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Abstract

Transient phase change through a horizontal channel that subjected to discrete heat flux and filled with porous media of high-conductivity material, copper, is numerically investigated with n-pentane as the working fluid. The thermal non-equilibrium model is used in conjugate with the multiphase mixture model to analyze the transient behavior of fluid and solid phases. Three cases are studied regarding the position of the discrete heat flux: (1) discrete heat flux at the lower wall, (2) discrete heat flux at the upper wall and (3) discrete heat flux at both the lower and upper walls. Results show that the minimum liquid saturation and the maximum solid temperature (thermal non-equilibrium condition) are located above the heated suction. Results also show that the dryout zone is formed first at the upper wall due to the lower heat transfer from the upper heated wall. Temperature distribution for both solid and fluid phases, liquid saturation, vapor and liquid velocities are presented and analysed.

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Index Terms

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Keywords

Porous Media; Transient; Phase Change; Thermal non-equilibrium model; Horizontal Channel.