

The phase change heat transfer process has a time-dependent solid-liquid interface during melting and solidification, where heat can be absorbed or released in the form of latent heat [1]. A uniform energy equation is established in the whole region, treating the solid and liquid states separately, corresponding to the physical parameters of the PCMs in the solid and ...

A novel phase change thermal storage device based on micro heat pipe array with a more rational heat transfer structure was proposed in this study. 3D numerical models of the relative positions of different MHPAs to the heat transfer fluid channels were developed, and a comparative study was carried out.

1. Introduction. The burning of fossil fuels pollutes the atmosphere, and utilizing renewable energy is needed to minimize such impacts. Thermal energy storage (TES) using PCM can store solar energy for later use that is employable in buildings, solar systems, and heat energy recovery systems [1], [2], [3]. Latent heat thermal energy storage (LHTES) stores 5-14 ...

Energy storage technology has greater advantages in time and space, mainly include sensible heat storage, latent heat storage (phase change heat storage) and thermochemical heat storage. The formula (1-1) can be used to calculate the heat [2]. Sensible heat storage method is related to the specific heat capacity of the materials, the larger the ...

The heat pipes are two-phase flow passive and reliable devices that transfer heat effectively and are vastly utilized in thermal systems. A summary of experimental and numerical studies related to advanced technologies of applications of heat pipes and thermosiphons is offered in this review. This paper focused mainly on the hybrid combinations ...

A photovoltaic panel coupled with heat pipes and phase change materials could be a promising solution to generate electricity and utilize the waste heat simultaneously. ... Ghali, K.: Heat-pipe PV-T system with phase change thermal storage to enhance the energy efficiency (2015) Sobol'iak, P., et al.: Heat transfer performance of paraffin wax ...

Hybrid combination of the heat pipe and phase change materials This section reviews the previous work carried out on thermal systems using the combination of heat pipes and phase change materials. Phase change materials (PCMs) are widely used in thermal energy storage and thermal managing applications. A heat pipe (HP) has a high heat transmis-

The thermal energy storage system in this study consists of a square container, finned heat pipes, and potassium nitrate (KNO_3) as the phase change material. The charging process of the same thermal energy storage system was reported in ...

Phase change energy storage heat pipe

Abstract. Phase change materials (PCMs) are promising for storing thermal energy as latent heat, addressing power shortages. Growing demand for concentrated solar power systems has spurred the development of latent thermal energy storage, offering steady temperature release and compact heat exchanger designs. This study explores melting and ...

The fin heat exchange pipes are fixed by the lower tube plate and the upper tube plate. The phase change heat storage material is filled in the gap part of the shell cylinder, the annular plate circumscribes the base ring, and the base ring supports the entire shell cylinder. ... Simulation optimization research on solar energy-phase change ...

Numerical simulations are performed to analyze the thermal characteristics of a latent heat thermal energy storage system with phase change material embedded in highly conductive porous media. A network of finned heat pipes is also employed to enhance the heat transfer within the system. ANSYS-FLUENT 19.0 is used to create a transient multiphase ...

Heat pipe coupled Latent Heat Thermal Energy Storage (LHTES) is a commonly used technique for improving heat storage, due to its advantages such as heat conduction, isothermal, and uniform temperature. Adding fins to the heat pipe can enhance energy storage efficiency and system performance.

Pulsating heat pipes (PHPs) were fabricated and used in the thermal storage system as heat transfer devices between PCM and saline water due to their high conductivity, one-way heat transfer (thermal diodes), temperature control, and single-charging operation (compared to the high number of charging operations when using thermosiphon heat pipes) ...

Experimental Study of Thermal Energy Storage Characteristics using Heat Pipe with Nano-Enhanced Phase Change Materials. Jogi Krishna 1, ... [12] Sahu S.K and Chougule Sandesh S 2015 Thermal Performance of Nanofluid Charged Heat Pipe With Phase Change Material for Electronics Cooling Journal of electronic packaging 137 021004-7.

For further improvement, scholars have tried to develop BTMS independent of external circuitry, such as heat pipe (HP) and phase change material (PCM). Both have a simple structure, but also have their own advantages and disadvantages. ... Despite the high energy storage density of phase change materials, the thermal conductivity is generally ...

Today's heat storage technologies mainly include sensible heat energy storage, latent heat energy storage (phase change energy storage), and thermochemical energy storage. ... (HTF) pipe, the stronger the heat conduction and the weaker the convection. There is an optimal balance between heat conduction and convection. The detailed structure of ...

Heat pipes and thermosyphons--devices of high effective thermal conductivity--have been studied for many

years for enhancing the performance of solid, liquid and phase change material (PCM) heat stores. However, as the applications of heat storage widen, from micro-electronics thermal control to concentrated solar heat storage and vehicle ...

Semantic Scholar extracted view of "Experiment study of oscillating heat pipe and phase change materials coupled for thermal energy storage and thermal management" by Jiateng Zhao et al. Skip to search form Skip to main content Skip to account menu. Semantic Scholar's Logo. Search 222,152,748 papers from all fields of science ...

PCM Heat Sinks can absorb thermal energy (heat) with minimal temperature rise during the solid-to-liquid phase transition. During this phase transition, the latent heat (J/kg) is at least one (1) to two (2) orders of magnitude higher than the sensible energy that can be stored by the specific heat of a material in its solid or liquid phase.

In this paper, influence of void ratio on phase change of thermal storage unit for heat pipe receiver under microgravity is numerically simulated. Accordingly, mathematical model is set up. Numerical method is offered. The liquid fraction distribution of thermal storage unit of heat pipe receiver is shown. Numerical results are compared with experimental ones in Japan. ...

The use of heat pipes (HPs) between the TEC and PCM as heat transfer elements can overcome the aforementioned problems. ... Analysis of cold thermal energy storage using phase change materials in freezers. J. Energy Storage, 51 (2022), Article 104433, 10.1016/j.est.2022.104433. View PDF View article View in Scopus Google Scholar [10] M ...

The system is designed to recover and store waste thermal energy from residual fluids using heat pipes for recovery and an environmentally friendly phase change material for heat storage. Experimental investigation was conducted using water as the primary agent and varying the temperature between 60 °C, 65 °C, and 70 °C at a constant flow ...

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