

Phase shift control of a dc-dc converter for a PV panel

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Abstract: Integration of solar photovoltaic (PV) panels has seen a dramatic increase in the past decade. This therefore has brought about the need to simulate PV systems connected to the grid. This tutorial discusses the phase shift control of a dc-dc converter used to interface a PV panel to a high-voltage dc bus of a dc-ac converter. The aim of this report is to describe the contents of the simulation package and instructions on how to use them.

Provided below is a description of the circuit files and instructions on using them.

	File Name	Description
1.	circuit_inputs.csv	Lists out the parameters of the simulation along with the circuit files, control files.
2.	hbridge.csv	Circuit schematic for the H bridge dc-dc converter.
3.	hbridge_params.csv	Parameter spreadsheet for the H bridge dc-dc converter schematic.
4.	single_phase_xmer.csv	Circuit schematic for the single phase transformer.
5.	single_phase_xmer_params.csv	Parameter spreadsheet for the single phase transformer schematic.
6.	sysconn1.csv	Circuit schematic for the connections to the transformer.
7.	sysconn1_params.csv	Parameter spreadsheet for the transformer connections schematic.
8.	modulator.py	Python control file with the Pulse Width Modulator (PWM)
9.	modulator_desc.csv	Parameters for the control file modulator.py
10.	phase_shift_control.py	Python control file that generates the phase shift for the dc-dc converter.
11.	phase_shift_control_desc.csv	Parameters for the control file phase_shift_control.py.
12.	mag_transf.py	Python control file to simulate a transformer.
13.	mag_transf_desc.csv	Parameters for the control file mag_transf.py.

The above files can be used either directly with the command line program (version 1.5.7) or with the web interface (2.0.2) in which case the simulation needs to be built interactively. Check out the instructions at the end of the document to know how to use the web application.

Variables of interest:

The following are the variables that upon plotting describe the effect of the simulator.

	Variable/Meter name	Description
1.	mod1_carr1, mod1_carr2	These are the carrier waveforms for the two legs of the dc-dc converter. Observe the phase shift between them as you change the variable phase_shift in phase_shift_control.py.
2.	mod1_S1gate, mod1_S2gate, mod1_S3gate, mod1_S4gate	These are the switching signals provided to switches S1, S2, S3, S4 of the dc-dc converter. Notice how the phase shift between the carrier waveforms results in a phase shift between these switching signals.
3.	Voltmeter_T1wdg1, Voltmeter_T1wdg2	The voltages at the primary and secondary of the step-up transformer.

About Python Power Electronics

Python Power Electronics is a free and open source circuit simulator that can be found on the website: <http://www.pythonpowerelectronics.com/>

All the latest updates in the project are added to the Updates page: <http://www.pythonpowerelectronics.com/contents/updates.html>

The latest version of the software can be found on the link: <http://pythonpowerelectronics.com/contents/softwaredownloads.html>

In order to install the software, read the document INSTALL.pdf: <http://pythonpowerelectronics.com/contents/papers/INSTALL.pdf>

To use the software, check out the user manual: http://pythonpowerelectronics.com/contents/papers/django_user_manual.zip

For further questions, contact me by email at pythonpowerelectronics@gmail.com

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