Abstract

Mohamed Abd El Fatah Mohamed Teamah

numerical simulation of laminar forced convection in horizontal pipe partiallycompletely filled with porous material"

laminar forced convection flow through a pipe partiallycompletely filled with a porous material isrninvestigated numerically for three different cases. in the first case the porous material has a cylindricalrnshape placed at the centerline of the pipe, in the second case the porous material has an annular shapernand in the third case the porous material has a cylindrical shape placed at zi¼ 0.05l from the pipe inlet.rnthe momentum equations are used for describing the fluid flow in the clear region. the darcyernforcheimerebrinkman model is adopted to describe the fluid transport in the porous region. the mathematicalrnmodel for energy transport is based on the one equation model which assumes a local thermalrnequilibrium between the fluidthe solid phases. the study covers a wide range of the dimensionlessrnouter radius of the porous material 0 rpe 1the effect of darcy number, 2 10 4 da 2 10 1.rnthe effect of the porous outer radiusdarcy number on the velocity profiles, the local nusselt number,rnthe average nusselt numberthe pressure are studied. through the study the prandtl number,rnreynolds number, the ratio between pipe length to outer diameterporosity were kept constant at 0.7,rn100, 250.9 respectively.