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Numerical study of finned heat pipe-assisted latent heat thermal energy storage system SAEED TIARI, SONGGANG QIU, MAHBOOBE MAHDAVI, Sustainable Energy and Energy Efficiency Laboratory, Department of Mechanical Engineering, Temple University, Philadelphia, PA — In the present study the thermal characteristics of a finned heat pipe-assisted latent heat thermal energy storage system are investigated numerically. A transient two dimensional finite volume based model employing enthalpy-porosity technique is implemented to analyze the performance of a thermal energy storage unit with square container and high melting temperature phase change material. The effects of heat pipe spacing, fin length and numbers as well as the influence of natural convection on the thermal response of the thermal energy storage unit have been studied. The obtained results reveal that the natural convection has considerable effect on the melting process of the phase change material. Increasing the number of heat pipes leads to the increase of melting rate and the decrease of base wall temperature. Also, the increase of fin length results in the decrease of temperature difference within the phase change material in the container, providing more uniform temperature distribution. Furthermore, it is showed that the number of fins does not affect the performance of the system considerably.

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