Modeling the Flow Past an Oscillating Airfoil by the Method of Viscous Vortex Domains

S. V. Guvernyuk and G. Ya. Dynnikova

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Abstract—The Lagrangian vortex method for solving the Navier–Stokes equations is applied for numerically modeling the unsteady flow past a wing airfoil executing angular oscillations in a viscous incompressible flow. Formulas relating the unsteady forces on the airfoil and the vorticity field are derived. The calculated results are compared with the experimental data for the NACA-0012 airfoil executing harmonic oscillations in an air flow at the Reynolds number $\mathrm{Re} = 4.4 \times 10^4$.

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