Heat pipe solar collector simulation

How is solar collector thermal efficiency determined?
The solar collector thermal efficiency is determined according to EN ISO 9806:2013standard and the absorber temperature distribution is measured through the back side of collector panel. The measured collector thermal efficiency and absorber temperature distribution are compared with the results from two different numerical models.

How does a solar collector work?
The energy conversion,which occurs inside solar collector,is carried out by a flat-plate,high conductive metal sheet called as the absorber plate. Useful heat,collected in the absorber plate,is taken away by working fluid,pumped through the flow channels which are welded to the absorber plate.

Is solar collector thermal efficiency correlated with internal temperature distribution?
The solar collector thermal efficiency is strongly correlatedwith the internal temperature distribution. In order to form highly accurate numerical model with proper heat losses,the spatial absorber temperature needs to be obtained.

Can a solar collector be modeled using a convective heat loss coefficient?
In this paper,the solar collector is modeled with assumption of uniform energy generation in the absorber tube and considering only a convective heat loss coefficient,calculated using external software SolEffs and set as an input for the CFD calculations.

How does temperature affect solar collector performance?
Higher temperature of fluid in marginal fins will also cause greater inequality of mass flow rate in other pipes,which contributes to the reductionof solar collector performance. Similar analysis could not be done with distributed-character model without an edge correction factor.

What are the different types of solar collector modeling methods?
These methods provide quite simple form of differential equations, with distributed character (D-C), which can be solved with the finite differences method. Another group of solar collector modeling approaches, highly developed during the last years, are CFD numerical methods .

The theoretical model involves three processes which are (i) the conversion of solar energy into thermal energy using absorber surface, (ii) transportation of the absorbed ...

TRNSYS simulation model for the forced flow of the heat transfer fluid in solar water heating systems with either flat plate or heat pipe evacuated tube collectors was created by Ayompe et al. [5]. ... fluid inside thermosyphon heat pipe solar collector. Experiments for ...

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This paper presents numerical and experimental investigation of a flat-plate solar collector. Fluid flow and heat transfer in the collector panel are studied by means of ...

The thermal performance of an individual pipe in an evacuated tube solar collector with a heat pipe is investigated by an analytical method based on the energy balance ...

Solar collector (SC) technology has proved promising applications in heating, desalination, refrigeration of water, etc. Thermal performance (TP) of Heat Pipe (HP) improves by combining the various profiled absorber plate with a flat-plate collector. The objective is to study HP attributes" effect (heat inputs, pipe inclinations, and mass flow rates of water) with various ...

The thermal efficiency (i s) of such a system is defined as the ratio of heat transfer rate (q ?) over the product of collector gross area (A c) and the total global solar radiation (G t) on the surface of the collectors [28].The results from experimental work showed an efficiency improvement of 26% for the normal operation and 66% for the stagnation mode compared to ...

SET 2002 1st International Conference on Sustainable Energy Technologies 12-14 June 2002, Porto, Portugal paper REN6 SIMULATION OF THE THERMAL BEHAVIOUR OF A HYBRID HEAT PIPE SOLAR COLLECTOR Jorge Facão and Armando C. Oliveira Faculty of Engineering, University of Porto Dept. Mechanical Engineering and Industrial Management Rua Dr. Roberto ...

The heat transfer in a typical evacuated tube heat pipe solar collector describing the heat flux from the sun, the different losses by conduction, ... The evacuated tube with the entire components and a solar simulator was mounted into a mobile structure. Inside the 4-L water tank, the condenser side of the gravity-assisted heat pipe was fitted.

Abstract: This paper presents the construction of a heat pipe for a solar collectors. Using finite element simulation, the internal temperature distribution of the heat pipe and its affecting elements are investigated. The following were obtained from the simulation: the thermal resistance of the heat pipe, the operating temperature, and the flow rate of the work mass under different ...

A nonlinear interface identification simulation for the temperature of the Evacuated Tube - Heat Pipe Solar Collector (ETHPSC) was included in this work. To col

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