

Abstract Submitted  
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**Effect of flexibility of wing on aerodynamic performance in plunge motion** TUYEN QUANG LE, Konkuk University, Seoul, Korea, JIN HWAN KO, Seoul National University, Seoul, Korea, SOO HYUNG PARK, DOYOUNG BYUN, Konkuk University, Seoul, Korea — The improvement of aerodynamic performance in plunge motion is investigated through a flexibility of chordwise and spanwise directions by applied a prescribed deformation on a airfoil at Reynolds number of 30000. The aerodynamic performance of flapping motion can be evaluated through a thrust force, a input power and a propulsive efficiency which is a ratio of propulsive power which generate from thrust force to input power. Unsteady viscous flows over NACA 0012 airfoils in plunge motions are computed by using a time-accurate preconditioned Navier-Stokes solver coupled with a volume grid deformation code. For spanwise or chordwise flexibility, there is a optimal phase angle for maximum thrust force and propulsive efficiency. Especially, a combination of spanwise and chordwise flexibility can improve aerodynamic performance higher than that of adding increment from each of flexibility. Compared with rigid motion, 10% deformation in chordwise and spanwise directions with zero phase angle can enhance the thrust force coefficient from 0.22 to 0.38 and 0.54 respectively, while thrust force coefficient is 0.8 by combination of spanwise and chordwise flexibility.

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