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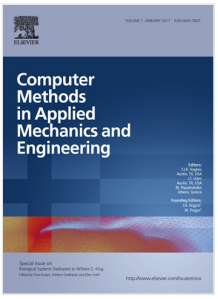

Numerical study for slip flow of carbon-water nanofluids

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Numerical study for slip flow of carbon-water nanofluids

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Abstract: Three-dimensional flow of carbon water nanofluid due to slendering nonlinear stretching sheet with slip effects is covered in this study. Nanofluid saturates the porous space. We consider water based SWNT and MWCNT nanofluids in this study. Isothermal model of homogeneous-heterogeneous reactions regulates the concentration. The system of partial differential equations are converted into ordinary differential equations. The numerical solutions are obtained through bvp4c technique. Tabulated values and graphical illustrations are point out for the influence of sundry variables. Volume fraction corresponds to enhancing the flow behavior while slip variable shows decline in flow. The simulations shows that wall heat flux is inversely proportional to slip effect. However value of heat flux is predicted more in case of larger the values of variable thickness variable. Heat transfer performance of MCNT case is higher when compared with SWCNT. Homogeneous variable and Schmidt number have opposite behaviors on nanoparticle concentration distribution. Favorable agreement is shown through comparison of past and present results in limiting case.

Keywords: Three-dimensional flow; CNTs (SWCNT and MWCNT); Homogenous-heterogeneous processes, Power-law surface velocity; Nonlinear stretching sheet; Variable sheet thickness; Slip effects.

1 Introduction

Lijima reported first time multi walled carbon nanotubes by Krastschmer and Huffman method in 1991 while single walled carbon nanotubes has been investigated by Donald Bethune in 1993. Environment, health care, electronics, energy etc have wide utilization of carbon nanotubes. Nanofluids remove the hurdles associated with low thermal conductivity of materials like water, ethylene glycol, oil and gasolene oil etc [(Iijima, 1991), (Ajayan et al., 1993), (Choi et al., 2003), (Helveg et al., 2004), (Hofmann et al., 2007), (De Volder et al., 2010), (Hayat et al., 2016) , (Haq et al., 2017)]. Hence nanofluids have more thermal conductivity when compared with ordinary liquid. Researchers tried to dispense nanoscale materials of length $1-100$ nm in conventional fluids for the enhancemeant

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