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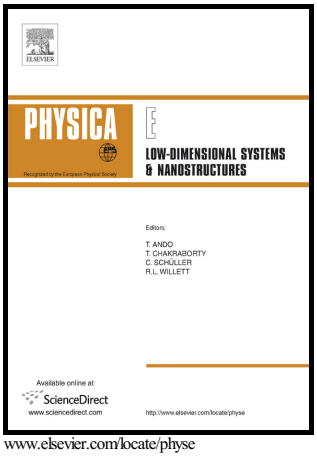

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Modern aspects of homogeneous-heterogeneous reactions and variable thickness in nanofluids through carbon nanotubes

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Abstract: This article examines homogeneous-heterogeneous reactions and internal heat generation in Darcy-Forchheimer flow of nanofluids with different base fluids. Flow is generated due to a nonlinear stretchable surface of variable thickness. The characteristics of nanofluid are explored using CNTs (single and multi walled carbon nanotubes). Equal diffusion coefficients are considered for both reactants and auto catalyst. The conversion of partial differential equation equations (PDEs) to ordinary differential equations (ODEs) is done via appropriate transformations. Optimal homotopy approach is implemented for solutions development of governing problems. Averaged square residual errors are computed. The optimal solution expressions of velocity, temperature and concentration are explored through plots by using several values of physical parameters. Further the coefficient of skin friction and local Nusselt number are examined through graphs.

Keywords: Darcy-Forchheimer flow; Homogeneous-heterogeneous reactions; Base fluids (water, engine and kerosene oils); Internal heat generation; Nonlinear stretching surface; Variable surface thickness.

1 Introduction

The blends of nanoparticles have certain physical properties that update their significance in industrial procedures, for example, food industries, paints, ceramics, coatings and drug delivery systems. Such blends are made of ultrafine nanoparticles. The ultra-superior cooling is one of the critical essentials of present mechanical developments. The nanofluids are generally employed to overcome the poor thermal performance of ordinary fluids like water, oil and ethylene glycol. Carbon nanotubes are cylindrical shapes like structures of carbon

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