

Abstract

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effect of reynoldsprandtl numbers on laminar forcedconvection in horizontal pipe partially filled with porous material

laminar forced convective flow through a pipe partially filled with a porous material is investigated numerically. the porous material has a cylindrical shape placed at $z=0.05l$ from the pipe inlet. the momentum equations are used for describing the fluid flow in the clear region. the darcy -forcheimer-brinkman model is adopted to describe the fluid transport in the porous region. the mathematical model for energy transport is based on the one equation model which assumes that there is a local thermal equilibrium between the fluid and the solid phases. the study covers a wide range of the dimensionless outer radius of the porous material $0 < r_p < 1$ the effect of darcy number, 2×10^{-4} to 2×10^{-1} . in addition, the reynolds number has values of 200, 400, 600 while prandtl number has values of 0.7, 5, 1020. through the study the ratio between pipe length to outer diameter to porosity were kept constant at 250.9 respectively.