

عنوان مقاله:

Performance Analysis of Nanofluid-based Photovoltaic Thermal Collector with Different Convection Cooling Flow

محل انتشار:

ژورنال مهندسی عمران، دوره 9، شماره 8 (سال: 1402)

تعداد صفحات اصل مقاله: 14

نویسندگان:

Zainal Arifin

Nuha Khairunisa

Budi Kristiawan

Singih Dwi Prasetyo

Watuhumalang Bhre Bangun

خلاصه مقاله:

Using solar energy through photovoltaic (PV) panels has excellent potential as an alternative energy source. However, the problem of high operating temperatures causing a reduction in work efficiency needs to be addressed. This study aimed to analyze the development of a cooling system to increase PV panels' electrical and thermal efficiency. The research involved analyzing the use of  $TiO_2$ ,  $Al_2O_3$ , and  $ZnO$  working fluids by adding  $0.5 \text{ vol}\%$  to water in an active cooling method. The cooling system involved a rectangular spiral and a rectangular tube behind the PV panel. A solar simulator simulated solar radiation with intensity variations to analyze the cooling system's performance in different working conditions. The results showed that the heat exchanger with a nanofluid configuration reduced the panel temperature by  $14 \text{ }^\circ\text{C}$ , which increased the electrical efficiency by up to  $4.7\%$  in the  $ZnO$  nanofluid. In the rectangular spiral configuration, the  $ZnO$  nanofluid reduced the panel temperature from  $60$  to  $45 \text{ }^\circ\text{C}$ , increasing the  $I_{sc}$  value from  $2.16 \text{ A}$  to  $2.9 \text{ A}$  and the  $V_{oc}$  value from  $21.5 \text{ V}$  to  $23 \text{ V}$ . This resulted in a maximum power increase of the panel to  $53 \text{ W}$ . Doi:  $10.28991/CEJ-2023-09-08-08$  Full Text: PDF

کلمات کلیدی:

.Photovoltaics; Nanofluids Cooling; Temperature; Efficiency; PV Panel

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1963010>

