

## Current-Voltage Modeling of Photovoltaic Solar Cells

M.T. Boyd, S.A. Klein, D.T. Reindl

The purpose of my project is to improve upon an existing current-voltage (I-V) model for photovoltaic solar cells and to develop a predictive model of cell temperature in terms of installation. The present I-V model, the 5-parameter model developed by DeSoto et al. at the Solar Energy Lab in 2004, uses only readily available data provided on manufacturer data sheets allowing one to model any commercial solar panel and needing only publicly available information. This model, however, is very difficult to obtain parameters for and is not accurate for all cell technologies, namely multi-junction. These two deficiencies are why the model has limited usage.

My project will involve making the 5-parameter model easier to solve and increasing the accuracy of the model by incorporating additional data that has just recently been provided by manufacturers. This data includes the temperature dependence of maximum power and I-V points at conditions additional to Standard Rating Condition. The temperature and radiation dependencies of model parameters will be explored and their addition to the model may result in better experimental agreement. In an effort to determine what additional data provided by the manufacturers could substantially improve photovoltaic modeling, my project will also include quantifying the effect of incorporating a potential manufacturer provided I-V trace into the 5-parameter model.