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Two-phase flow of non-newtonian eyring fluid over a vertical stretched surface with temperature dependent viscosity

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Abstract:
The investigation of the fluid flow problem via mathematical approach for non-Newtonian fluid is challenging due to the rise in complexity in its model. However, the study still attracted researchers since the model is able to capture properties of the existing fluid involved in industrial applications. There are several models representing the non- Newtonian fluid. In this paper, the model of Eyring-Powell fluid with dust particle under influence of temperature dependent viscosity is discussed. The model is formulated using the law of conservation of mass, the first law of thermodynamics and Navier-Stokes equation. The complexity of the model is reduced to a set of ordinary differential equations and the computation is done by using the finite difference method. The validation of the present results is attained by direct comparison with those existing in literature which is found to be in excellent agreement. The investigation revealed the viscosity of the fluid affecting the flow characteristics in both the phases.