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Magnetohydrodynamic flow and heat transfer impact on ZnO-SAE50 nanolubricant flow over an inclined rotating disk [倾斜旋转盘对 ZnO-SAE50 纳米磁流体流动和传热的影响]

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Abstract
The present article has been fine-tuned with the investigation of mixed convection Darcy-Forchheimer flow of ZnO-SAE50 oil nanolubricant over an inclined rotating disk under the influence of uniform applied magnetic field applied to various industries. The current study has been enriched with additional consideration of slip flow, thermal radiation, viscous dissipation, Joulian dissipation and internal heating. In view of augmentation of thermal conductivity of nanolubricant, a new micro-nano-convection model namely Patel model has been invoked. The specialty of this model involves the effects of specific surface area and nano-convection due to Brownian motion of nanoparticles, kinetic theory based micro-convection, liquid layering and particle concentration. Suitably transformed governing equations have been solved numerically by using Runge-Kutta-Fehlberg scheme. An analysis of the present study has shown that applied magnetic field, porosity of the medium, velocity slip and inertia coefficient account for the slowing down of radial as well as tangential flow of ZnO-SAE50 oil nanolubricant, thereby leading to an improvement in velocity and thermal boundary layers. © 2019, Central South University Press and Springer-Verlag GmbH Germany, part of Springer Nature.

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