Research on Next-generation High-efficiency Aircraft using the Aerodynamic Characteristics of the Korean Traditional Kite(Bangpaeyeon)

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This study sought to develop a next-generation high efficiency aircraft that uses the structure of traditional bangpaeyeon(kite) of Korea. In terms of the procedure of the study, a wind tunnel was produced to verify the structural characteristics of bangpaeyeon. The most stable ratio of hole was used to manufacture an aircraft. Then, an analysis experiment was conducted to verify the trajectory and characteristics in flying. Based on these findings, a hole-size-adjustable aircraft was developed. The results of this study is as follows. First, an aerodynamic experiment showed that when the hole was about 12.8% the oscillation of the bangpaeyeon was the smallest. Second, using the ratio of 12.8%, a bangpaeyeon-aircraft was developed which was able to fly more stably than fixed-wing aircrafts. Third, the smaller the ratio of the hole, the larger the rate of increase of angle of attack per unit time. Fourth, a carbon stick and servo were used to develop a hole-size-adjustable aircraft. When the hole was 0-12.8%, stop holding was possible. The smaller the hole, the greater the angle of attack was where stall occurred. The maximum flight speed was approximately 13.39m/s at 28.8%. Therefore hole-size-adjustable aircraft has significance in that it enables highly energy-efficient flying that is also stable by adjusting the hole size. Since stop holding and high speed flying are both possible, the aircraft can fly at a higher speed to the destination then carry out its task above destination through stop holding. This allows the aircraft to have high applicability as unmanned aircraft and also to load equipment such as solar cells or observation devices on its wide area.

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