
Read This Before Running Simulations

To run simulations and verify results the matlab script files in the folder should be used. All simulink models are automatically called from the scripts. The folders *Simulink Models* and *Functions* should be added to the matlab path for the programs to execute correctly. Below follows a short description of each program.

VSC_Model_Verification.m

This program verify that the converter works as expected. First a step of 1000 W is set as the power controller reference, then at time $t = 1$ the reference is set to -1000 W. The converter is connected directly to an AC voltage source.

VSC_Model_Verification_w_Grid.m

This program verify that the converter works as expected when a grid transmission line is added between the voltage/current measurements and the AC voltage source. The power steps are the same as the previous program.

VSC_Provoked_Cycle_Slip.m

This program show how the converter behave when cycle slipping is provoked from within the PLL. The estimated frequency disturbance to move to PLL out of phase lock is added to the PLL output frequency. Three disturbances are added, one where the PLL maintain lock, one where the PLL slips exactly one cycle and the last disturbance result in many slips. The converter is connected directly to an AC voltage source.

VSC_Provoked_Cycle_Slip_w_Grid.m

Exactly the same as the previous program except that the grid transmission line is added.

VSC_Phase_Shift_w_Grid.m

A phase shift is invoked in the AC voltage source. The converter is connected to a grid transmission line. The inductance in the line is increased to represent a *weak* grid. The average model is stopped prematurely due to divergence of the solution.

VSC_Phase_Shift_w_Grid.m

A step of 1400 W is applied to the active power controller reference at time $t = 0$. This time the converter is connected to a *weak* grid. Due to divergence of the average model only the switching device model is used.