Direct Expansion Solar System

Does a direct expansion solar assisted heat pump provide heat load?
Abstract. Direct expansion solar assisted heat pump (DX-SAHP) systems have the potential to provide the heat loadrequired for domestic hot water (DHW)

What is a direct expansion solar assisted heat pump (DX-SAHP)?
Columbus, Ohio, USA. October 30-November 3, 2022. V006T08A014. ASME. Direct expansion solar assisted heat pump (DX-SAHP) systems have the potential to provide the heat load required for domestic hot water (DHW) sustainably and with minimum emissions. DX-SAHPs utilize a solar thermal collector to evaporate a working fluid.

What is a direct-expansion solar-assisted heat pump?
The developed system in this investigation is a direct-expansion solar-assisted heat pump that works with both,photovoltaic and thermal solar energy by using photovoltaic panels and a collector(Fig. 1). Fig. 1. DX-SAHP scheme (P is a manometer and T is a thermocouple).

Are direct-expansion solar assisted heat pumps conductive to the environment?
Direct-expansion solar assisted heat pumps (DX-SAHPs) have a great potential for various applications and are conductive to the environmentby using low-temperature ambient energy and solar radiation. This review paper aims at presenting the advancements and the current status of DX-SAHPs.

Can solar integrated air source heat pump systems meet space-heating demand?
In addition, the ducting layout of heat pump systems for space heating is another challenge. Therefore, Dong [89] proposed and investigated a solar integrated air source heat pump system aiming to meet the individual space-heating demand of users living in high-rise apartment buildings.

What is a split type solar-assisted heat pump?
The split type solar-assisted heat pump is the main form existing in a large number of studies. It includes a collector-evaporator installed outside to obtain heat from the sun or ambient air,and the other three components inside building.

:,,,,, Abstract: In order to analyze the actual operation characteristics of direct-expansion solar-assisted heat pump for radiant floor heating system in Northern Cold Region, a direct-expansion solar-assisted heat pump system using propane (R290) as refrigerant is designed and built, in which the effect ...

Direct expansion solar-assisted heat pump system (DX-SAHP) is proven to be an effective energy-saving application. Due to the fact that the traditional bare-plate type direct expansion solar-assisted heat pump occupies large footprint and is inefficient under low solar irradiation, a modified direct expansion solar-assisted heat pump system with finned-tube ...

The concept of direct-expansion solar-assisted heat pump (DX-SAHP) technology was first introduced in the 1950 s [2]. Unlike indirect-expansion solar-assisted heat pumps, DX-SAHP systems eliminate the need for water circulation within the solar collector system, thereby reducing heat transfer losses and significantly enhancing energy ...

A direct-expansion solar-assisted heat pump (DX-SAHP) water heater is studied numerically. A simulation model, which includes the models of components and the frost formation of the collector/evaporator, is established to research the heating performance of the system and the growth of frost.

In this paper, the design, fabrication, and testing of a DX-SAHP system for cold climates is presented. A mathematical model representing the system was developed by ...

PV systems, which are an effective way of capturing and transforming solar radiation into electricity, have been incorporated into building-integrated photovoltaic (BIPV) systems [[4], [5], [6]] or used in remote places as a feasible alternative to extending power lines [7].Furthermore, only 10-20% of solar energy can be converted directly into electrical power, ...

Direct expansion solar assisted heat pump systems have widely been used in solar drying, water heating, space heating, space air conditioning and cold storage applications. With the high potentials of its efficient heat retrieving unit to effectively use low temperature solar energy, the investigation of the heating and cooling applications of the system has advanced ...

A direct expansion solar/air source heat pump system (DX-S/ASHP) with a direct expansion solar collector evaporator and an external air heat exchanger has been built. Two sets of refrigerant/water heat exchangers were added at the condensing end for different water temperature supplies. The detailed system is shown in Fig. 1. Due to the ...

Direct-expansion solar assisted heat pumps (DX-SAHPs) have a great potential for various applications and are conductive to the environment by using low-temperature ambient ...

