Reduction of Noise Pollution by Changing the Surface of the Blades

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Introduction

This research aims to reduce the noise generated, or more precisely to improve the noise to power-generation ratio, of wind turbines by altering the surface texture of the blades.

Methods

Blades were designed using CAD, fabricated from a 3-D printer, and then tested in an aerodynamic simulator. The location of separation was noted. Promising designs were then upscaled and tested on an A-30 turbine. Varying angles of attack were measured for rpm and level of sound

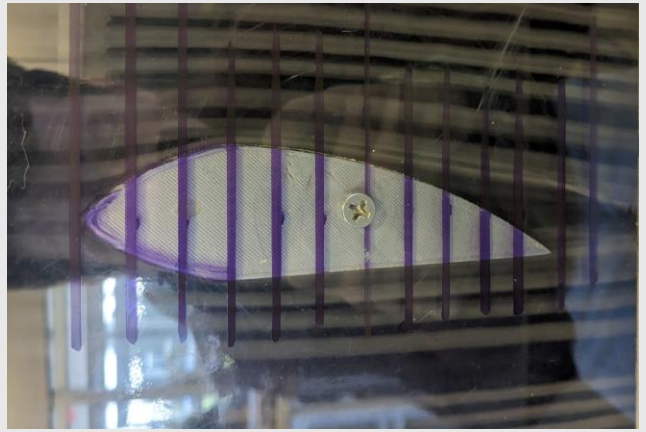
Results

Results showed that the coarse surface of 260 microns diameter particles provided a significant delay in boundary layer separation. There was a parabolic relationship with the increase of the power to sound ratio with the maximum being at 26% with an angle of attack of 15 degrees.

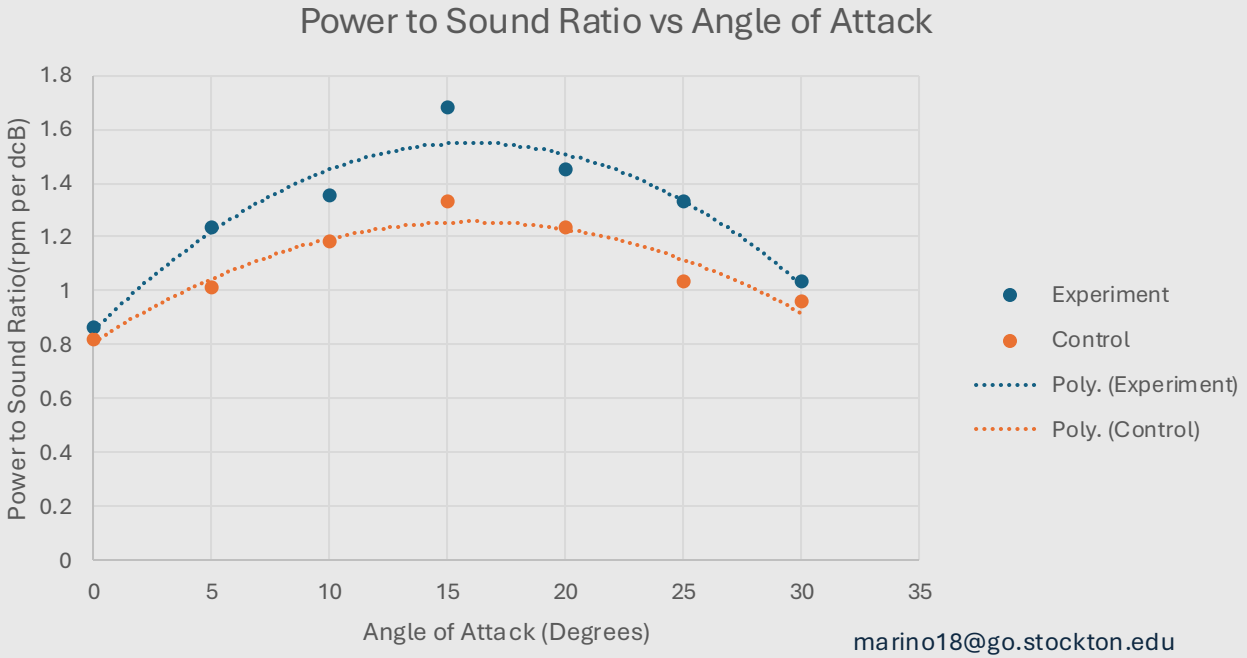
Discussion

While the coarse surfaces do not reduce the overall noise of the turbine, they can increase the amount of power generated without adding a significant increase in noise. Thus, less turbines need to be built to acquire more energy. Research will continue next year, and different textures will be tested.

Texture characteristic



Camber in aerodynamic simulator



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