

## **Numerical solutions of unsteady boundary layer flow due to an impulsively stretching surface.**

### **ABSTRACT**

In this study, we investigate numerically the problem of unsteady boundary layer flow caused by an impulsively stretching surface with constant viscous flow. The boundary layer equations are transformed into similarity equations via the similarity transformation, which are then solved numerically using an efficient implicit finite-difference scheme known as the Keller-box method. The numerical solutions are obtained which are uniformly valid for all dimensionless time from initial unsteady-state flow to final steady-state flow in the whole spatial region. It is found that there is a smooth transition from the small-time solution to the large-time solution. The numerical results for the skin friction coefficients are compared with those of the analytical approach results, and they are found to be in good agreement. The numerical solutions for the velocity profiles are also presented in this paper.

**Keyword:** Unsteady flow; Boundary layer; Impulsively stretching surface; Numerical solutions.