Increasing the Angle of Attack of an Airfoil Using Bernoulli's Principle

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Although aviation technology is highly advanced, planes must follow the fundamental laws of physics. It is possible for any type of airplane to stall if its angle of attack is too large, which causes a major decrease in lift. This can lead to damaged or destroyed airplanes, injury, and death. Implementing modifications to an airfoil to increase the possible angle of attack could lead to less frequent stalls. The purpose of this experiment was to determine whether it is possible to increase the angle of attack of an airfoil and achieve lift at angles that were previously limited by stall points, and improve upon both the safety and the efficiency of airplane wings. We developed a basic airfoil and a modified airfoil with a raised aerodynamic structure on the top to channel air downwards to generate greater lift at angles that would normally stall. We conducted an experiment using a wind tunnel and measured the lift produced in grams. A simulation was used to confirm the results of the experiment without confounding variables. The results showed that the modified airfoil produced greater lift at nearly every angle of attack. Our hypothesis was incorrect as we predicted that as we increased the angle of attack, the modified airfoil's stall point would occur later than the original airfoil. Instead, both airfoils had similar stall points. However, it could be stated that the lift generated by the modified airfoil was so significant, that the stall point was irrelevant until a considerably greater angle. The results of this experiment have many real world applications, from civilian to military aircraft.

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