Unsteady flow across a stretching surface

ABSTRACT

In this paper, the problem of unsteady uniform flow across a stretching surface in an arbitrary direction is studied theoretically, where the unsteadiness is caused by the impulsive motion of the stretching surface. Numerical results of the governing partial differential equations are obtained using an implicit finite-difference scheme for the whole transient from the early or initial unsteady-state flow to the final steady-state flow. The early unsteady-state flow is solved analytically. The numerical solution obtained for the reduced skin friction coefficient is compared with previously reported results and the results for velocity profiles, h and g profiles are also presented in this paper. It is found that there is a smooth transition from the small-time solution (initial unsteady flow) to the large-time solution (final steady-state flow).