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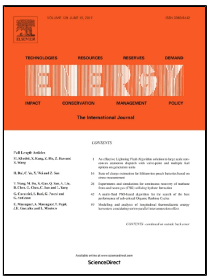

Computational modeling of a BIPV/T ethylene tetrafluoroethylen (ETFE) cushion structure roof

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Computational modeling of a BIPV/T ethylene tetrafluoroethylen (ETFE) cushion structure roof

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Abstract

Building integrated ETFE foils are used as the absorbing structure in the solar energy targeted applications. These foils as a building transparent material have been drawing much more attention for the past decades. In addition, integration of amorphous photovoltaic cells with these ETFE foils is taken into account due to the low production cost and its resistance to high operating temperatures. In the present study, a Building integrated Photovoltaic thermal (BIPV/T) ETFE cushion roof was numerically modeled and the thermal and electrical performances of this system were obtained in two cases: the cushion with the steady state mass flow and the cushion with the air pressure regulator system. Verification of the modeling was performed by comparing the model's results with the available experimental data in the literature. The main strength of the present modeling is consideration of the air pressure regulator system in the modeling process which has not been studied yet. The result of the present study showed that the present model predicts the BIPV/T ETFE cushion performance with a reasonable accuracy and can predict the system performance under different operating conditions. The results also showed that in case of the cushion with the steady state mass flow, the power generation is 15% higher than that of the cushion with the pressure regulator system. However, the cushion with the steady state mass flow has a low net output power due to the high consumed power of the blower.

Key words: ETFE, computational, PV module, modeling, cushion, BIPV