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A COMPARATIVE STUDY ON A SYSTEM OF PARTIAL DIFFERENTIAL EQUATIONS

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Abstract: Analytical and numerical research is done to determine how carbon nanotubes (CNT's) nanofluid affects natural convection close to an endless vertically heated plate. The corresponding system of non-linear partial differential equations is solved analytically. The Kamal transform is used to compute the explicit approximate analytical solutions for characteristics of nanofluid flow, such as the velocity and the temperature profile. The analytical expressions for the velocity and the temperature distributions are given in explicit form. The outcomes are next compared with the numerical solution with the help of numerical inversion formula, which demonstrates a good agreement. The average absolute error percentage is calculated for both the velocity and the temperature profile to show the effectiveness of this present approach. Also, the 3D view of non-dimensional temperature and velocity are plotted. The approximate analytical expression for the Nusselt number is consequently derived. Graphical representations are given for the numerous effects of significant physical parameters.

Keywords and Phrases: Fourier's law, Carbon nanotube (CNT), Natural convection flow, The Kamal transform, Parameter perturbation method (PPM), Numerical inversion method (Stehfest's formula).

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