

How effective is a heat exchanger?

As mentioned in Section 2.5, the effectiveness of heat exchanger is usually regarded as an ideal value in previous studies, that is, it is set to be equal in energy storage and energy release phases and is not affected by other parameters.

How does pressure affect heat exchanger performance?

The pressure loss in the effectiveness of heat exchanger also affects heat exchanger performance. In addition, due to changes in the pressure in compressed air storage during energy storage and release process and changes in operating conditions, the air mass flow also changes, which also leads to changes in the effectiveness of heat exchanger.

Are solid-to-liquid phase-change materials suitable for thermal energy storage?

J. Heat Mass Transfer. May 2024, 146 (5): 054501 (6 pages) Recently, there has been a renewed interest in solid-to-liquid phase-change materials (PCMs) for thermal energy storage (TES) solutions in response to ambitious decarbonization goals.

What is the principle of TES in a double-tank heat exchange fluid?

The principle of TES in a double-tank heat exchange fluid is as follows: TES medium and cold storage medium are respectively stored in two tanks, and the hot and cold fluid is circulated in system along with energy storage process and energy release process, and heat transfer is performed through heat exchanger by indirect contact heat exchange.

What is double-tank heat exchange fluid heat storage?

The double-tank heat exchange fluid heat storage is widely used in practical demonstration projects because of its mature technology, low cost and simple system. It is also a widely used and researched TES in CAES.

Can compact heat exchanger design overcome PCM thermal conductivity limitations?

Results show that reducing the PCM-encasement thickness yields substantially better performance than by improving the thermal conductivity, thereby demonstrating the potential for compact heat exchanger design to overcome the PCM thermal conductivity limitations. 1. Sol. Energy Mater.

The effects of nanoparticle concentrations and tree fin branching angles on the fluid dynamics, melting time, heat transfer, energy storage, and entropy generation characteristics were investigated. By employing tree fins, the melting time was respectively reduced by up to 60.20% and 36.05% compared to the finless case and the rectangular fins ...

The medium and deep U-type borehole heat exchanger (MDUBHE) coupled with ground source heat pump

systems has recently received extensive attention as a novel closed-loop geothermal energy ...

In order to explore the shell-side flow and heat transfer characteristics for spiral wound heat exchanger (SWHE) in floating liquefied natural gas (FLNG), a model was established to simulate the ...

Energy storage performance improvement of phase change materials-based triplex-tube heat exchanger (TTHX) using liquid-solid interface-informed fin configurations March 2023 Applied Energy 333 ...

Semantic Scholar extracted view of "Comparative study of thermally stratified tank using different heat transfer materials for concentrated solar power plant" by Tielu Jiang et al. ... This work evaluates the influence of combining twisted fins in a triple-tube heat exchanger utilised for latent heat thermal energy storage (LHTES) in three ...

Abstract. A parametric analysis has been conducted for the phase change material (PCM)-air cooled battery pack. The system is composed of 26650 lithium-ion LiFePO₄ batteries enclosed by PCM. A one-dimensional thermal model for the PCM domain is developed using the enthalpy method. The finite volume method is employed to solve the energy ...

Thermal Energy Storage (TES) is a crucial and widely recognised technology designed to capture renewables and recover industrial waste heat helping to balance energy demand and supply on a daily, weekly or even seasonal basis in thermal energy systems [4]. Adopting TES technology not only can store the excess heat alleviating or even eliminating ...

Jiang [70] established a heat transfer model in packed bed, and used ANSYS software to simulate the TES characteristics of packed bed. And then the numerical simulation ...

With the increasing proportion of new energy generation and the increasing depth of peaking of thermal power generation, the contradiction between supply and demand in energy is becoming increasingly prominent, and energy storage technology has become a research hotspot. 1,2 Phase change heat storage technology has a broad application prospect ...

Non-supplementary Fired Compressed Air Energy Storage System Ping Jiang, Ranran Chang a and Haijian Lv. College of Electronic and Informational Engineering, Hebei University, Baoding 071002, China. ... The model of NF-CAES system using heat exchanger storage of compressed air, the cooling water as the heat storage medium, cooling after high ...

The square fin was used to improve the heat transfer rate of the concentric tube phase change heat exchanger. ... Negnevitsky M, et al. Melting characteristics of a longitudinally finned-tube horizontal latent heat thermal energy storage system. Sol Energy 2021; 230: 333-344. Crossref. ... Purchase 24 hour online access to view and download ...

Semantic Scholar extracted view of "Energy storage performance improvement of phase change materials-based triplex-tube heat exchanger (TTHX) using liquid-solid interface-informed fin configurations" by B. Palmer et al. ... Philani Hlanze Aly Elhefny Zhiming Jiang Jie Cai H. Shabgard. Engineering, Environmental Science. Applied Energy. 2022; 12.

Moving packed bed particle/SCO₂ heat exchanger (MPBE) is a critical equipment to integrate particle thermal energy storage technology with SCO₂ power cycle block in the next generation CSP plants.

