Non-Perturbative Solution of the Magnetohydrodynamic Flow over a Nonlinear Stretching Sheet by Homotopy Perturbation Method-Padé Technique

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In this study, we investigate the magnetohydrodynamic (MHD) boundary layer flow by employing the homotopy perturbation method (HPM) and Padé approximation. The series solution of the governing nonlinear problem is developed. Generally, the truncated series solution is adequate only in a small region when the exact solution is not reached. We overcame this limitation by using the Padé techniques, which have the advantage in turning the polynomials approximation into a rational function, and applied it to the series solution to improve the accuracy and enlarge the convergence domain. A comparison of the present solution with the existing solution is made and excellent agreement is noted.

Key words: Nonlinear Stretching; Padé Approximation; Homotopy Perturbation Method; Magnetohydrodynamic Flow; Non-Perturbative Solution.