Remanent (residual) Flux in a Transformer Energization Study

Written for PSCAD v4.6

This example shows how to vary the remanent (residual) flux in a transformer for energization study. A simple example in provided in which the overal power circuit is shown, see Figure 1.

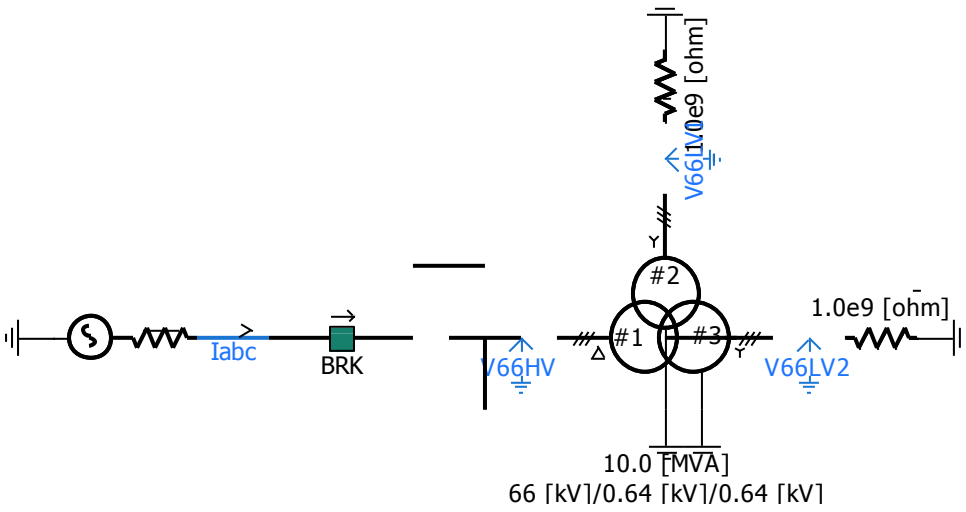

Figure 1: Overall power system for remanent flux study in a Transformer energization study

A simulation set is created using one simulation case as the Master and the other as the Slave.

Load the workspace "RemanentFluxExample.pswx" into PSCAD as shown as follows:

- The workspace has two PSCAD cases (MasterCase.pscx and SlaveCase.pscx), and a "Simulation Sets" (i.e. Set1).
- Right-click on the Simulation Sets to run the simulation set "Set1" as shown in Figure 2:

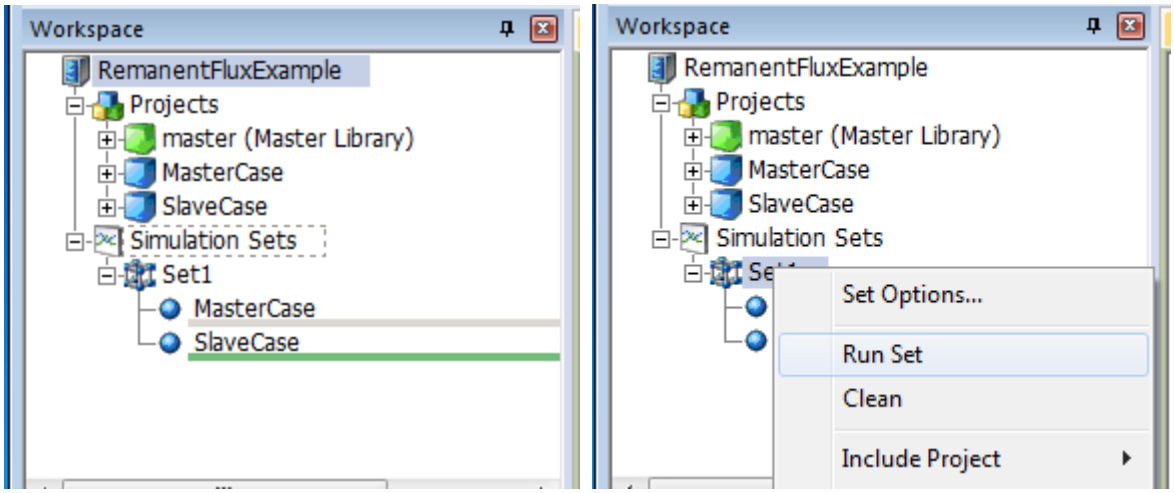

Figure 2: Run the simulation set

In the Master Case, there is a multiple-run component that runs the simulation several times.

