

IRREVERSIBILITY ANALYSIS FOR A THIN FILM OF THIRD-GRADE FLUID OVER HEATED INCLINE PLATE

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Abstract: The present article investigates the effect of flow and heat transfer characteristics of a thin layer of third grade fluid that is flowing steadily over a heated incline plate. The mathematical formulations for the physical system are based on the combination of momentum together with heat conservation laws that forms the theoretical framework for the present investigation. The exact solutions of the dimensionless nonlinear problems are obtained and valid for both small and large parameter values. The effects of viscous dissipation and heat transfer are balanced in the energy equation and play a major role in the entropy generation procedure. The result of the mathematical analysis revealed the significance of thermal effects together with the entropy built-up due to incomplete energy conversion.

Keywords: *Third-grade fluid; Thin film; Entropy generation; Heat irreversibility.*