

Heat transfer analysis of thermal radiative over a stretching curved surface using molybdenum disulfide and silicon dioxide composite material under the influence of solar radiation

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Abstract

Purpose – The primary focus of this study is to tackle a critical industry issue concerning energy inefficiency. This is achieved through an investigation into enhancing heat transfer in solar radiation phenomena on a curved surface. The problem formulation of governing equations includes the combined effects of thermal relaxation, Newtonian heating, radiation mechanism, and Darcy-Forchheimer to enhance the uniqueness of the model. This research employs the Cattaneo–Christov heat theory model to investigate the thermal flux via utilizing the above-mentioned phenomenon with a purpose of advancing thermal technology. A mixture of silicon dioxide (SiO_2) and Molybdenum disulfide (MoS_2) is considered for the nanoparticle's thermal propagation in base solvent propylene glycol. The simulation of the modeled equations is solved using the Shifted Legendre collocation scheme (SLCS). The findings show that, the solar radiation effects boosted the heating performance of the hybrid nanofluid. Furthermore, the heat transmission progress increases against the curvature and thermal relaxation parameter.

Design/methodology/approach – Shifted Legendre collocation scheme (SLCS) is utilized to solve the simulation of the modeled equations.

Findings – The findings show that, the solar radiation effects boosted the heating performance of the hybrid nanofluid. The heat transmission progress increase against the curvature and thermal relaxation parameter.

Originality/value – This research employs the Cattaneo–Christov heat theory model to investigate the thermal flux via utilizing the above-mentioned phenomenon with a purpose of advancing thermal technology.

Keywords Shifted Legendre collocation scheme (SLCS), Solar radiation effects, Hybrid nanofluid, Molybdenum disulfide and silicon dioxide

Paper type Research paper



1. Introduction

Conventional fluids with nanoparticles play a significant role, offering various advantages across many fields. These nanoparticles enhance the rheological and thermophysical characteristics of the base fluid due to their superficial chemical and physical properties.