# ENTROPY GENERATION OF AN MHD JEFFREY NANOFLUID FLOW WITH NON-LINEAR HEAT FLUX: APPLICATIONS IN SOLAR ENERGY

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## ABSTRACT

The global requirement for sustainable energy supply to enhance industrial productivity and reduce production costs has caught the attention of researchers on renewable energy in recent years [1]. Solar energy mitigates the dangers associated with the deployment of fossil fuels in the generation of electricity [2]. This research investigates the entropy generation analysis and heat transfer enhancement of magnetohydrodynamic (MHD) Jeffrey nanofluid flow under the influence of nonlinear thermal radiation, heat source, and Cattaneo–Christov heat flux model. The governing partial differential equations of the models are formulated with the aid of conservation laws and transformed into non-dimensional, coupled nonlinear ordinary differential equations using suitable similarity transformations. The resulting non-dimensional models are solved using the spectral local linearization method [3, 4]. The accuracy and the convergence of the method are shown by comparing the obtained results with a known work in the literature, and they are observed to be in good agreement. The impacts of the emerging non-dimensional parameters on the fluid flow profiles are discussed graphically and in tabular form. The results show that the temperature of the fluid increases with the rise in the heat source and thermal radiation parameters. The velocity profile and the magnetic field parameter exhibit an inverse relationship, whereas the temperature of the fluid shows an opposite impact. The findings of this study will shed more light on the design and improvement of solar energy systems, thermal energy technologies, and various electronic cooling systems.

***K*eywords** Jeffrey fluid · Nanofluid · Entropy Generation · Solar Energy · Cattaneo-Christov heat

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