CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

S0308

Project Title

Optimizing Surfboard Fin Design by Maximizing the Ratio of Lateral Resistance to Drag

Abstract

Objectives/Goals

The objective of our project was to measure the different forces exerted by surfboard fins. Our investigative question is "what fin is optimal for surfing local waves." Our hypothesis was that the fin with small width and large height would yield the most optimum results (low drag, and high lateral resistance).

Methods/Materials

We created the fins using Blender, a 3D modeling program and proceeded to 3D print them out and label them according to height and length. They were printed by a friend, Scott, at Tesla. In order to test lateral resistance, we built a contraption that would mount the board perpendicularly to the edge of the pool with the finbox area within the pool's jet stream. We used a standard, 5'10" surfboard with Future's fin boxes in them, which our custom fins fit into. We tied a rope to the tail area of the board, and attached it to a spring scale in order to measure the amount of drag. We repeated these tests for both lateral resistance and drag each five times per fin.

Results

After we finished the testing with the different fins, we found that in general the greater the surface area of the fin, the greater lateral resistance and drag it provided. More specifically we discovered that the length of the fin sideways is more correlated with lateral resistance than it is with drag, and the depth that the fin extends into the water is more correlated with drag then lateral resistance.

Conclusions/Discussion

We found that the fin with the optimal qualities had a small height and large length, which perfectly matched the description of fin 1-3. For the most part, these results tend to make sense because with a taller fin, the head-on drag should be increased, and with a longer fin, the lateral resistance should be increased. We determined this by looking the correlation values in the graphs of lateral resistance vs. length and drag vs. height. The correlation between lateral resistance and length was strong, and so was the correlation between drag and height. It was interesting to see that this style of fin is widely used among the surf community, and a common shape for surfing.

Summary Statement

We measured the drag and resistance forces provided by our different fins to determine the optimum one for surfing.

Help Received

We received help from Bryan Largay as he gave us ideas on how to set up our experiment and from