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Estimation of parameters for a model of polycrystalline solar cells

ABSTRACT. In many countries of the world the main factor for increasing energy potential and saving the environment is exploiting nonconventional energy. Renewable energy is mostly connected with solar radiation. Mastering solar energy depends, above all, on technological advancement. The main goal of scientists is to increase the efficiency of photoelectric converting systems and decrease their cost. Parameters correctly computed from relevant solar cell characteristics or a set of experimental data are required for controlling photovoltaic (PV) systems. However, experimental or accurate characteristic (i.e., the current (I)–voltage (V) curve) data for a PV module may not be readily available. The present paper describes calculations of solar cell parameters, based on polycrystalline silicon, using experimental and theoretical approaches. Finding appropriate model circuit parameters of solar cells is crucial for performance evaluation, control, efficiency computations and maximum power point tracking of solar PV systems. Based on our results, some suggestions are provided.

Keywords: fill factor, photovoltaics, solar energy, volt–ampere characteristics

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