

Abstract

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Lie-group method of solution for steady two-dimensional boundary-layer stagnation-point flow towards a heated stretching sheet placed in a porous medium

The boundary-layer equations for two-dimensional steady flow of an incompressible, viscous fluid near a stagnation point at a heated stretching sheet placed in a porous medium are considered. We apply Lie-group method for determining symmetry reductions of partial differential equations. Lie-group method starts out with a general infinitesimal group of transformations under which the given partial differential equations are invariant. The determining equations are a set of linear differential equations, the solution of which gives the transformation function the infinitesimals of the dependent and independent variables. After the group has been determined, a solution to the given partial differential equations may be found from the invariant surface condition such that its solution leads to similarity variables that reduce the number of independent variables of the system. The effect of the velocity parameter λ , which is the ratio of the external free stream velocity to the stretching surface velocity, permeability parameter of the porous medium k_1 , and Prandtl number Pr on the horizontal and transverse velocities, temperature profiles, surface heat flux and the wall shear stress, has been studied.