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Efficiency Improvement of Ternary Nanofluid Within a Solar Photovoltaic Unit Combined with Thermoelectric Considering Environmental Analysis

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Abstract : Impacts of environmental parameters and dust deposition on the efficiency of solar panel have been scrutinized in this article. To gain thermal output, trapezoidal cooling channel has been attached in the bottom of the panel incorporating ternary nanofluid. To produce working fluid, water has been mixed with Fe_3O_4-TiO_2-GO nanoparticles. Also, the arrangement of fins has been considered to grow the cooling rate of the silicon layer. The existence of a thermoelectric layer above the cooling channel leads to higher electrical output. Efficacy of ambient temperature (Ta), speed of wind (V_{in}) and inlet temperature (T_{in}) and velocity (Vin) of ternary nanofluid on performance of PVT has been assessed. As Tin increases, electrical efficiency declines about 3.63%. Increase of ambient temperature makes thermal performance enhance about 33.46%. The PVT efficiency decreases about 13.14% and 16.6% with augment of wind speed and dust deposition. CO_2 mitigation has been reduced about 15.49% in presence of dust while it increases about 17.38% with growth of ambient temperature.

Keywords : photovoltaic system, CO_2 mitigation, ternary nanofluid, thermoelectric generator, environmental parameters, trapezoidal cooling channel

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