A flight control through unstable flapping flight

MAKOTO IIMA, Hiroshima University, NAOTO YOKOYAMA, Kyoto University, NORIO HIRAI, Osaka Prefecture University, KEI SENDA, Kyoto University — We have studied a flight control in a two-dimensional flapping flight model for insects. In this model, the model of center-of-mass can move in both horizontal and vertical directions according to the hydrodynamic force generated by flapping. Under steady flapping, the model converges to steady flight states depending on initial conditions. We demonstrate that simple changes in flapping motion, a finite-time stop of flapping, results in changes in the vortex structures, and the separation of two steady flight state by a quasi-steady flight. The model’s flight finally converges to one of the final states by way of the quasi-steady state, which is not observed as a (stable) steady flight. The flight dynamic has been also analyzed.

1KAKENHI (23540433, 22360105, 21340019) and CREST No. PJ74100011