

Analysis of Potential Flow around Two-Dimensional Body by Surface Panel Method and Vortex Lattice Method

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Abstract : This paper deals with the analysis of potential flow past two-dimensional body by discretizing the body into panels where the Laplace equation was applied to each panel. The Laplace equation was solved at each panel by applying the boundary conditions. The boundary condition was applied at each panel to mathematically formulate the problem and then convert the problem into a computer-solvable problem. Kutta condition was applied at both the leading and trailing edges to see whether the condition is satisfied or not. Another approach that is applied for the analysis is Vortex Lattice Method (VLM). A vortex ring is considered at each control point. Using the Biot-Savart Law the strength at each control point is calculated and hence the pressure differentials are measured. For the comparison of the analytic result with the experimental result, different NACA section hydrofoil is used. The analytic result of NACA 0012 and NACA 0015 are compared with the experimental result of Abbott and Doenhoff and found significant conformity with the achieved result.

Keywords : Kutta condition, Law of Biot-Savart, pressure differentials, potential flow, vortex lattice method

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