Numerical solutions of Wang's stretching/shrinking sheet problem for nanofluids

ABSTRACT

The steady stagnation-point flow of a viscous and incompressible fluid over a continuously stretching or shrinking sheet in its own plane in a water-based copper (Cu) nanofluid is studied theoretically. The formulation of the present problem in a nanofluid follows that of Wang's stretching/shrinking sheet problem in a viscous fluid. The nonlinear partial differential equations are transformed into ordinary differential equations via the similarity transformation. The transformed boundary layer equations are solved numerically using the shooting method. The numerical solutions are obtained and discussed for the skin friction coefficient and the velocity profiles for various values of the governing parameters, namely the nanoparticle volume fraction and stretching/shrinking parameters. It is found that dual solutions exist for the shrinking sheet case.