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Flight trajectory of a rotating golf ball with grooves[1] MOONHEUM BAEK, JOOHA KIM, HAECHEON CHOI, Seoul National University — Dimples are known to reduce drag on a sphere by the amount of 50% as compared to a smooth surface. Despite the advantage of reducing drag, dimples deteriorate the putting accuracy owing to their sharp edges. To minimize this putting error but maintain the same flight distance, we have devised a grooved golf ball (called G ball hereafter) for several years. In this study, we modify the shape and pattern of grooves, and investigate the flow characteristics of the G ball by performing wind-tunnel experiments at the Reynolds numbers of $0.5 \times 10^5 - 2.5 \times 10^5$ and the spin ratios (ratio of surface velocity to the free-stream velocity) of 0 – 0.6 that include the real golf-ball velocity and rotational speed. We measure the drag and lift forces on the rotating G ball and compare them with those of a smooth ball and two well-known dimpled balls. The lift-to-drag ratio of the G ball is much higher than that of a smooth ball and is in between those of the two dimpled balls. The trajectories of flying golf balls are computed. The flight distance of G ball is almost the same as that of one dimpled ball but slightly shorter than that of the other dimpled ball. The fluid-dynamic aspects of these differences will be discussed at the talk.

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