Effect of heat generation/absorption on natural convective boundary-layer flow from a vertical cone embedded in a porous medium filled with a non-Newtonian nanofluid

F.M. Hady , F.S. Ibrahim , S.M. Abdel-Gaied , M.R. Eid

Abstract:

This work is focused on the study of the natural convection boundary-layer flow over a downward-pointing vertical cone in a porous medium saturated with a non-Newtonian nanofluid in the presence of heat generation or absorption. The transformed boundary layer governing equations are solved numerically. The influences of pertinent parameters such as the heat generation or absorption, the solid volume fraction of nanoparticles and the type of nanofluid on the flow and heat transfer rate in terms of Nusselt number are discussed. Comparisons with previously published work on special cases of the problem are performed and found to be in excellent agreement. The generalized governing equations derived in this work can be applied to different cases of non-Newtonian fluids with different values of the power-law viscosity index. The results of this parametric study are shown graphically and the physical aspects of the problem are highlighted and discussed.

Keywords:

Natural convection Non-Newtonian nanofluid Porous media Heat generation or absorption

Published In:

International Communications in Heat and Mass Transfer , Vol. 38 , PP.1414-1420