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Experimental Investigation of A Heat Pipe-Assisted Latent Heat Thermal Energy Storage System[1] SAEED TIARI, MAHBOOBE MAHDAVI, Mechanical Engineering Department, Gannon University, Erie, PA, SONGGANG QIU, Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV — In the present work, different operation modes of a latent heat thermal energy storage system assisted by a heat pipe network were studied experimentally. Rubitherm RT55 enclosed by a vertical cylindrical container was used as the Phase Change Material (PCM). The embedded heat pipe network consisting of a primary heat pipe and an array of four secondary heat pipes were employed to transfer heat to the PCM. The primary heat pipe transports heat from the heat source to the heat sink. The secondary heat pipes transfer the extra heat from the heat source to PCM during charging process or retrieve thermal energy from PCM during discharging process. The effects of heat transfer fluid (HTF) flow rate and temperature on the thermal performance of the system were investigated for both charging and discharging processes. It was found that the HTF flow rate has a significant effect on the total charging time of the system. Increasing the HTF flow rate results in a remarkable increase in the system input thermal power. The results also showed that the discharging process is hardly affected by the HTF flow rate but HTF temperature plays an important role in both charging and discharging processes.

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