Article Abstract

Title:	Mixed convection flow and heat transfer in a vertical wavy channel containing porous and fluid layer with traveling thermal waves
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Abstract:	Mixed convection flow and heat transfer in a vertical wavy channel filled with porous and fluid layers is studied analytically. The flow in the porous medium is modeled using Darcy-Brinkman equation. The coupled non-linear partial differential equations describing the conservation of mass, momentum and energy are solved by linearization technique, wherein the flow is assumed to be in two parts; a mean part and a perturbed part. Exact solutions are obtained for the mean part and a perturbed part is solved using long wave approximation. Separate solutions are matched at the interface using suitable matching conditions. Results for a wide range of governing parameters such as Grashof number, viscosity ratio, width ratio, conductivity ratio, and traveling thermal temperature are plotted for different values of porous parameter on the velocity and temperature fields. Closed form expression for the skin friction and Nusselt number at both left and right channel walls are also derived and all the results are depicted pictorially. It is found that the presence of porous matrix, viscosity ratio and conductivity ratio suppress the velocity whereas, Grashof number and width ratio promotes the velocity parallel to the flow direction and reversal effect is observed on the velocity perpendicular to the flow direction.
Keywords:	Convective flow; wavy channel; porous medium; traveling thermal waves.