

Stagnation-point flow over a stretching/shrinking sheet in a nanofluid.

ABSTRACT

An analysis is carried out to study the steady two-dimensional stagnation-point flow of a nanofluid over a stretching/shrinking sheet in its own plane. The stretching/shrinking velocity and the ambient fluid velocity are assumed to vary linearly with the distance from the stagnation point. The similarity equations are solved numerically for three types of nanoparticles, namely copper, alumina, and titania in the water-based fluid with Prandtl number $Pr = 6.2$. The skin friction coefficient, Nusselt number, and the velocity and temperature profiles are presented graphically and discussed. Effects of the solid volume fraction ϕ on the fluid flow and heat transfer characteristics are thoroughly examined. Different from a stretching sheet, it is found that the solutions for a shrinking sheet are non-unique.

Keyword: Nanofluid; Stretching/shrinking sheet; Stagnation point.