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Entropy generation in a williamson nanofluid near a stagnation point over a moving plate with binary chemical reaction and activation energy
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Abstract
This research explores the impact of entropy generation on stagnation point flow of a non-Newtonian Williamson nanofluid over a moving plate with activation energy and binary chemical reaction. For energy activation a modified Arrhenius function is invoked. Suitable transformation variables are used to simplify the governing flow problem to obtain self-similar solutions. Numerical solutions for temperature distribution, fluid velocity, concentration of nanoparticles, and entropy profile are established and examined using the shooting method. The results reveal that the velocity profile reduces due to an increasing Williamson parameter, whereas the temperature distribution and concentration of nanoparticles are enhanced with larger values of the Williamson parameter. It is also found that the concentration boundary layer increases due to the activation energy and decreases due to the reaction rate and temperature differences. Moreover, the entropy generation profile is higher for a non-Newtonian fluid compared to a Newtonian one. The results obtained from the present methodology are validated when compared with the data from articles in the existing literature. It gives excellent agreement with the predecessors. The expressions for the Nusselt and Sherwood numbers are also taken into consideration and presented in graphs and tables. © 2018 by Begell House, Inc.

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