

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**FLOW AND HEAT TRANSFER OVER STRETCHING OR
SHRINKING WEDGE IN HYBRID NANOFUIDS USING
TIWARI-DAS MODEL**

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

This study intends to discover the flow and heat transfer over stretching or shrinking wedge in hybrid nanofluid. Yacob et al. (2011) conducted a study on steady two-dimensional boundary layer flow past a static or a moving wedge immersed in nanofluids. They have numerically studied the Falkner-Skan problem for a static or moving wedge immersed in nanofluids. They obtained triple solution in stretching/shrinking parameter in nanofluids. Motivated by the growing trend of hybrid nanofluids, which are driven by heat and flux transfer across moving surfaces and have a wide range of industrial applications. Therefore, we will extend the paper of Yacob et al. (2011), but in hybrid nanofluid to study the effect of wedge parameter, and stretching or shrinking parameter on the velocity, temperature profiles, local skin friction coefficient and local Nusselt number. The governing equations were transformed into non-linear ordinary differential equations using a similarity transformation, which were then solved using the `bvp4c` function in MATLAB. Two types of nanoparticles, copper (Cu) and alumina (Al_2O_3) were considered in the water-based hybrid nanofluid. The results showed that increasing the wedge angle (m) leads to an increase in the skin friction coefficient and heat transfer rate at the surface. The volume fraction of nanoparticles is fixed at $\varphi_1 = \varphi_2 = 0$. Additionally, dual solutions were only found to exist for the shrinking sheet. As the value of the shrinking parameter increases, the range of boundary layer separation also increases.