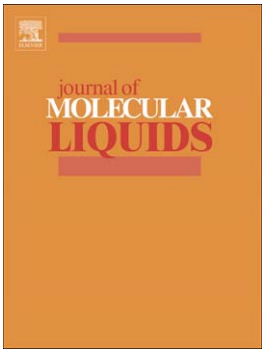

Numerical simulation of nonlinear thermal radiation and homogeneous-heterogeneous reactions in convective flow by a variable thicked surface

M. Ijaz Khan, M. Waqas, T. Hayat, M. Imran Khan, A. Alsaedi

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Numerical simulation of nonlinear thermal radiation and homogeneous-heterogeneous reactions in convective flow by a variable thicked surface

M. Ijaz Khan[a,], M. Waqas[a], T. Hayat[a,b], M. Imran Khan[c] and A. Alsaedi[b]

[a]Department of Mathematics, Quaid-I-Azam University 45320 Islamabad 44000, Pakistan

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

[c]Heriot Watt University, Edinburgh Campus, Edinburgh EH14 4AS,United Kingdom

Abstract: The present work addresses flow in a non-Darcy porous medium. Flow is due to nonlinear stretching surface with variable thickness. Formulations consists of salient features of nonlinear thermal radiation, viscous dissipation, Joule heating and homogeneous-heterogeneous reactions. In whole analysis equal diffusions for reactants and autocatalyst are invoked. Resulting problems are numerically solved using built-in-shooting technique. Outcome of different thermophysical variables i.e., ratio of mass diffusion coefficient, radiation parameter, local inertia coefficient, inverse Darcy number, shape parameter, surface thickness parameter, Hartman number, Prandtl number, Biot number, strength of homogeneous reaction parameter, Eckert number, Schmidt number and strength of heterogeneous reaction parameter on the momentum, thermal and concentration distributions is investigated. Velocity is found to decay for higher estimation of Hartman number while thermal and concentration fields are enhanced for larger Eckert and Biot numbers.

Keywords: Joule heating; Homogeneous-heterogeneous reactions; Viscous dissipation; Non-Darcy porous medium; Convective boundary condition; Nonlinear thermal radiation.

[1]Corresponding author:

mikhan@math.qau.edu.pk (M. Ijaz Khan)