International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 8 No. II (March, 2014), pp. 117-136

FINITE ELEMENT ANALYSIS OF CONVECTIVE FLOW OF HEAT AND MASS TRANSFER THROUGH POROUS MEDIUM IN A RECTANGULAR DUCT

G. VENUGOPALA KRISHNA[1], D. CHITTI BABU[2] AND D.R.V. PRASADA RAO[3]

[1] Department of Mathematics,
VRS & YRN College of Engg. & Tech., Chirala, A.P., India
[2] Reader in Mathematics, Department of Mathematics,
Government College (A), Rajahmundry, A.P., India
[3] Department of Mathematics,
S. K. University, Anantapur, A. P., India

Abstract

In this paper an attempt has been made to discuss the combined influence of radiation and dissipation on the convective heat and mass transfer flow of a viscous fluid through a porous medium in a rectangular cavity using Darcy model. The Galerkin finite element analysis with linear triangular elements is used to obtain the Global stiffness matrices for the values of stream function, temperature and concentration. These coupled matrices are solved using iterative procedure and expressions for the stream function, temperature and concentration are obtained as a linear combinations of the shape functions. The behaviour of velocity, temperature, concentration, Nusselt number and Sherwood number are discussed computationally for different values of the governing parameters $Ra, \alpha, N, N_1, Sc, S_0$ and Ec.
