ABSTRACT

Modification of flow by dimples over a golf ball

Golf is an outdoor field club-and-ball sport where players use various clubs to hit a ball into a series of holes on a course in as few strokes as possible. Unlike most games, the playing area in golf is not standardized. The modern golf is believed to be originated in the 15th century in Scotland. The ball used in golf is a special kind of dimpled sphere weighing no more than 45.9 grams and diameter not less than 42.7mm or 0.0427m. In ancient times around the 17th century, the golf balls were made of wood and leather without any dimples. It was in 1897 when David Stanley Froy, James McHardy, and Peter G. Fernie received a patent for a ball with indentations and found that dimpling of the golf ball provides better control of the ball's trajectory, flight, and spin. It also increases the range of shots. David Stanley Froy was the first to play with the prototype in 1900.[1] Dimples are used in golf balls to reduce drag and boost lift.

The golf ball's surface has dimples that produce pockets of turbulence that constrict the airflow around the object by re-energizing the flow. As a result, there is less detached air behind the ball because the separation points move towards the trailing edge and the flow remains attached for a longer distance compared to smooth sphere, which reduces drag and produces a smaller wake. Different patterns, depths, and arrangements of the dimples impact the aerodynamics of a golf ball by reducing drag and in turn increasing its range. The rearward spinning motion of a golf ball can account for up to half of its lift because of the Magnus effect. A ball rises in the air when it spins backwards because the air pressure beneath it is higher than the air pressure above it. This impact is amplified by dimples, which can account for up to 50% of the overall lift. [2] [4]

The authors' aim is to study the modification of flow over a dimpled golf ball from various research papers and experimental data performed in the past. The project also briefly emphasizes the CFD results from the past. One of the objectives is also to analyze different dimple geometries and configurations to find the best suitable dimples placement for optimal performance of the ball.

The various references that will be used for the study are listed in the references section.

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