

CFD/CSD 및 최적제어기법을 연계한 3-자유도계 에어포일의 플러터 억제

(Flutter Suppression of a 3-DOF Airfoil Using CFD/CSD with Integrated Optimal Control Method)

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Key Words : 공력탄성학(Aeroelasticity), 3 자유도계(3-DOF), 전산유체역학(CFD), 전산구조동역학(CSD), 최적 제어(Optimal Control), 플러터억제(Flutter Suppression), 진동제어(Vibration Control)

ABSTRACT

In this study, computational demonstrations for the flutter suppression are presented for the 3-DOF airfoil system with oscillating flap. Advanced computational methods such as computational fluid dynamics (CFD) and computational structural dynamics (CSD) are used and a simultaneous coupling method has been developed to accurately conduct flutter analyses. In addition, optimal control theory is integrated into the CFD based flutter analysis method to construct the coupled aeroservoelastic analysis system for the airfoil with oscillating flap. For a well-defined typical section model, fundamental unsteady aerodynamics and flutter characteristics are investigated. Finally, to show the effectiveness of flutter control the physical aeroelastic responses are directly compared between the open loop and the closed loop systems.

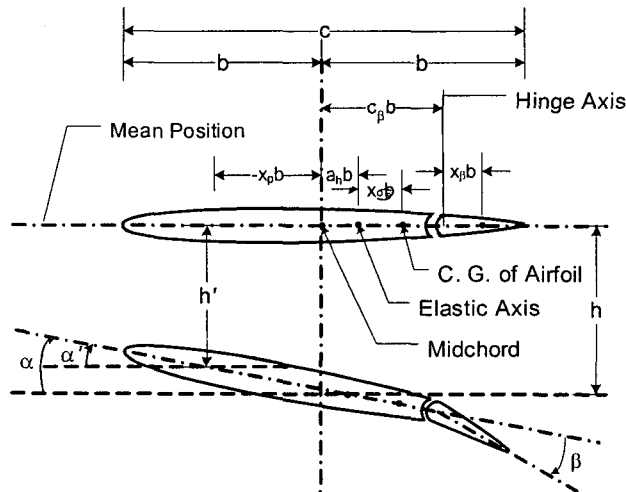


Fig. 1 Schematic diagram of three-degree-of freedom airfoil system with oscillating flap

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