

Abstract Submitted
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Locomotion of a flapping flexible plate in ground effect XI-YUN

LU, CHAO TANG, University of Science and Technology of China — Locomotion of a three-dimensional flapping flexible plate in ground effect is studied numerically by the coupled solution of the fluid flow and the plate motion. When the leading-edge of the flexible plate is forced to take a vertical oscillation near a ground, the plate moves freely due to the fluid-structure interaction. Mechanisms underlying the dynamics of the plate near the ground are elucidated. The ground effect can enhance propulsive speed and improve propulsive efficiency, especially in the medium bending stiffness regime. The analysis of unsteady dynamics and deformation of plate indicates that the ground effect becomes weaker for more flexible plate. Therefore it is found that a suitable degree of flexibility can improve the propulsive performance in ground effect. The vortical structure and pressure distribution around the plate and their connection with the dynamics of the plate are also investigated.

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