

NUMERICAL STUDY OF FLOW SEPARATION CONTROL OVER A NACA 2415 AIRFOIL

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Abstract : This study involves numerical simulation of the flow around a NACA2415 airfoil, with a 18° angle of attack, and flow separation control using a rod. It involves putting a cylindrical rod -placing upstream of the leading edge- in vertical translator movement in order to accelerate the transition of the boundary layer by interaction between the wake behind the rod and the boundary layer. The viscous, non-stationary flow is simulated using ANSYS FLUENT .13 The rod movement is reproduced using the dynamic mesh technique and an in-house developed UDF (User Define Function). The frequency varies from 75 to 450 Hz and the considered amplitudes are 2%, and 3% of the foil chord. The frequency chosen closed to the natural frequency of separation, and the rod diameter is equal to 2% the foil cord. Our results show a substantial modification in the structure of the flow and a maximum drag reduction of 61%.

Keywords : CFD, Flow separation, Active control, Boundary layer, rod, NACA 2415.

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