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Unsteady Falkner-Skan Flow of Hybrid Nanofluid Over a Nonlinear Moving Wedge

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Abstract:
The efficient heat transfer performance of hybrid nanofluid making the fluid crucial in many industrial applications like heat exchangers, nuclear reactors, automotive cooling systems, and most manufacturing processes. This research aims to uncover the properties of an unsteady Falkner-Skan hybrid nanofluid flows over a nonlinear moving wedge with the convective boundary condition. The water-based hybrid nanofluid that is considered in this research is composite nanoparticles of alumina (Al2O3) and copper (Cu). The governing nonlinear partial differential equations are transformed into nonlinear ordinary differential equations by incorporating similarity variables of appropriate types. A Keller-Box method is then used to solve the transformed equations numerically. The effects of various pertinent parameters such as unsteady flow, moving wedge, and angle wedge parameters on fluid flows and heat transfer are examined and graphically presented. The moving wedge parameter has enhanced the velocity profile and the heat transfer performance of the fluid. However, an opposite tendency is observed in temperature profiles for the increment of the angle wedge parameter.