

# Analysis of Magnetohydrodynamics Stagnation point flow with Partial slip boundary conditions

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## Abstract

In this article, the existence and uniqueness result for the solution of a singular third-order ordinary differential equation has been investigated on a semi-infinite domain  $[0, \infty)$ . Such differential equation arises in boundary layer flow near a stagnation point on a rough plate in the presence of a transverse magnetic field. A suitable similarity transformation is used to transform the governing partial differential equation into a nonlinear ordinary differential equation along with partial slip boundary conditions. The resulting equation with its boundary conditions contains two parameters: the magnetic parameter,  $M$  and the slip parameter,  $\lambda$ . Some properties of the velocity profiles such as monotonic behaviour and bounded are obtained before proceeding numerical results. Further, the asymptotic behaviour at the free boundary has also been discussed. The validation of the obtained solution has been done numerically by shifted Chebyshev collocation method. The velocity profiles are plotted to address the significance of the parameters. The results are also compared through the table with previous results and found remarkably good agreement.

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