

## **Mixed convective stagnation point flow towards a vertical Riga plate in hybrid Cu-Al<sub>2</sub>O<sub>3</sub>/water nanofluid**

### **ABSTRACT**

The present work highlights the stagnation point flow with mixed convection induced by a Riga plate using a Cu-Al<sub>2</sub>O<sub>3</sub>/water hybrid nanofluid. The electromagnetohydrodynamic (EMHD) force generated from the Riga plate was influential in the heat transfer performance and applicable to delay the boundary layer separation. Similarity transformation was used to reduce the complexity of the governing model. MATLAB software, through the bvp4c function, was used to compute the resulting nonlinear ODEs. Pure forced convective flow has a distinctive solution, whereas two similarity solutions were attainable for the buoyancy assisting and opposing flows. The first solution was validated as the physical solution through the analysis of flow stability. The accretion of copper volumetric concentration inflated the heat transfer rate for the aiding and opposing flows. The heat transfer rate increased approximately up to an average of 10.216% when the copper volumetric concentration increased from 0.005 (0.5%) to 0.03 (3%).

**Keyword:** Hybrid nanofluid; Mixed convection; Stagnation point flow; Riga plate; Wall-parallel Lorentz force; Dual solutions