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Entropy Generation on MHD Flow of a Casson Fluid over a Curved Stretching Surface with Exponential Space-Dependent Heat Source and Nonlinear Thermal Radiation

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Abstract: The present model concentrates on entropy generation on a steady incompressible flow of a Casson liquid past a permeable stretching curve surface through chemical reaction and magnetic field effects. The exponential space-dependent heat source cum heat and mass convective boundary conditions are accounted for. The resulting nonlinear boundary layer model is simplified by the transformation of similarity. Chebyshev spectral technique is involved for obtaining numerical results of the converted system of the mathematical models. Behavior of the determining thermo-physical parameters on the profiles of velocity, temperature, concentration, skin friction, heat, mass transfer rate, rate of entropy generation, and finally the Bejan number are presented. The major point of the present investigation show that the curvature term weakens the mass transfer profile as the fluid temperature reduces all over the diffusion regime. A decrease in heat generation strengthens the species molecular bond, which prevents free Casson particle diffusion. Furthermore, the mass transfer field diminishes in suction and injection flow medium

Keywords: Casson fluid, Chebychev spectral method, convective boundary condition, irreversibility analysis, nonlinear thermal radiation