# THE USE OF THERMODIFFUSION IN CONSTITUENT SEPARATION IN POROUS MEDIA: MULTI-DOMAIN TECHNIQUES

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**ABSTRACT** A numerical study is carried out on double-diffusive, natural convection within a vertical circular porous annulus. The motions are driven by the externally applied constant heat flux imposed across the vertical cylinder while the horizontal surfaces are impermeable and adiabatic. The effects of cross phenomena "Soret effect" were considered in the analysis. It is demonstrated that the cylindrical annulus permits a higher thermal gradient. It is established that such system has an optimal separation for a given thermal Rayleigh number, Ra. For low thermal Ra, the transport mechanism is mainly diffusive with weak separation and for high Ra number the flow is strong that the convective mixing prevents the separation process. To overcome such limitation, two sub-domains (buffer) allowing filtration separation was added. In the formulation of the problem, the Brinkman extended Darcy model is adapted, which allows for no-slip boundary condition on solid surfaces. The flow is assumed to be laminar and two-dimensional. The density variation is taken into account by the Boussinesq approximation. The control-volume approach is used for solving the governing equations. The flow field, temperature and concentration distributions and Nusselt, Nu, and Sherwood, Sh , numbers are obtained in terms of the governing parameters. The effect of the sub-domains scales, the Darcy number, *Da*, and the curvature, *R*, on flow, transfer and specie separation ability is found to be significant.