

## Stability analysis of Wang's stretching/shrinking sheet problem for nanofluids

### ABSTRACT

The steady stagnation-point flow of nanofluid over a stretching or shrinking sheet in its own plane is investigated. The governing nonlinear partial differential equations are transformed into a nonlinear ordinary differential equations via the similarity transformation before they are solved numerically using the bvp4c solver in the MATLAB. Three different types of nanoparticles (Cu; Al<sub>2</sub> O<sub>3</sub>; TiO<sub>2</sub> ) in the water-based fluid are analyzed in this paper. Effects of the solid volume fraction  $\phi$  on the fluid flow and heat transfer are evaluated. Numerical results are obtained for velocity and temperature distribution, as well as the skin friction coefficient and local Nusselt number are presented graphically. There exist dual solutions for a certain range of stretching/shrinking parameter  $\epsilon$ . Therefore, a stability analysis is performed to determine which solution is linearly stable and physically realizable. From the stability analysis it is found that the first solution is stable whilst the second solution is not..

**Keyword :** Boundary layer; Dual solutions; Stagnation-point flow; Nanoparticles; Stability analysis