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THE EFFECT OF THERMAL RADIATION, VELOCITY SLIP AND VISCOUS DISSIPATION ON MHD STAGNATION-POINT FLOW AND HEAT TRANSFER OVER A SHRINKING SHEET IN NANOFLUIDS WITH STABILITY ANALYSIS

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Research on heat transfer problems is important in view of applications in industries and engineering. As a result, the present study examines numerically the steady MHD stagnation point flow and heat transfer over a shrinking sheet in the presence of suction, thermal radiation, viscous dissipation and velocity slip. The flow for this problem is considered in nanofluids and a Buongiorno's model is used. The boundary layer equation is derived by reducing the governing equations to an ordinary differential equation. An appropriate similarity transformation is used to convert from PDEs to ODEs. The numerical results were then processed using the bvp4c package in Matlab. The impacts of the characteristics studied were graphically represented and extensively described in this study. Dual solutions occur within a particular range of α, according to the numerical results. Finally, a stability analysis proves that there are two solutions to the problem and only one of them is stable.

Introduction.

For many scientific fields, the stagnation point flow is a challenging issue which requires much attention and research. At present a lot of applications use the stagnation point flow, such as the flow over the aircrafts, oil ships, submarines and others. The stagnation point is acknowledged as being the highest pressure, heat transfer and mass decomposition rate. Many scientific publications have been concerned with the study of the stagnation point flow in its different effects. Ibrahim *et al.* [1] investigates the effects of thermal radiation and heat generation on a continuous MHD flow near a stagnation point. Junoh *et al.* [2] focus on the MHD stagnation point flow in a hybrid nanofluid with an induced magnetic field. Khashiie *et al.* [3] study a mixed convective stagnation point flow, and Najib *et al.* [4] study the slip effect on the stagnation point flow. The shrinking surface is one of the applications in controlling the amount of heat variations which would produce a good quality of final products. The earliest claim is made by Miklavčič and Wang [5], who believe that the solutions for the shrinking sheet are not unique. Next, the problem of shrinking sheet has been studied in assorted situations, such as Najib *et al.* [4], who explore the shrinking sheet in a nanofluid by using a Buongiorno's model. Nandy and Pop [6] focus on the effects of thermal radiation and magnetic field over a shrinking sheet, and Mansur *et al.* [7] study the shrinking sheet with the suction