

Analytical Approach to a Slowly Deforming Channel Flow with Weak Permeability

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In this paper, we develop the analytical solution of the Navier-Stokes equations for a semi-infinite rectangular channel with porous and uniformly expanding or contracting walls by employing the homotopy perturbation method (HPM). The series solution of the governing problem is obtained. Some examples have been included. The results so obtained are compared with the existing literature and a remarkable improvement leads to an excellent agreement with the numerical results.

Key words: Homotopy Perturbation Method; Analytical Solution; Deformable Channel; Viscous Fluid; Permeable Walls.