

Effects of Propeller Shape on Thrust

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Abstract

Our goal was to investigate the effects of propeller shape, number of blades, blade angle, and area of blades. We measured the force produced using a mass meter. In conclusion, we observed that the area of blades and angle of blades affected the force's strength.

1 Introduction

There are many types of fans around us. Their differences in shape are likely due to differences in their uses. However, we don't know what the effects of these differences are. So, we started this research to investigate how changes in the shape of propellers affect the thrust. By producing propellers using a 3D printer, and then we did several experiments using them.

2 Theory and Experiment

We focused on three variables; the number of propeller blades, the angle of the blades, and the area of the blades. In our first experiment, we measured the strength of the force generated by each fan. In our second experiment, we measured the distribution of the force generated. We used all of our 3D printer propellers in both experiments.

3 Results

There was no difference in the amount of the force generated by changing the number of blades. However, when the number of blades increased, the force was distributed over a larger area. In contrast, when the angle of the blades or the area of the blades increases, the force increased. But the distribution of force similarly increased over a wider area.

4 Conclusion

These results suggest that the force generated by a propeller depends on the thrust. So, the angle of blades and area of blades affected the force's strength. Furthermore, in these experiments we were able to establish a method for measuring the force generated by fans using a mass meter.

5 References

Kōki Taguchi another 【sōfūkinohanenokeijyōhaokosukazeni donoyōnieikyōsurunoka】
Kensuke Akase another 【sōfūkinohanenokeijyōhaokosukazeni donoyōnieikyōsurunoka】
Panasonic 【yokuarugositumon senpūkinohanenomaisūniyorutigai】
DRONE Vol.75 【tyūgatadoro-nnomuzukasisa[Hisatoku Haruharano Drone trendwatching]】