عنوان مقاله:

Numerical analysis of photovoltaic power generation in different locations of Bangladesh

محل انتشار:

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خلاصه مقاله:

Photovoltaic (PV) module is one of the most useful, sustainable and non-harmful products in the field of renewable energy. It offers longer service period for least maintenance cost. The elements of PV are abrasive, easy for designing, and their structure like the stand-alone technique gives production from micro to mega-power level. A ۳D numerical system of PV module has been built up and solved applying FEM technique-based software COMSOL Multiphysics in this article. The average solar irradiation and optimum tilt angle for six divisions (Dhaka, Chittagong, Rajshahi, Khulna, Barishal and Sylhet) in Bangladesh have been calculated. The effects of solar radiation, angle of inclination, ambient temperature, and partial shading on temperature of solar cell, electrical power and PV module's electrical efficiency have been investigated. It has been observed from the results that the greatest value of electrical power ۱۵.۱۴ W is found in Rajshahi for solar radiation ۲۰۹ W/m۲. The highest electrical efficiency is found as ۱۲.۸۵% in Sylhet at irradiation level of ۱۸۹ W/m۲. For every ۱° increase of inclination angle, electrical power and electrical efficiency level devalue by ۰.۰۶ W and ۰.۰۵%, respectively. Results also show that the efficiency level decreases from ۱۴.۶۶ to ۱۱.۳۲% due to partial shading area from ۰ to ۴۰%. PV module's electrical power; and electrical efficiency reduces approximately ۰.۰۱ W and ۰.۰۱%, respectively due to every ۱°C addition of solar cell temperature.

کلمات کلیدی:

PV cell, Irradiation, Tilt angle, Partial shading, Power, Efficiency