

LATENT SOLAR THERMAL STORAGE SYSTEMS, PACKED BEDS WITH SPHERICAL PHASE CHANGE CAPSULES OF DIFFERENT PHYSIOCHEMICAL PROPERTIES

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Abstract: A latent thermal storage system LTSS of spherical PCM capsules packed bed is considered in this investigation . Such a LTSS is considered to be one of the most practical systems for the purpose . It is compact, easy to construct and maintain, with very good storage characteristics. Physiochemical properties of PCM and the capsules size are the two most effective properties of the storage system . Number of researchers investigated the performance of such systems under different designs and operating conditions . In this work a LTSS system is constructed with PCM capsules of different sizes and of different PCM properties . The capsules are packed with different capsules sizes and varying PCM properties along the bed to match the temperature profile best . The performance of the LTSS as described is investigated numerically and presented in terms of the bed temperature profiles function of location and charging time. The effectiveness of the storage system is presented in terms of time evolution of the liquid fraction of the PCM and in terms of the percentage of the energy storage in the PCM. The first represent the degree of utilization of the PCM and the later shows the effectiveness of the heat transfer and storage process of the LTSS for different system designs . The results as above are compared with the reference cases of uniform arrangements with uniform and constant PCM properties along the bed.