

## Boundary-layer flow and heat transfer of Blasius and Sakiadis problems in nanofluids with partial slip and thermal convection

### ABSTRACT

This study aims to investigate the steady two-dimensional laminar boundary layer flow past a fixed (Blasius) or past a moving (Sakiadis) semi-infinite flat plate in water-based nanofluids with partial slip and thermal convective boundary condition. The similarity equations are solved numerically for three types of metallic or non-metallic nanoparticles such as copper (Cu), alumina (Al<sub>2</sub>O<sub>3</sub>), and Titania (TiO<sub>2</sub>) in the base fluid of water with the Prandtl number  $Pr = 6.2$  to investigate the effect of the solid volume fraction parameter  $\varphi$  of the nanofluids. The governing partial differential equations are transformed into a system nonlinear ordinary differential equation using a similarity transformation which is then solved numerically using a shooting method in Maple software. The numerical results are presented in tables and graphs for the skin friction coefficient  $C_f$  and local Nusselt number  $Nu$  which represents the heat transfer rate at the surface as well as the velocity and temperature profile for a range of various parameters such as nanoparticles volume fraction, slip parameter and Biot number. The results indicate that the solid volume fraction affects the fluid flow and heat transfer characteristics.

**Keyword:** Heat transfer; Blasius; Sakiadis; Partial Slip; Nanofluids