Recent studies have focused on improving the thermal performance of PCM HXs by optimizing the spacing and geometry of fins to maximize the energy storage capacity of the system [54, 55] one study, PCM HX performance was numerically and experimentally investigated for rectangular-type and fractal-type metal fins [54]. The HX system incorporated a 50 °C phase ...

Abstract. Recently, there has been a renewed interest in solid-to-liquid phase-change materials (PCMs) for thermal energy storage (TES) solutions in response to ambitious decarbonization goals. While PCMs have very high thermal storage capacities, their typically low thermal conductivities impose limitations on energy charging and discharging rates. Extensive ...

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Sun B, Xu Y, Zhang Y, et al. Simulation and optimization research of double energy storage floor based on heat transfer characteristic of phase change materials. J Energy Storage 2022; 51: ... He S, Habte BT, Jiang F. LBM prediction of effective thermal conductivity of lithium-ion battery graphite anode. ... Purchase 24 hour online access to ...

4 Particle Technology in Thermochemical Energy Storage Materials. Thermochemical energy storage (TCES) stores heat by reversible sorption and/or chemical reactions. TCES has a very high energy density with a volumetric energy density ~2 times that of latent heat storage materials, and 8-10 times that of sensible heat storage materials 132 ...

The indirect heat transfer method which can obtain clean afterheat is a better choice for granular waste heat recovery. And the most challenge is how to enhance the heat transfer in the in-direct heat exchanger, especially in a granular heat recovery system [11,23,24]. Herein, an novel Moving Bed Indirect Heat Exchanger (MBIHE) Nomination Abbreviation

@article{Jiang2024ExperimentalAN, title={Experimental and numerical study on the attenuation and recovery characteristics of ground temperature during deep-buried pipe heat transfer}, author={Chao Jiang and Chao Li and Zilong Jia and Gaozhe Xing and Yanling Guan and Ruitao Yang and Jiale Wu},

journal={Energy and Buildings}, year={2024}, url ...

DOI: 10.1016/b978-0-12-819723-3.00127-x Corpus ID: 244695398; Second Law Analysis of Latent Heat Based Thermal Energy Storage Systems @article{Jiang2021SecondLA, title={Second Law Analysis of Latent Heat Based Thermal Energy Storage Systems}, author={Zhu Jiang and Yelaman Maksum and Zhiwei Tang and Xianglei Liu and Yimin Xuan and Yulong ...

Recent theoretical studies dealing with the novel scheme for earth-deep hot dry rock geothermal energy extraction based on the use of a super-long heat pipe indicate its superior technical viability.

Abstract. Performance of a novel ultracompact thermal energy storage (TES) heat exchanger, designed as a microchannel finned-tube exchanger is presented. With water as the heating-cooling fluid in the microchannels, a salt hydrate phase change material (PCM), lithium nitrate trihydrate ($\text{LiNO}_3 \cdot 3\text{H}_2\text{O}$), was encased on the fin side. To establish the ...

View all access and purchase options for this article. Get Access. References. 1. ... Sun B, Xu Y, Zhang Y, et al. Simulation and optimization research of double energy storage floor based on heat transfer characteristic of phase change materials. J ... He S, Habte BT, Jiang F. LBM prediction of effective thermal conductivity of lithium-ion ...

DOI: 10.1016/j.icheatmasstransfer.2023.107127 Corpus ID: 264894805; Heat transfer efficiency enhancement of gyroid heat exchanger based on multidimensional gradient structure design @article{Chen2023HeatTE, title={Heat transfer efficiency enhancement of gyroid heat exchanger based on multidimensional gradient structure design}, author={Fei Chen and ...

DOI: 10.1016/J.ENCONMAN.2008.04.013 Corpus ID: 93397663; Heat transfer of high thermal energy storage with heat exchanger for solar trough power plant @article{Vaivudh2008HeatTO, title={Heat transfer of high thermal energy storage with heat exchanger for solar trough power plant}, author={Sarayooth Vaivudh and Wattanapong Rakwichian and Sirinuch Chindaruksa}, ...

In this study, we have established an experimental platform featuring a shell and tube heat exchanger (STHE) combined with phase change material (PCM) to investigate its energy ...

The comprehensive impacts of heat-transfer fluid and backfill body on the heat-transfer efficiency and thermal influencing radius of the horizontal single pipe were investigated. The growth ratio of heat-transfer capacity can be as high as 227.3% when thermal conductivity increases from 0.5 kJ / (kg \cdot $^{\circ}\text{C}$) to 2 kJ / (kg \cdot $^{\circ}\text{C}$). The heat ...

DOI: 10.1016/j.est.2023.106785 Corpus ID: 256749600; Numerical investigation of a plate heat exchanger thermal energy storage system with phase change material @article{Taghavi2023NumericalIO,

title={Numerical investigation of a plate heat exchanger thermal energy storage system with phase change material}, author={M M Taghavi and Minna ...

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 [].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 ...

Abstract. Based on abundant hydrothermal geothermal resources at the depth of 1000-2000 m formation in the basin of the BoHai Bay, the deep borehole heat exchanger (DBHE) combined with the geothermal wells is proposed. According to the modified thermal resistance and capacity model (MTRCM), the heat transfer models inside and outside ...

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