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Heat and mass transfer characteristics of nanofluid over horizontal circular cylinder
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Abstract
In this work, the impact of Brownian motion and thermophoresis on heat and mass transfer flow over a horizontal circular cylinder embedded in porous media filled with nanofluid is numerically examined. The transformed boundary layer equations for momentum, temperature and concentration subject to the appropriate boundary conditions are solved numerically by using an optimized, efficient and extensively validated Finite element method. The influence of the non-dimensional parameters such as the buoyancy ratio parameter (Nr), mixed convention parameter (Ra), thermophoresis parameter (Nt), Brownian motion parameter (Nb), tangential coordinate (ξ) and the Lewis parameter (Le) on velocity, temperature and concentration evolutions in the boundary layer region is analyzed in detail and the results are shown graphically. The local Nusselt number and the local Sherwood number are also investigated for various values of these non-dimensional parameters and the results are shown in tabular form. The comparison of present results with existing results shows good agreement. © 2016 Faculty of Engineering, Ain Shams University

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