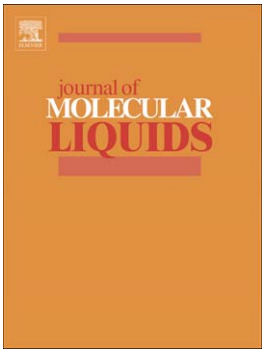

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Tasawar Hayat, Tayyaba Ayub, Taseer Muhammad, Ahmed Alsaedi

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Flow of variable thermal conductivity Oldroyd-B fluid with generalized Fourier's and Fick's laws

Tasawar Hayat[1,2], Tayyaba Ayub[1], Taseer Muhammad[1*] and Ahmed Alsaedi[2]

[1]Department of Mathematics, Quaid-I-Azam University, Islamabad 44000, Pakistan

[2]Nonlinear Analysis and Applied Mathematics (NAAM) Research Group, Department of Mathematics, Faculty of Science, King Abdulaziz University, Jeddah 21589, Saudi Arabia

*Corresponding author E-mail: taseer_qau@yahoo.com (Taseer Muhammad)

Abstract: Here two-dimensional Oldroyd-B fluid flow has been studied in the presence of generalized Fourier's and Fick's laws. The flow is generated due to an exponentially stretchable surface. The process of heat and mass transfer through theory of Cattaneo-Christov double diffusion characterizing the features of thermal and concentration relaxation factors are studied. Temperature dependent thermal conductivity of fluid is taken into consideration. The set of partial differential equations governing the flow of an Oldroyd-B fluid and heat and mass transfer through the Cattaneo-Christov double diffusion theory is developed. The appropriate transformations correspond to the strong nonlinear ordinary differential system. Optimal homotopy scheme is employed for the solutions of governing system. The optimal values of nonzero auxiliary parameters are computed. The solution expressions of temperature and concentration are examined through the plots. The contributions of several pertinent parameters are studied in detail. Further the heat and mass transfer rates are characterized by numerical data. Our computations reveal that the heat and mass transfer rates are higher for larger values of thermal and concentration relaxation parameters.

Keywords: Oldroyd-B fluid; Cattaneo-Christov double diffusion; Variable thermal conductivity; Exponentially stretching surface; Optimal homotopy analysis method (OHAM).