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Longitudinal heat conduction effects in a microchannel filled with a porous medium and subjected to a uniform heat flux. IAN MONSIVAIS, National Autonomous University of Mexico, JOSE LIZARDI, Autonomous University of Mexico City, FEDERICO MENDEZ, National Autonomous University of Mexico — The conjugate heat transfer between the walls of a microchannel and a fluid circulating inside is numerically studied. The microchannel is filled with a homogeneous porous medium and subjected to a uniform heat flux on the external walls of the microchannel. The governing equations are written in dimensionless form and basically, we show the existence of two dimensionless parameters that govern the problem: the Darcy number, Da , and the conjugate heat transfer parameter α_c/ε_h^2 . The numerical predictions show that for $\alpha_c/\varepsilon_h^2 \gg 1$, the temperature of the fluid at each point of the microchannel is higher than in the case of $\alpha_c/\varepsilon_h^2 \ll 1$. These limits are well known as the thermally thin and thermally thick wall limits respectively.

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