عنوان مقاله:

Modeling Finned Thermal Collector Construction Nanofluid-based Al۲O۳ to Enhance Photovoltaic Performance

محل انتشار:

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خلاصه مقاله:

Extensive research has been conducted to address the issue of the reduced efficiency of solar photovoltaic (PV) cells at high temperatures. To address this problem, a hybrid cooling system has been developed. This system uses a thermal collector to convert waste heat into reusable heat. Selecting the best configuration and operational parameters for the collector is crucial for maximizing system performance. To achieve this, we conducted computational fluid dynamics (CFD) modeling using ANSYS. Various factors affecting the cooling of PV solar cells were analyzed, including the collector design, mass flow rate, and concentration of the Al۲O۳ nanofluids. Results showed that the ۱۲S finned thermal collector system exhibits the lowest temperature for PV solar cells, at approximately ۲۹.۶۵۴ oC. The electrical efficiency of PV solar cells is influenced by the concentration of Al۲O۳ nanofluids. We found that the ۱۲S finned collector system with ۱% water/Al۲O۳ nanofluid achieved the highest efficiency (approximately ۱۱.۷۴۹%) at a flow rate of ۰.۰۹ kg/s. The addition of finned collectors affects efficiency and variations in fluid mass flow rates, and there is no relation between the connector type and different Al۲O۳nanofluid concentrations. In other words, the cooling system can be optimized to enhance the efficiency of the PV solar cells under high-temperature conditions. Doi : ۱۰.۲۸۹۹۱/CEJ-۲۰۲۳-۰۹-۱۲-۰۳ Full Text : PDF

کلمات کلیدی:

.PV; CFD; ANSYS; Finned Thermal Collector; Efficiency

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