

Photovoltaic module efficiency evaluation: The case of Iraq

This study aims to evaluate the performance of a photovoltaic module under some extreme climate conditions, and with a case study for Iraq. CFD model is developed for the analysis of the photovoltaic module using the commercial CFD software of COMSOL Multiphysics v5.3a for the transient conditions. The results are verified with the analytical solution to the onedimensional non-linear energy balance equation using Matlab. The results are also compared with measurements reported in the literature for validation. The results reveal that the free convection currents in inclined and horizontal positions of the module were weaker relative to the vertical position. Also, the increase in the length of inclined photovoltaic module, up to 1.3 m, enhances the heat transfer rate. However, beyond this length, the temperature of the module becomes higher, and the convective heat transfer coefficients are reduced regardless of the inclination. In the horizontal position, the convective heat transfer rate is lower, particularly on the bottom surface of PV system