

Can artificial neural networks predict layer temperatures in a solar thermal system?

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<div class="df_qntext">Can two models of solar thermal collectors be compared?

Two models of solar thermal collectors will be compared and used in a system containing two different heat storages in order to study the behaviour of these models. The tests were carried out in a Simulink based block-oriented environment called SimSolar. Content may be subject to copyright. ...

<div class="df_qntext">Why do we need a mathematical model for solar power generation?

In solar PV power generation systems, applications such as maximum power point tracking, power prediction, fault diagnosis and efficiency analysis are often involved. In these applications, the corresponding mathematical model of PV cells is required as a theoretical support.

<div class="df_qntext">Can artificial neural networks predict layer temperatures in a solar thermal system?

In this study an artificial neural network (ANN) model is introduced for modelling the layer temperatures in a storage tank of a solar thermal system. The model is based on the measured data of a domestic hot water system.

<div class="df_qntext">Can a simple model predict energy storage?

Despite this shortcoming of the simple model, it can predict all three parameters confidently and gives a maximum error of 9% in the energy storage compared with a 7% error in a recent 2-D mathematical model .
Fig. 4. Comparison of Simulated Temperature with experimental work .

<div class="df_qntext">Can a mathematical model accurately reflect the working nature of PV cells?

As a well-built mathematical model, it should be able to correctly reflect the working nature of PV cells. Meanwhile, the established model can reflect the characteristics of actual PV cells under different temperatures and different solar irradiances as accurately as possible.

<div class="df_qntext">Can datasheet information be used in photovoltaic cell modeling?

Data in datasheet information is fully utilized in the processing of modeling. In order to tackle the nonlinear transcendental equation and intractability of traditional photovoltaic (PV) cells model, this paper proposes a two-step modeling method based on datasheet information.

This paper presents the details of a mathematical model for UTC using heat transfer expressions for the collector components, and empirical relations for estimating the various heat ...

The current work presents a reduced-order one-dimensional mathematical model to simulate the transient

behaviour of EPCM-TES systems and an experimental concentrated solar ...

The model requires the use of solar insolation and weather information for the location retrieved from NASA databases, using the geographical coordinates and dates involved. The model calculates the ...

Abstract The solar chimney power plant is a system with promise to generate electrical power from free solar energy. In this study, a solar collector, chimney and turbine are modeled ...

A mathematical model based on the continuity, momentum, energy, and state equations is developed for the sloped solar chimney system in this study. The flow details inside a collector are included in the ...

This chapter presents a numerical model for calculating basin-type solar water distillation. The model is used to calculate solar distillation for both passive natural convection and forced convection with ...

The developed mathematical model of the horizontal all-glass evacuated tube solar collectors integrated with bottom mirror reflectors is generic and suitable for any tilt angle of the unit ...

The solar energy collector is the heart of a flat-plate solar collector (FPSC) system. This is designed and developed for operation in the low-temperature range (ambient to 60°C) or in ...

Abstract A mathematical model to determine the thermal function on a solar cooker box-type with internal reflector as well as one application in numerical simulation for predicting the ...

Abstract Mathematical model has been developed to assess the effects of using phase change materials (PCM) in a fully mixed water accumulation tank. Packed bed system of spheres ...

The mathematical models of the whole system including the collector, the double-effect absorption chiller and the plate heat exchanger were established and were validated by field tests. ...

The goal of this review is to provide a novel, significant, and original way to mathematically describe a solar still. This study shows genuine breakthroughs and advancements in solar stills in a theoretical ...

Abstract In this work we propose to model a 7.5 kWe power generation system, implementing a Parabolic Trough Collector system, coupled to an Organic Rankine Cycle (PTC/ORC) and a bladder ...

The yard layout significantly influences the performance of automated container terminals (ACTs), especially those employing a perpendicular stack configuration, where the yard ...

The article presents a mathematical model that relates the thermal properties of a concentration solar cooker with some optical properties of several of the materials used in its ...

Additionally, mathematical modelling was carried out using twelve models to predict the drying behaviour of cucumber slices accurately. Lastly, colour analysis was performed to assess ...

A script developed in Matlab was used to calculate the captured amount of global solar radiation from 1 November to 1 March of the next year for all the selected greenhouse shapes. The mathematical ...

Since the mathematical modeling is done with time dependence, the system should go to steady state within the time. To observe this phenomenon, the system is simulated with a ...

The model was designed as a convenient tool for dimensioning and integrating various energy sources in hydraulic accumulation systems and will allow analyzing the behavior of hydraulic ...

In order to more accurately evaluate the operation and output characteristics of the solar chimney power plant integrated seawater desalination, a refined mathematical model for ...

This paper presents a comparative study of three different mathematical models for the packed bed latent heat storage system, comprised of a cylindrical storage tank filled with paraffin ...

A thorough literature review is performed to investigate and compare the results and accuracy of different mathematical models, numerical methods and thermodynamic analysis of using ...

In order to tackle the nonlinear transcendental equation and intractability of traditional photovoltaic (PV) cells model, this paper proposes a two-step modeling method based on datasheet ...

Abstract In a mathematical sense, regardless of the equivalent circuit, solar cells are represented by nonlinear dependencies of current and voltage. First, this paper discusses novel ...

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