

Abstract Submitted
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Pitching motion control of a butterfly-like 3D flapping wing-body model KOSUKE SUZUKI, Institute of Engineering, Shinshu University, KEISUKE MINAMI, TAKAJI INAMURO, Dept. Aeronautics and Astronautics, Kyoto University — Free flights and a pitching motion control of a butterfly-like flapping wing-body model are numerically investigated by using an immersed boundary-lattice Boltzmann method. The model flaps downward for generating the lift force and backward for generating the thrust force. Although the model can go upward against the gravity by the generated lift force, the model generates the nose-up torque, consequently gets off-balance. In this study, we discuss a way to control the pitching motion by flexing the body of the wing-body model like an actual butterfly. The body of the model is composed of two straight rigid rod connected by a rotary actuator. It is found that the pitching angle is suppressed in the range of $\pm 5^\circ$ by using the proportional-plus-integral-plus-derivative (PID) control for the input torque of the rotary actuator.

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