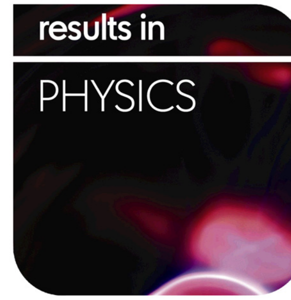
Accepted Manuscript



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PII: S2211-3797(17)32153-8
DOI: https://doi.org/10.1016/j.rinp.2017.12.024
Reference: RINP 1099

To appear in: *Results in Physics*

Received Date: 2 November 2017
Revised Date: 6 December 2017
Accepted Date: 10 December 2017

Please cite this article as: Zeeshan, A., Shehzad, N., Ellahi, R., Analysis of activation energy in Couette-Poiseuille flow of nanofluid in the presence of chemical reaction and convective boundary conditions, *Results in Physics* (2017), doi: https://doi.org/10.1016/j.rinp.2017.12.024

Analysis of activation energy in Couette-Poiseuille flow of nanofluid in the presence of chemical reaction and convective boundary conditions

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Abstract: The motivation of the current article is to explore the energy activation in MHD radiative Couette-Poiseuille flow nanofluid in horizontal channel with convective boundary conditions. The mathematical model of Buongiorno [1] effectively describes the current flow analysis. Additionally, the impact of chemical reaction is also taken in account. The governing flow equations are simplified with the help of boundary layer approximations. Non-linear coupled equations for momentum, energy and mass transfer are tackled with analytical (HAM) technique. The influence of dimensionless convergence parameter like Brownian motion parameter, radiation parameter, buoyancy ratio parameter, dimensionless activation energy, thermophoresis parameter, temperature difference parameter, dimensionless reaction rate, Schmidt number, Brinkman number, Biot number and convection diffusion parameter on velocity, temperature and concentration profiles are discussed graphically and in tabular form. From the results, it is elaborate that the nanoparticle concentration is directly proportional to the chemical reaction with activation energy and the performance of Brownian motion on nanoparticle concentration gives reverse pattern to that of thermophoresis parameter.

Keywords: Convective boundary conditions, Activation energy, Chemical reaction, Couette-Poiseuille flow, Thermal radiation, nanofluid

Nomenclature

$\boldsymbol{V}$	Dimensional nanofluid velocity [ms^{-1}]	T_1	Lower wall temperature [K]
$\boldsymbol{T}$	Dimensional nanofluid temperature [K]	T_2	Upper wall temperature [K]
$\boldsymbol{C}$	Dimensional nanoparticle concentration [K]	$\boldsymbol{g}$	Gravitational acceleration [ms^{-2}]
$\bar{u}$, $\bar{v}$	Dimensional components of velocity along $\bar{x}$ and $\bar{y}$ [ms^{-1}]	T^*	Mean temperature of T_1 and T_2 [K]
$\bar{p}$	Dimensional pressure [Nm^{-2}]	C_1	Lower wall concentration [K]

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