Viscous flow due to a permeable stretching/shrinking sheet in a nanofluid.

ABSTRACT

The classical problems of forced convection boundary layer flow and heat transfer near the stagnation point on a permeable stretching/shrinking surface in a nanofluid is studied theoretically. The similarity equations were solved numerically for two types of nanoparticles, namely copper and silver in the base fluid of water with the Prandtl number Pr = 6.7850 to investigate the effect of the solid volume fraction or nanoparticle volume fraction parameter φ of the nanofluid. Also the case of conventional or regular fluid ($\varphi = 0$) with Pr = 0.7 is considered for comparison with previously known results from the open literature. The comparison showed excellent agreement. The skin friction coefficient, the Nusselt number and the velocity and temperature profiles were presented and discussed in detail. It was found that the nanoparticle volume fraction substantially affects the fluid flow and heat transfer characteristics.

Keyword: Boundary layer; Nanofluid; Stretching; Shringking.