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Solar Panel Simulation with Xyce

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ABSTRACT

The steady increase in efficiency and potential for significant decrease in manufacturing cost promise to make Thin-film photovoltaics (TFPV) a suitable source of electrical energy for a wide variety of applications [2]. The increase in performance is linked to our ability to design, model, simulate and optimize TFPV technologies. PVpanel Sim is a spice based simulation utility on nanoHUB that has previously been used to explore a broad range of design issues related to thin-film solar panels [4][3]. A broader adoption of this uniquely useful resource will depend on the ability to scale the simulation to larger arrays as well as simplification of the user interface. In this work we updated its core engine from Berkeley SPICE to Xyce, improved the user interface and added the capability for varying contact sheet resistance. The Workspace [1] utility on nanoHUB was used as a development platform by providing access to Rappture, MATLABr and Xyce. Existing source code was modified to be compatible with Xyce and input restrictions were established to avoid simulation convergence issues. It's expected that the new version of PVpanel Sim will be installed on nanoHUB, with open access to all nanoHUB members. PVpanel Sim can thus further serve as a useful simulation tool for TFPV researchers. It's hoped that future versions will include more models for different TFPV technologies.

KEYWORDS

Photovoltaic, Solar, solar panel, thin films, pv, simulation

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