Thermal radiation in nanofluid penetrable flow bounded with partial slip condition

ABSTRACT

Thermal radiation enhances heat transfer, and it is used widely in manufacturing and materials processing applications. Thus, steady two-dimensional boundary layer flow over an exponentially porous shrinking sheet of nanofluids was considered in the influence of thermal radiation related to partial slip boundary conditions and suction. This paper aims to study the nanofluid penetrable flow over an exponentially shrinking sheet with thermal radiation and partial slip. The effects of silver (Ag) nanoparticles with two different types of base fluids named water and kerosene oil are investigated in this study. First, the governing equations and boundary conditions are transformed to a non-linear ordinary differential equation and then solved using bvp4c solver. Using Matlab software, it is found that the dual solution exists in some values from the suction parameter. Furthermore, we identified both nanoparticle volume fraction and suction parameter increase, leading to the rise in velocity profile. Moreover, the suction parameter increases both skin friction coefficient and Nusselt number increase.

Keyword: Dual solutions; Nanofluid; Thermal radiation; Boundary layer flow; Suction