Design for PV/Thermal Heat Pump Water Heating System

Abstract

The solar generated PV/thermal heat pump water heater (PVT-HPWH) system mentioned in this paper utilizes a new solar power and thermal module design, which collects the heat to provide PVT-HPWH power consumption and manufacturing hot water for the operational purpose. Due to the Freon, it would bring away the heat that forms in the generation process. Additionally, this makes the increase of PV efficacy. The model is established by MATLAB/Simulink software containing friendly-used picture interface. The difficulty of constructing module process is reduced by the modular database. Concerning the effect on PVT module, sunshine intensity and environmental conditions should be taken into consideration. Therefore, partial thermodynamics is added to computerize the temperature of PVT module. The characteristics of output's voltage and power could be precisely calculated. By using PVT module's table, relevant data in the literature and inputting PVT's I-V, P-V, special curving line and the state of operational PVT-HPWH that drafted in the module, next chart is used to illustrate the results. Through calculation, the calculated COP achieve 9.68, the outcome of efficacy is very satisfactory.

Keywords: photovoltaic/thermal, heat pump water heater, MATLAB/Simulink

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