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Enhancement of Thermal Storage Properties of Phase Change Material by Using Metallic Swarf

Abstract- *The phase change materials (PCM) is commonly used for storage heat as a latent heat, the main disadvantage of this method is slow response time during charging and discharging; this due to the PCM thermal properties. This work studied experimentally the enhancement of thermal properties of PCM by adding various metallic swarf such as copper, aluminum and iron swarf. Metallic swarf used as thermal conductivity promoter to produce modified paraffin wax samples. The addition of the previous enhancers was conducted with a weight fraction of (7.5%, 12.5% and 17.5%) to the whole weight of the mixture. The experimental results showed that adding of metallic swarf to the PCM decrease the charging time by (5.5 - 22.1%) for weight fractions from (7.5-17.5%) respectively. The addition of metallic swarf to PCM showed enhancement of discharging time by (27 - 77 %) compared with the case of pure wax for copper swarf weight fraction of (7.5 – 17.5%) respectively. Thermal conductivity of PW was enhanced by using aluminum, copper, and iron swarf, where it is found that the maximum enhancement about (53 times) due to the addition of (17.5%) of aluminum swarf. This method is considered a successful economic way due to the use of manufacturing waste.*

Keywords- *Thermal energy storage systems, Latent heat storage, Phase change materials, Heat transfer, Paraffin wax, Charging time, swarf.*

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