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RESEARCH ARTICLE

Mixed convection boundary layer flow past a horizontal circular cylinder in viscoelastic nanofluid with constant wall temperature

Rahimah Mahat [a,b], Noraihan Afiqah Rawi [b], Abdul Rahman Mohd Kasim [c], Sharidan Shafie [b,*]

[a] *Universiti Kuala Lumpur Malaysian Institute Technology of Industrial Technology, Persiaran Sinaran Ilmu, Johor Bahru, Johor, Malaysia*
[b] *Department of Mathematics, Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia*
[c] *Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia*

* *Corresponding sharidan@utm.my*

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Abstract

The steady of two-dimensional convection boundary layer flow of viscoelastic nanofluid over a circular cylinder with constant wall temperature is investigated in this paper. Carboxymethyl cellulose solution-water (CMC-water) is chosen as the base fluid and copper as a nanoparticle with the Prandtl number Pr = 6.2. The governing boundary layer partial differential equations are transformed into dimensionless forms. Then the obtained equations are solved numerically by using the Keller-Box method. This paper focus on the effect of selected parameter on the flow and heat transfer characteristics and be presented in graphs. The results show that, the velocity profiles are increased while the temperature profiles are decreased by increasing the values of nanoparticles volume fraction and viscoelastic parameter, respectively. Also, the values of reduced skin friction are increased by increasing mixed convection parameter, but the values of heat transfer coefficient produce an opposite behavior with an increasing in mixed convection parameter.

***Keywords*:** Viscoelastic, nanofluid, mixed convection, horizontal circular cylinder, constant wall temperature