Transport Phenomenon Analysis to Enhance Peristaltic Motion for Hybrid Nanofluid in Curved Microchannel

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ABSTRACT:

This study gives a thorough theoretical analysis of how a hybrid nanofluid can improve peristaltic transport in a curved microchannel. It focuses especially on possible blood flow management applications. The hybrid nanofluid, which has unique thermal and rheological properties, is made up of copper (Cu) nanoparticles dispersed in copper oxide (CuO) base fluid. This study investigates the effects of different important factors, including as the Hartmann number, curvature parameter, nanoparticle volume percentage, and Reynolds number, on flow behaviour and heat transfer qualities using the electromagnetic-hydrodynamic (EMHD) methodology. This study examines how these characteristics affect flow dynamics through methodical theoretical analysis, revealing important details on precise control methods for fluid transport in microchannels. The precise control of Cu-CuO hybrid nanofluids within microchannels is illuminated by this research, with implications for improving blood flow in biomedical contexts. The findings have significant implications for medical technology and microscale fluidic systems and provide useful direction for the design and manufacturing of microfluidic devices that improve heat dissipation and transport qualities in curved geometries.

Keywords: EMHD, Peristaltic Motion, Curved microchannel, Nano particles (Cu-CuO)