

Experimental Study of Semitransparent and Opaque Photovoltaic Modules with and without Air Duct

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Abstract : In this paper, thermal modeling has been developed for photovoltaic PV modules, namely; Case A: semitransparent PV module without duct, Case B: semitransparent PV module with duct, Case C: opaque PV module without duct, Case D: opaque PV module with duct for Delhi, India climatic condition. MATLAB 7.0 software has been used to solve mathematical models of the proposed system. For validation of proposed system, the experimental study has also been carried out for all above four cases, and then comparative analysis of all different type of PV module has been presented. The hybrid PVT module air collectors presented in this study are self sustaining the system and can be used for the electricity generation in remote areas where access of electricity is not economical due to high transmission and distribution losses. It has been found that overall annual thermal energy and exergy gain of semitransparent PV module is higher by 11.6% and 7.32% in summer condition and 16.39% and 18% in winter condition respectively as compared to opaque PV module considering same area (0.61 m²) of PV module.

Keywords : semitransparent PV module, overall exergy, overall thermal energy, opaque

Conference Title : ICEEB 2017 : International Conference on Environment, Energy and Biotechnology

Conference Location : London, United Kingdom

Conference Dates : July 24-25, 2017