Free Convection in Horizontal Channel with Porous Blocks

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Abstract:

In this paper, laminar natural convection in a horizontal channel provided with blocks porous periodically distributed on its lower adiabatic surface has been analyzed. This numerical study is based on the multiple-relaxation-time (MRT) Lattice Boltzmann method (LBM). The objective of the study is to analyze the effect of the Darcy number ($10^{-1} \leq Da \leq 10^{-6}$), Rayleigh number ($10^{3} \leq Ra \leq 10^{7}$) and the relative blocks height ($1/8 \leq D \leq 1/2$). The obtained results show the important effect of these parameters, which cannot be neglected, on both flow and the heat transfer structure, within this kind of channel.