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Abstract:
Non-Newtonian is a type of fluid that does not comply with the viscosity under the Law of Newton and is being widely used in industrial applications. These include those related to chemical industries, cosmetics manufacturing, pharmaceutical field, food processing, as well as oil and gas activities. The inability of the conventional equations of Navier-Stokes to accurately depict rheological behavior for certain fluids led to an emergence study for non-Newtonian fluids' models. In line with this, a mathematical model of forced convective flow on non-Newtonian Eyring Powell fluid under temperature-dependent viscosity (TDV) circumstance is formulated. The fluid model is embedded with the Newtonian heating (NH) boundary condition as a heating circumstance and is assumed to move over a stretching sheet acting vertically. Using appropriate similarity variables, the respective model was converted into ordinary differential equations (ODE), which was later solved utilizing the Keller box approach. The present model is validated by comparing the existing output in literature at certain special limiting cases, where the validation results display a firm agreement. The current outputs for the proposed model are shown in tabular and graphical form for variation of skin friction plus Nusselt number, velocity and temperature distribution, respectively.