

Nonsimilarity solutions for mixed convection from horizontal surfaces in a porous medium-variable surface heat flux

**Authors:** Aldoss, T.K., Chen, T.S., Armaly, B.F.

**Abstract:** A nonsimilarity solution for mixed convection from impermeable horizontal surfaces in a saturated porous medium is obtained for the case of variable heat flux. Solutions that cover the entire regime of mixed convection, including the two limits of pure forced convection and pure free convection, are made possible through using two different transformations to the governing equations. The nonsimilarity parameter  $\eta = \sqrt{Ra_x/Pe_x}$  results from transformation of the governing equations for the forced flow dominated regime and the nonsimilarity parameter  $\eta = \sqrt{Pe_x/Ra_x}$  arises from transformation of the governing equations for the buoyancy dominated regime. The two solutions provide results that cover the entire mixed convection regime from pure forced to pure free convection limit. Numerical results for different values of surface heat variation are presented. Correlation equations for the local and average Nusselt numbers, valid for the entire mixed convection regime, are also presented.