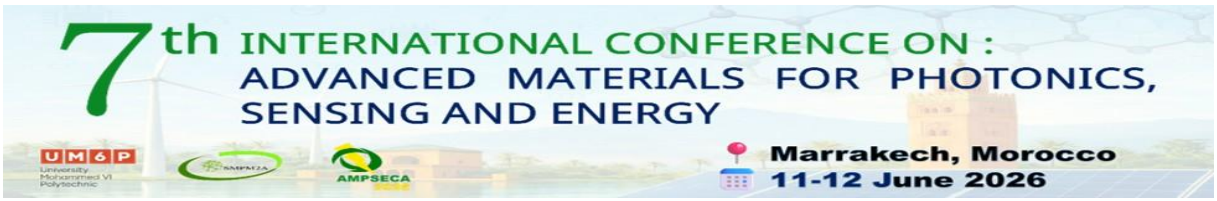

Different PV Cooling Approaches Leading to Hybrid PVT System Development

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Photovoltaic (PV) modules encounter major output losses during generation due to temperature increases resulting decreasing their efficiency. It does not suffer only performance losses but also creates faults, hotpots, cracks and other types of defects in the PV system module. Conventional active cooling systems like water-based, air based, phase change material (PCM) cooling are used to mitigate temperature rise in the PV system, but it requires external energy to deploy, and the recovered heat cannot be used as useful thermal energy. There are different types of photovoltaic thermal collector exists in the literature, but they mostly focus on the thermal energy generation where the improvement of electrical energy generation is significantly ignored [1].

This work discusses different existing cooling strategies and an overview of the development of hybrid PVT system. To identify sensitiveness of the model, different parameters changes impact on the PVT system is also analyzed. The mathematical model based on electrical and thermal model of the PVT system is also established [2]. Maximum power point tracking (MPPT) is an important factor to be considered in the photovoltaic energy generation and efficiency analysis which is also demonstrated for this developed model [3]. Finally, the work demonstrates the motivation of cooling techniques in the PV system leading to the development of hybrid PVT system.

Keywords: Temperature influence; PV cooling; PVT system; mathematical modeling, thermal modeling, electrical modeling.

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