عنوان مقاله:

Behavior of Nanofluid with Variable Brownian and Thermal Diffusion Coefficients Adjacent to a Moving Vertical Plate

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خلاصه مقاله:

This work was motivated by studying the behavior of nanofluid adjacent to a moving vertical plate. A non-homogeneous distribution of nanoparticles inside the boundary layer was considered with variable Brownian and thermal diffusion coefficients throughout the layer. Employing group similarity transformation method transformed the governing mathematical model into a system of ordinary differential equations. The resultant system was numerically solved using shooting method. The numerical investigation was carried out for different parameters namely: Prandtl number, Pr, temperature difference ratio, Y, and the ratio of nanoparticles volumetric fraction difference, Yφ, and the attained results were illustrated graphically to examine their effect on different fluid characteristics. The results showed that increasing Pr values decreased the nanofluid velocity, shear stress, temperature distribution and nanoparticles volumetric fraction, while it increased the heat flux and nanoparticles gradient inside the boundary layer. On the other hand, increasing Y values increased the nanofluid velocity, shear stress and heat flux but it decreased the temperature distribution. Also, increasing Yφ values decreased the nanofluid velocity, shear stress and temperature distribution but it increased the heat flux. The characteristics of nanofluids were studied to enhance the thermal conductivity and the efficiency of heat transfer systems. A comparison between the obtained results and the previous published results indicated an excellent agreement.

کلمات کلیدی:

Brownian diffusion coefficient, Group method, Nanofluids fluids, Prandtl number, Volumetric nanoparticles fraction

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