

Abstract Submitted
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Modeling of the Electric Characteristics of Solar Cells BENJAMIN LOGAN, MARIAN TZOLOV, Department of Physics, Lock Haven University — The purpose of a solar cell is to convert solar energy, through means of photovoltaic action, into a sustainable electrical current that produces usable electricity. The electrical characteristics of solar cells can be modeled to better understand how they function. As an electrical device, solar cells can be conveniently represented as an equivalent electrical circuit with an ideal diode, ideal current source for the photovoltaic action, a shunt resistor for recombination, a resistor in series to account for contact resistance, and a resistor modeling external power consumption. The values of these elements have been modified to model dark and illumination states. Fitting the model to the experimental current voltage characteristics allows to determine the values of the equivalent circuit elements. Comparing values of open circuit voltage, short circuit current, and shunt resistor can determine factors such as the amount of recombination to diagnose problems in solar cells. The many measurable quantities of a solar cell's characteristics give guidance for the design when they are related with microscopic processes.

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