عنوان مقاله:

Investigation on the effect of metal foam properties on the PCM melting performance subjected to various heat fluxes

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خلاصه مقاله:

The purpose of this paper is to analyze the effects of structural and mechanical characteristics of metal foam on the melting behavior of phase change materials under the influence of different heat fluxes. To this aim, a two dimensional numerical model considering the non-equilibrium thermal factor, non-Darcy effect and local natural convection was used. The governing equations of PCM and metal foam are discretized using a finite volume method with a collocated grid arrangement. To simulate the melting of PCM, the enthalpy-porosity method is applied which computes the liquid fraction at each iteration, based on the enthalpy balance. The effect of metal foam characteristics (porosity, pores size and base material) and wall heat flux on the PCM melting time were investigated. The result showed that for both wall heat fluxes (۴۰۰۰ W m-۲ and ۸۰۰۰ W m-۲), foam structure and its mechanical properties have significant influence on the PCM melting time which these effects should be considered.

کلمات کلیدی:

Thermal Energy Storage, PCM, Porous medium properties, Non-equilibrium model, wall heat flux