions.
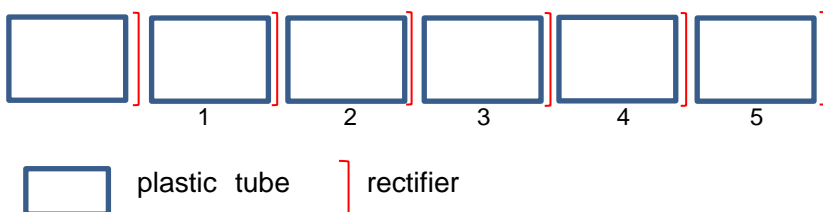
4.Result・Consideration

In this graph, the horizontal axis means the position of the viewpoint. We call the furthest point from vacuum cleaner one, and the nearest one five. And, the vertical axis means thread's swing width. It is based on thread's swing which is in the furthest point from Vacuum cleaner in the wind tunnel without any straws and meshes. We called it one.
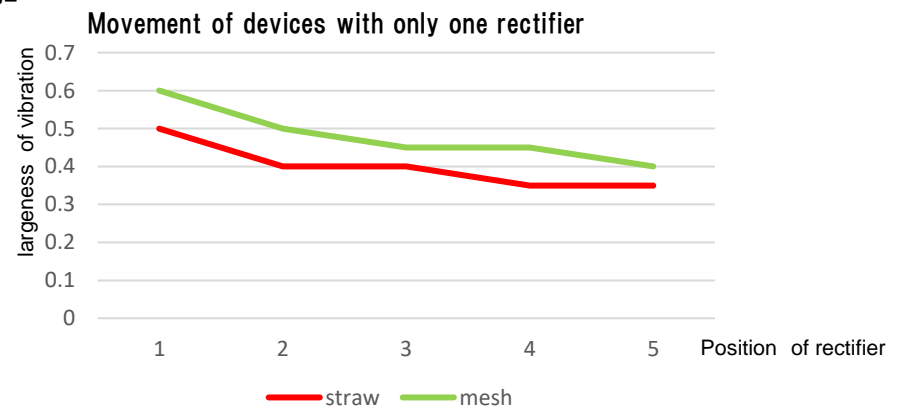
Fig1

Movement of Full rectifiers devices
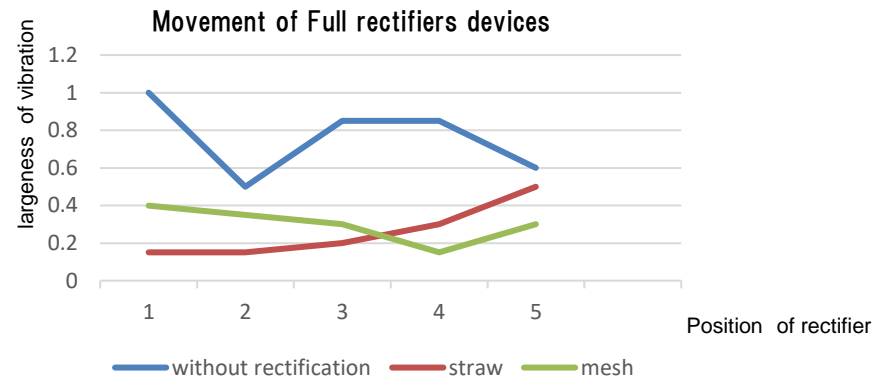
From this graph, both straws and meshes can make wind`s movement more smoothly than nothing.
Judging from the graph when we put straws or meshes all points, meshes worked better than straws .

Fig2

Movement of devices with only one rectifier

According to Fig2, straw seems better compare to mesh.
When we put straws or meshes at all points, it seemed that meshes work better than straws. When we put straws or meshes at one view point, it seemed straws work better .
So we think we should put both straws and meshes in our machine properly.

5.Conclusion・Future Work

We could search good rectifier and good observation position.
Future work, we are going to make a larger wind tunnel from the results of this experiment.

Reference   国立大学５６工学系ホームページ   https://www.mirai-kougaku.jp/laboratory/pages/130109.php