

ELEN0445-1 Microgrids

Assignment 2: MPPT

Introduction. This assignment aims to help you better understand the concepts seen during the course by implementing several maximum power point tracking (MPPT) algorithms and analyzing their effects in a real-time electrical simulation.

As shown during class, you will use `Typhoon HiL`, a software for hardware-in-the-loop simulation¹. With this description, you have received a set of `Typhoon HiL` files that you should use as a starting point. Pay attention that you must download and use a more complete license to access the microgrid components. To do so, you should enroll and start the "HIL Fundamental" class, a license download link is available right at the start of the course: <https://hil.academy/courses/hil-fundamentals/>.

The assignment must be carried out by groups of **two students** and submitted as a zip file on eCampus before **October 23, 23:59**. The zip should contain a report describing your process, results, and analyses and the whole folder with the `Typhoon HiL` files you have produced. You will present your results orally on **October 25**. You can create some slides or a text report and use this support for the oral presentation. Be concise; **it should not be longer than 4 A4 pages**, including figures and tables.

Maximum Power Point Tracking. For the first part of this assignment, you have to implement three algorithms for the MPPT of the PV panels:

1. Idle (constant voltage reference)
2. Fractional open-circuit voltage
3. Perturb and observe
4. Incremental conductance

The video <https://youtu.be/0ItjKs7aJFM> details the algorithms.

We ask you to compare the results for the three algorithms, in power output and convergence efficiency, and to discuss the choice of the parameters.

Tests. The file `MG_HW2_TEST.py` provided is to be used with `Typhoon HiL Test IDE`. With this tool, you can launch a simulation and some tests.

Feel free to modify this base test file to simulate whatever you find interesting.

For questions and remarks, contact tstegen@uliege.be and clement.moureau@uliege.be

¹You can download it at: <https://www.typhoon-hil.com/products/software-download/>