

Unsteady 3D Post-Stall Aerodynamics Accounting for Effective Loss in Camber Due to Flow Separation

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Abstract : The current study couples a quasi-steady Vortex Lattice Method and a camber correcting technique, ‘Decambering’ for unsteady post-stall flow prediction. The wake is force-free and discrete such that the wake lattices move with the free-stream once shed from the wing. It is observed that the time-averaged unsteady coefficient of lift sees a relative drop at post-stall angles of attack in comparison to its steady counterpart for some angles of attack. Multiple solutions occur at post-stall and three different algorithms to choose solutions in these regimes show both unsteadiness and non-convergence of the iterations. The distribution of coefficient of lift on the wing span also shows sawtooth. Distribution of vorticity changes both along span and in the direction of the free-stream as the wake develops over time with distinct roll-up, which increases with time.

Keywords : post-stall, unsteady, wing, aerodynamics

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