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Aerodynamic effect of hind-wing tails on a gliding swallowtail butterfly HAEICHEON CHOI, HYUNGMIN PARK, KISOO BAE, WOO-PYUNG JEON, Seoul National University — In butterfly flight, the relationship between wing morphology and gliding performance have been one of the major concerns. The hind-wing tails, observed in most swallowtail butterfly, have been also conjectured to promote the gliding ability of butterfly. In this study, the aerodynamic role of hind-wing tails in gliding swallowtail butterfly is experimentally investigated using butterfly models with and without tails. The butterfly models are copied from a dried specimen of real swallowtail butterfly, *Papilio Ulysses*. Varying the attack angle, we measure the lift, drag and pitching moment for both models, and visualize the flow fields using an array of smoke wires at the attack angle of 20° . With the tails, the lift and drag increase by about 10 ~ 20% and 5%, respectively, at the attack angles higher than 15° , which results in the increase of lift-to-drag ratio in a wide range of attack angles. Also, with the tails, the nose-down pitching moment increases more rapidly with increasing attack angle, indicating the enhanced longitudinal static stability by the tails. From visualization, it is found that strong vortical structures are drawn closer to the upper wing surface by the tails.

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