## Abstract

In this study, two distinct nanoparticles: aluminum oxide ($Al_2O_3$) and copper (Cu) are chosen as nanomaterials to examine the effects of nonlinear electrically conducting magnetohydrodynamic radiation on the flow of tangential hyperbolic hybrid nanofluid across a nonlinearly stretched sheet with convective boundary conditions. The equations that regulate fluid flow are represented as partial differential equations. These equations are reduced to their equivalent ordinary differential equations, which are solved using the homotopy analysis approach with the help of similarity variables. The effect of essential physical factors on fluid velocity, temperature, skin friction coefficient, and local Nusselt number is investigated and discussed. Results ascertain that the heat transfer rate of $Cu/H_2O$ nanofluid becomes high when equated to $Cu–Al_2O_3/H_2O$ nanofluid. Furthermore, the temperature distribution enhances with the rise in solid volume fraction while it diminishes with improved magnetic field for both nanofluid and hybrid nanofluid.