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MHD flow of a non-Newtonian nanofluid over a non-linearly stretching sheet in the presence of thermal radiation with heat source/sink
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Abstract
Purpose: The purpose of this paper is to analyze the mangnetohydrodynamic boundary layer flow of a viscous, incompressible and electrically conducting non-Newtonian nanofluid obeying power-law model over a non-linear stretching sheet under the influence of thermal radiation with heat source/sink.
Design/methodology/approach: The transverse magnetic field is applied normal to the sheet. The model used for the nanofluid incorporates the effects of Brownian motion with thermophoresis in the presence of thermal radiation. On this regard, thermophoresis effect on convective heat transfer on nanofluids are investigated simultaneously. The governing partial differential equations are reduced to ordinary differential equations by suitable similarity transformations which are solved numerically by variational finite element method. Findings: The computations carried out for some values of the power-law index, magnetic parameter, radiation parameter, Brownian motion and thermophoresis. The effect of these parameters on the velocity, temperature and nanoparticle volume fraction distribution are presented graphically. The skin friction coefficient, Nusselt number and Sherwood number for various values of the flow parameters of the problem are also presented. Originality/value: To the best of the authors' knowledge, no investigations has been reported regarding the study of non-Newtonian nanofluids which obeying power-law model over a nonlinear stretching sheet. The principal aim of this paper is to study the boundary layer MHD flow of a non-Newtonian power-law model over a non-linear stretching sheet on a quotient viscous incompressible electrically conducting with a nanofluid. © Emerald Group Publishing Limited.

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