# A NUMERICAL UNSTEADY ANALYSIS OF A PLUNGING WING

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**Abstract**

Numerical simulation of unsteady motion of wing through undisturbed fluid is formulated using Unsteady Vortex Lattice Method. A free-wake algorithm is developed using a fourth order Adam-Bashforth technique. Rankine vortex model is used to avoid numerical singularities and wake decay algorithm is used to model the viscous dissipation of the shed wake. The resulting MN x MN equations are solved for unknown $\Gamma_{wing}$ using LU decomposition, where M and N are number of divisions of the wing along chord and span respectively. The aerodynamic coefficient of lift, $C_L$, induced drag, $C_{Di}$ , distribution of circulation, $\Gamma$ and wake geometry are calculated for unsteady plunging motion. Effect of cross-flow is studied. The results are found to be in good agreement with available literature.

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