The novel photovoltaic-thermal and air dual-heat-source direct-expansion heat pump system operating under the solar energy source or solar energy and air dual-heat-source modes exhibited excellent operation performance under the testing condition, with increase in the coefficient of performance by 23.6 %-31.4 % compared with the air source mode.

Combining solar thermal collectors and heat pumps into a single solar-assisted heat pump (SAHP) system is a promising technology for offsetting domestic hot water (DHW), space-heating, and cooling loads more efficiently. Task 44 of the Solar Heating and Cooling (SHC) Programme of the International Energy Agency (IEA) is currently investigating ways to ...

The objective of this study was to investigate the impact of solar radiation intensity on the performance of direct-expansion solar PVT heat pump systems. To this end, an experimental setup was constructed for direct ...

Direct-expansion solar assisted heat pump (DX-SAHP) is a solar thermal conversion technology. The DX-SAHP can be regarded as a significant expansion of solar energy thermal utilization as well as heat pump applications [2] a DX-SAHP, the integrated solar collector-evaporator collects solar energy and vaporizes refrigerant, which enables the system to equip ...

A direct-expansion solar-assisted heat pump hot water system using variable frequency control was studied experimentally. The system mainly consisted of a frequency conversion compressor, a condenser using microchannel heat exchanger, a bare plate solar collector/evaporator, and an electronic expansion valve as the throttling device.

Therefore, the main object of this study is to propose a novel direct expansion heat pump assisted solar drying system (DEHPASDS), the drying system was designed and constructed at Jinan, China. The novelty of DEHPASDS is to use the collector/evaporator as the heat absorbing plate of the solar air collector for different operation control strategy.

In the reference paper, a direct-expansion solar-assisted heat pump with evacuated tube collector-evaporator system was tested for different parameters. In the present paper, the methodology reflects the performance of the DX-SAHP system based on determined heating output values.

The direct expansion solar assisted heat pump (DX-SAHP) is a kind of hybrid system that combines solar collector and heat pump together. For a heat pump system, one of the key factors that affect the coefficient of performance (COP) is the evaporating temperature.

In the solar direct-expansion heat pump system, the input and output of the energy both are rely on the phase changing of the refrigerant; all of the components are linked together by the refrigerant. Therefore, it is very important and necessary to select a reasonable pointcut to simplify the calculation process. The compressor which connected ...

In this paper, the thermodynamic performance of a direct expansion solar assisted heat pump (DX-SAHP), which is used to heat domestic water from 20°C to 45°C, is theoretically investigated. The system includes a 3m 2 single-cover flat plate solar collector, 0.150m 3 water tank and 70m tube immersed in the water tank as a condenser. The effect ...

A flexible design scheme for a direct expansion solar-assisted heat pump system is presented. Based on the flexible theory for the virtual operating point of the basis design, ...

The objective of this study was to investigate the impact of solar radiation intensity on the performance of

direct-expansion solar PVT heat pump systems. To this end, an experimental setup was constructed for direct-expansion photovoltaic (PVT) solar heat pump water heating systems and photovoltaic (PV) power generation systems. The system ...

: ;;; Abstract: The classification,principles and characteristics of the solar-assisted heat pump system are summarized,and some latest researches on collector evaporator and system capacity matching as well as some related properties of the direct-expansion solar-assisted heat pump system(DX-SAHP) are ...

In order to identify these new approaches, DX-SAHP systems can be classified as direct expansion solar-air dual source heat pump (DX-SA-DHP), direct expansion solar-air parallel heat pump (DX-SA-DHP) and direct expansion solar-air serial heat pump of ...

A comparison of the thermal performance of direct expansion solar-air source heat pump system (SAHP-DX) in SAM (solar and air mode) and AM (air mode) operating with R410A is investigated for water heating. Performance characteristics of the system in both summer and winter experimental days are evaluated and compared with respect to T a, I g ...

Wang et al. (2019) compared PVT and traditional solar systems for heat and power cogeneration. The evaluation showed that the PVT system has the highest total power output and emission reduction potential. ... The direct-expansion photovoltaic-thermal heat pump system is an energy-efficient and economically feasible approach towards building ...