STAGNATION-POINT FLOW OVER A STRETCHING/SHRINKING CYLINDER IN A ALUMINA-WATER NANOFLUID

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ABSTRACT An analysis is carried out to study the steady stagnation-point flow and heat transfer towards a horizontal linearly stretching/shrinking cylinder in a Alumina-water nanofluid. The governing partial differential equations in cylindrical form are first transformed into ordinary differential equations before being solved numerically by a finite-difference method. Results for the skin friction coefficient, local Nusselt number, velocity profiles as well as temperature profiles are presented for different values of the governing parameters. Effects of the curvature parameter, solid volume fraction, stretching/shrinking parameter and Prandtl number on the flow and heat transfer characteristics are thoroughly examined. Different from a stretching cylinder, it is found that the solutions for a shrinking cylinder are non-unique. It is observed that the surface shear stress and the heat transfer rate at the surface increase as the curvature parameter increases.