

Are fibre-optic sensor-based solar PV panel temperature monitoring effective?

Advanced fibre-optic sensors offer distinct advantages of greater accuracy, a more comprehensive range, and a very high sampling rate. The present experimental work focuses on fibre Bragg grating sensor-based solar PV panel temperature monitoring.

How do fibre-optic sensors affect panel temperature?

The unique capabilities of fibre-optic sensors are demonstrated by studying the rapid perturbations in panel temperature over time for indoor and outdoor conditions. The effects of incident radiation flux and the inclination angle on panel temperature are analyzed. Temperature sensitivity of 6 pm/°C is obtained.

What temperature does a fibre-optic sensor measure?

It confirms that heat flow, transferred radially from the center of the panel to its edges, can be measured with a fibre-optic sensor. Similarly, during the afternoon, Point O, at 47.2 °C, continues to have a higher temperature than A (46 °C) and B (44.8 °C).

How is temperature measured on a solar panel?

The temperature at three points is measured using the FBG sensor. This three-point measurement is selected based on the pre-measurement experiments conducted on the same panel with more diagonal locations. Researchers can vary the number of sensor locations based on the solar panel type and size.

Can fibre-optic sensor technology be used in solar farms?

The most significant application of this study is the widespread use of fibre-optic sensor technology in solar farms, where the temperature of several panels needs to be monitored precisely.

How does temperature affect solar photovoltaic (PV) performance?

Solar photovoltaic (PV) performance is affected by increased panel temperature. Maintaining an optimal PV panel temperature is essential for sustaining performance and maximizing the productive life of solar PV panels. Current temperature sensors possess a long response time and low resolution and accuracy.

Abstract: Raman distributed optical fiber sensing technology can realize large-scale and high-precision temperature detection, and has a wide range of social needs and application ...

The optical power is sent through a dedicated optical fiber, whereas the data are transmitted (mono or bidirectionally) by a different optical fiber. In an alternative scheme, both ...

Optical fiber sensor; photovoltaic module; thermal monitoring ... The measurement of temperature in photovoltaic models plays an essential role in testing technical standards for ... R. ...

Researchers have developed a range of fiber optic sensors for temperature measurement, such as the Fabry-Perot fiber optic interferometer(F-P) [1], Fiber Bragg grating (FBG) [2], Sagnac ...

In this paper, a Fabry-Perot interferometer filled with ultraviolet curing adhesive sensitization of high sensitivity fiber optic temperature sensor is proposed, by filling the F-P cavity with ...

Based on studying Raman scattering principle and its application technology,a distributed optical fiber temperature measurement system is developed.The system implements distributed ...

Fiber Bragg Grating (FBG) sensors are an emerging and prominent optical sensing technology of accurately measuring strain, depth, temperature, density, and several physical parameters. ...

This paper proposes the use of fiber Bragg gratings (FBG) in thermal monitoring of photovoltaic (PV) modules. Results acquired from FBG sensors were compared with two commonly used ...

This method provides technical support for measuring the temperature field of a photovoltaic module and other heat source equipment. Schematic diagram of energy input and ...

