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Thermal-diffusion and diffusion-thermo effects on MHD natural convective flow through porous medium in a rotating system with ramped temperature
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Abstract
Purpose - The purpose of this paper is to analyze the thermal-diffusion and diffusion-thermo effects on magnetohydrodynamics (MHD) natural convective flow through porous medium in a rotating system with ramped temperature. Design/methodology/approach - Using the non-dimensional variables, the flow governing equations along with corresponding initial and boundary conditions have been transformed into non-dimensional form. These non-dimensional partial differential equations are solved by using finite element method. This method is powerful and stable. It provides excellent convergence and flexibility in providing solutions. Findings - The effects of Soret number, Dufour number, rotation parameter, magnetic parameter, Hall current parameter, permeability parameter, thermal Grashof number, solutal Grashof number, Prandtl number, thermal radiation parameter, heat absorption parameter, Schmidt number, chemical reaction parameter and time on the fluid velocities, temperature and concentration are represented graphically in a significant way and the influence of pertinent flow governing parameters on the skin frictions and Nusselt number are presented in tabular form. On the other hand, a comparison for validation of the numerical code with previously published work is performed, and an excellent agreement is observed for the limited case existing literature. Practical implications - A very useful source of information for researchers on the subject of MHD flow through porous mediumin a rotating system with ramped temperature. Originality/value - The problem is moderately original, as it contains many effects like thermal-diffusion (Soret) and diffusion-thermo (Dufour) effects and chemical reaction. © 2017 Emerald Publishing Limited.

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