MATHEMATICAL MODEL OF CARBON NANOTUBE WATER-BASED HYBRID NANOFLUID ON A STRETCHED SHEET

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ABSTRACT

Hybrid nanofluids are fluids that comprise of two or more different nanoparticles and are added into a base fluid. Those fluids are selected because of its ability to improve the energy transferring as well as reducing stress properties. This study considers carbon nanotube and copper are chosen as nanoparticles and water as base fluid. This study focuses on the mathematical model of carbon nanotube water-based hybrid nanofluid on a stretched sheet. The partial differential equations (PDEs) which consist of continuity, momentum and energy equations are transformed to ordinary differential equations (ODEs) by applying the similarity transformation variables. The purpose of transforming these equations is to reduce the complexity of the PDEs. Then, Maple software is used to encode the obtained ODEs using the Runge-Kutta Fehlberg Fourth Fifth (RKF45) method. The accuracy of the results obtained from this study is verified by comparing the results with previous research papers. In results and discussion part, several parameters which are heat source/sink parameter, stretching parameter, conjugate parameter, volume fraction of nanoparticles and Prandtl number are discussed over the velocity and temperature profiles. Results have shown that the increment of velocity profile is due to the increment of stretching parameter and volume fraction for copper parameter while volume fraction for carbon nanotube parameter causes the velocity profile decreases. Interestingly, the velocity profile is not affected by heat source/sink parameter, conjugate parameter and Prandtl number. On the other hand, temperature profile increases because of increasing parameters heat source/sink, conjugate and volume fraction for both carbon nanotube and copper. The incremented stretching parameter and Prandtl number result in reduction of temperature profile.

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