Open-source software for solar power : update

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Sandia National Laboratories

PVPerformance MODELING COLLABORATIVE

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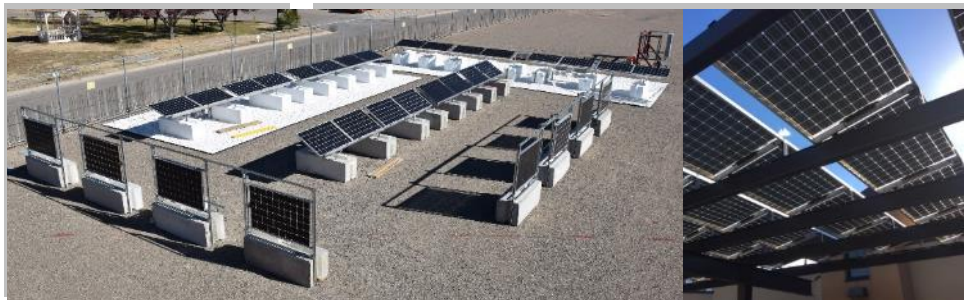

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What's new in PVLib for Matlab?

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Current version 1.4 (released Aug 2018)

- Bifacial irradiance model from Purdue University
  - Regular rows of fixed tilt module racks
  - Calculates direct, sky diffuse, and ground reflected irradiance on front and rear surfaces
- Reflection loss factors by irradiance component (direct, sky diffuse, ground reflected)
  - Martín, N., Ruiz, J. M. 2005. Annual angular reflection losses in PV modules. Progress in Photovoltaics: Research and Applications, 13(1), 75–84.
- Functions for translating IV curves in irradiance and temperature
  - IEC 60891 methods 1 and 2
- Functions for calculating series resistance from IV curves
- PVLib for Matlab is on github.com at https://github.com/sandialabs/MATLAB_PV_LIB/

What's new in pvlib-python?

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- Current version 0.6.2 (release May 2019)

https://github.com/pvlib/pvlib-python/releases

- Py3.7 support added
- pvlib python (preferred name) now a NumFocus affiliated project
- Preferred citation:

  William F. Holmgren, Clifford W. Hansen, and Mark A. Mikofski. "pvlib python: a python package for modeling solar energy systems." Journal of Open Source Software, 3(29), 884, (2018). https://doi.org/10.21105/joss.00884

- Please use the logo where appropriate!

- Major enhancements since v0.5.2
  - Added module `iotools` : functions to read SurfRAD, UO SRML, MIDC, others.
  - Added CEC and Pvsyst single diode models
  - Added wrapper for `pvfactors` bifacial irradiance model (from SunPower)
  - Many improvements to single diode model calculations
  - Moving toward `get_` method names, e.g., `PVSystem.get_relative_airmass()` rather than `PVSystem. relativeairmass()`

Planned for pvlib-python 0.7

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- Py2.7 support ends June 2019

- Migrate to modules by modeling step: e.g., `celltemp.py` with `celltemp.sapm` rather than `pvsystem.sapm_celltemp`
- Add `ivtools` module : use SAM SDK to calculate CEC model parameters, fit diode equations to IV curve data

- We welcome (and need) your participation
  - https://github.com/pvlib/pvlib-python (code development)
  - Stackoverflow tag `pvlib`
  - https://groups.google.com/forum/#!forum/pvlib-python (announcements and user discussion)

Solar Forecast Arbiter

- DOE funded project to develop an open-source platform for evaluation and analysis of solar irradiance and solar power forecasts
  - www.solarforecastarbiter.org
  - https://github.com/SolarArbiter/solarforecastarbiter-core
- Univ of Az (lead), SNL, EPRI, Sharply Focused
- Open-source core to include functions that:
  - Get data from NOAA NOMADS server (GFS, HRRR forecasts)
  - Get data from public sources (ARM, Sandia)
  - Compute reference forecasts (cloud cover to GHI, persistence, GFS, HRRR)
  - Identify data issues (physical limits, consistency checks, identify clipping and curtailment, stale data values)
  - Compute metrics
- Built on pvlib python

OrangeButton

- Orange Button[SM] is an open data exchange standard for the solar PV industry.
  - Information models, taxonomy (XBRL), a test suite
  - https://github.com/SunSpecOrangeButton
  - V1.3 release Feb 2019
- Applications in development
  - Pyoblib (v.10 released March 2019)
    - Core library to read/write OB-compliant files)
  - Product-code-registry-api : create and manage unique product code strings
  - Open-API : communicate with OB using a REST API
- Ongoing DOE project
  - Extend OB capabilities for O&M use cases
  - Build open-source infrastructure (github-like)