Laboration report
Wing orientation

Worlds Adrift
Ziwix#2834

laboration date: 30 November 2017

Abstract

The purpose of this laboration is to test which of two popular wing patterns is the most optimal one, two tests are set up with the same ship to see which can turn faster. The results showed that one of the shapes were clearly more optimal and was further mathematically explained.

1 Introduction

In worlds adrift wings are a vital part of your ship and it is well known that vertical wings will help you rotate your ship and that horizontal wings help you tilt your ship up and down. The placement of the wings seems very straight forward if you want good turn and tilt speed, for example; if you have four wings you could use two of them as turning wings and the other two as tilt wings. But many players also prefer to place their wings in an X-shaped pattern, with every wing facing diagonally out from your ship. The purpose of this laboration is to experiment with both of these patterns to determine which is the most optimal one.

2 Method

One ship is built and used for all the tries, se table 1 for ship statistics.

Table 1: Ship statistics

Weight	955 kg
Engine	47 power, 84 spinup
Wing	24 power, 62 pivot speed

Four wings and one engine were used, the wings were all identical and used in both tests. Both tests were conducted far enough away from any island to reduce client lag and to remove manta disturbances, the ship was turned to south-west and put to a complete stop before the test started. The W and A key were held down until full throttle and full turn was apparent, the ship was then spun around for five total revolutions and at the end of the last turn a timer was stopped.

Figure 1: The basic ship frame.

3 Results

The recorded time for the ship with the plus-shaped wing pattern was 143.2 seconds and the time for the X-shaped one was 112.5 seconds, 79% of the plus shaped one.

4 Discussion

The probable reason to why an X-shaped pattern for your wings is more efficient can be explained with maths, there's only two ailerons helping your ship turn in a plus-shaped pattern, but these ailerons work at their full potential, which is

$$T_+ = 2 \cdot P \tag{1}$$

, where P is the potential of one aileron and T is the overall ship turning. In the case of the X-shape all four ailerons will help in the turning, but because of their angle they will help slightly less, the potential for the X-shape should be

$$T_X = 4 \cdot cos(\frac{\pi}{4}) \cdot P \tag{2}$$

, where $\frac{\pi}{4}$ is the assumption that the wings are at a 45 degree angle, this is roughly equal to $2.8 \cdot P$.

This means that the turning for the X-shape is 40% more efficient, this cannot be translated to a useful dimension. The tilt efficiency was never tested based on the assumption that only one test were needed to show which pattern is more efficient, to further strengthen these tests such and experiment should be conducted. It is also worth noting that instead of strating the timer directly when the throttle of the ship is started, you could instead start it when one lap has passed to get a more accurate information about the time for each revolution.

5 Conclusion

The X-shape wing pattern is clearly better when it comes to turning and probably when it comes to tilting your ship up and down, but further tests should be conducted to strengthen this theory.