Ann-based optimization of a parabolic trough solar thermal power plant

Can Ann algorithms predict a parabolic trough solar thermal power plant?

A highly unique, flexible ANN algorithm was presented to predict and optimize a parabolic trough solar thermal power plant using Thermic oil as HTF and integrated with TES and FBS. The results obtained using SAM software were used to train several ANN algorithms, such as LM, SCG, and CGP.

Can a parabolic trough solar thermal power plant predict energy production?

In this paper,both types of models have been investigated in the particular context of a parabolic trough solar thermal power plant. The models aim to predict the electric energy productionat the output of the electric generator and,more especially,the hourly energy production of the power plant.

What is parabolic trough solar thermal power plant (ptstpp)?

While solar energy can play a key role to solve these issues,parabolic trough solar thermal power plant (PTSTPP) is considered as one of the most proven concentrating solar power technologies for power generation.

How are parabolic trough power plants optimized?

A recent literature review shows that most studies on the optimization of parabolic trough power plants are based on physical or analytical models,including steady-state and dynamic models,while machine learning models such as artificial neural networks (ANN) models are rarely used.

Can ANN model be used to estimate ptstpp energy production in Morocco?

Since Morocco is planning to implement further solar power plants with parabolic trough technology. The suggested ANN model could be used to estimate energy productionof similar PTSTPP design as in ABM for other locations in Morocco. The analytical models proposed in this paper lead to similar but lower accuracy levels than the ANN model.

What are the analytical models of a parabolic trough collector?

The first analytical model (AM I) is based on calculating the heat losses of parabolic trough collectors (PTCs), while the second analytical model (AM II) is based on the thermal efficiency of PTCs. The third model is an artificial neural networks (ANN) model derived from artificial intelligence techniques.

In this study, an optimization of two parabolic trough solar thermal power plants integrated with thermal energy storage (TES), and fuel backup system (FBS) has been performed. The...

The accurate estimation of a concentrated solar power plant production is an important issue because of the fluctuations in meteorological parameters like solar radiation, ...

Therefore, the objective of this study is to investigate the feed-forward back-propagation learning algorithm

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with three different variants; Levenberge Marguardt (LM), ...

Concentrating solar power (CSP) technologies have demonstrated success producing energy in the global renewable and clean energy industry [1], [2] has made ...

Title: Parabolic Trough Solar Thermal Electric Power Plants. Concentrating Solar Power SnapShot (Fact Sheet). Author: H. Price Subject: Although many solar technologies ...

The study examined absorbers" thermal properties, thermal efficiency of combined thermal exchangers, concentration ratio, heat efficiency, and steam generation to determine their influence on...

Groumpos et al. [33] applied DP technique to a PV power plant in order to determine in an optimal way the amount of energy to be supplied to each connected load in ...

Atiz et al. [8] proposed a solar integrated system to generate electricity and hydrogen using a solar pool source of 217 m 2 and an evacuated tube solar collector (ETSC) with a total ...

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Performance optimization of the parabolic trough power plant using a dual-stage ensemble algorithm ... and solar-assisted heat pumps, was provided by Elsheikh et al. [31]. ...

As a mature and low-cost large-scale solar thermal power generation technology, parabolic trough solar thermal power generation technology is becoming increasingly ...

Boukelia et al. [7] present an optimization of a parabolic trough solar thermal power plant based on a feed-forward back-propagation ANN model. Sozen and Arcaklioglu [8] have ...

Highlights ANN model with LM variant in the modelling of two PTSTPPs was investigated. The first plant using thermic oil and the second based on salt technology. The two plants were ...

Design and optimization of a solar power plant are very complex and require many calculations, data and time. From this point of view, artificial neural network (ANN) models are desired ...

In this work, three models were conducted in order to estimate the hourly electric production of a parabolic trough solar thermal power plant (PTSTPP) located at Ain Beni ...

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The principle objective of this work is to comprehensively overview the Moroccan parabolic trough solar thermal power plant Noor 1 as one of the leading solar plants in Africa ...

Solar multiple optimization for a solar-only thermal power plant, using oil as heat transfer fluid in the parabolic trough collectors Sol. Energy, 83 (2009), pp. 2165 - 2176 View ...

Keywords: solar thermal power plant, solar-hybrid power plant, solar tower plant, parabolic trough. 1. Introduction Solar thermal power plants can guarantee supply security by ...

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