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Response of High Optical Heterogeneity in Three Dimensional Solar Cells YUAN LI, Wake Forest University, XIANG WAN, University of Virginia, WENXIAO HUANG, WANYI NIE, Wake Forest University, HUIHUI HUANG, Wuhan University, DAVID CARROLL, Wake Forest University — The incident light throughout the cavity of three dimensional photovoltaic architecture is heterogeneous, and it may influence the cell's outputs, including the open circuit voltage, short current density, and fill factor and corresponding efficiency. In this work, an equivalent circuit for three dimensional solar cells was derived by an infinitesimal method, to model the response at different light distribution. Using this model, an upper bound was given to estimate the difference between two distributions, and this can show heterogeneous light has a similar effect on open circuit voltage (Voc) as well as that from homogeneous light while low heterogeneity. We further provided a method to predict the accurate Voc on very high optical heterogeneity, such that the optimum architecture can be found to design the three dimensional solar cells.

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