Abstract

In this dissertation, the analytical discussion of viscous fluid flow model is presented. The main objective is to study the impact of CNTs (carbon nanotubes) nanofluid on free convective flow of viscous fluids with Prabhakar fractional derivative between two vertical plates. Nanofluids are colloidal suspensions made out of nanoparticles such as: metals, oxides, carbides and carbon nanotubes in some base fluid, and are known for their thermal conductivity. The nanostructures derived from rolled graphene planes are called carbon nanotubes having many interesting physical and chemical properties. CNTs exist as single walled (SWNTs) and multi walled (MWNTs) structures possessing different properties like, e.g., ultra-light weight, high thermal conductivity, strength and electronic effects ranging from metallic to semiconducting. This phenomenon is studied by considering the generalized fractional thermal flux. The generalized Fourier's law with fractional derivative is introduced in thermal analysis by using Prabhakar time fractional derivative. Solutions for temperature distribution and velocity profile are determined with the help of Laplace and finite sine-Fourier's transforms. The traditional (classical) models (with classical Fourier's law) are recovered as a specific case of the fractional models. The efficacy of fractional as well as physical parameters on developed model for temperature distribution and velocity profile are graphically captioned.