During each run, the values of variables (parameter values) are red from multiple run in the Master Case and sent to Slave Case. The Slave Case runs the simulation for these parameter values to energize the transformer. The simulation results are saved into output files in the Slave Case.

In the Master Case, double-click on the multiple run, and the following settings are displayed:

- The number of variables to control for this multiple run is 4 and the variable data type is real. The first three vaiables are remanent Flux (RFlux1 to 3), and the forth is Closing time. See Figure 3.

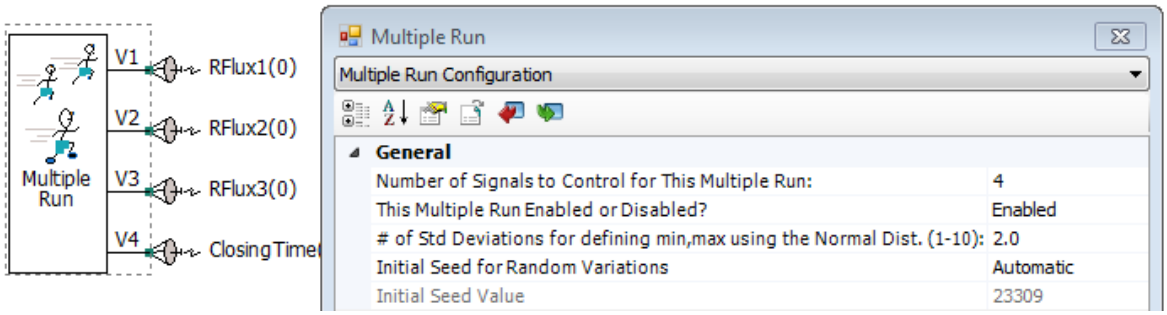

Figure 3: Multiple Run data

- The remanent Flux (RFlux1 to 3) changes from 0 to 0.5 with steps of 0.1 per unit, (see Figure 4).

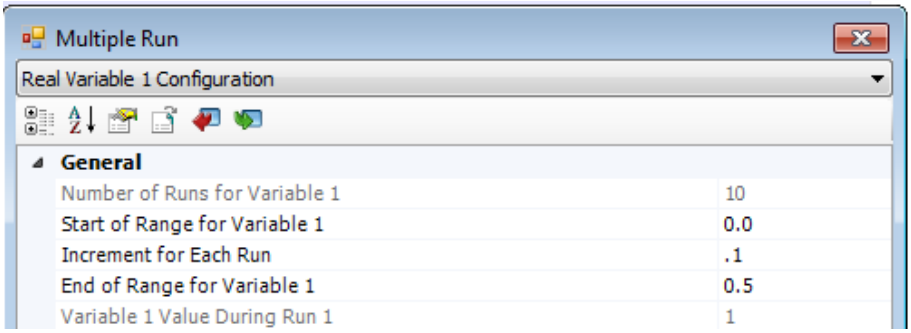

Figure 4: Remanent Flux variation range

- The closing time changes from 0.5 to 0.517 with steps of 0.002 sec (see Figure 5).

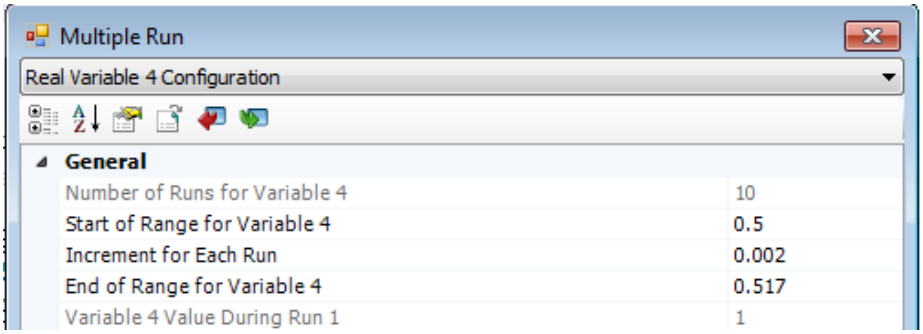

Figure 5: Closing time variation range

In the slave case, the variables (the remanent flux and the closing time of the breaker) are applied to the simulation, as shown in Figure 6.

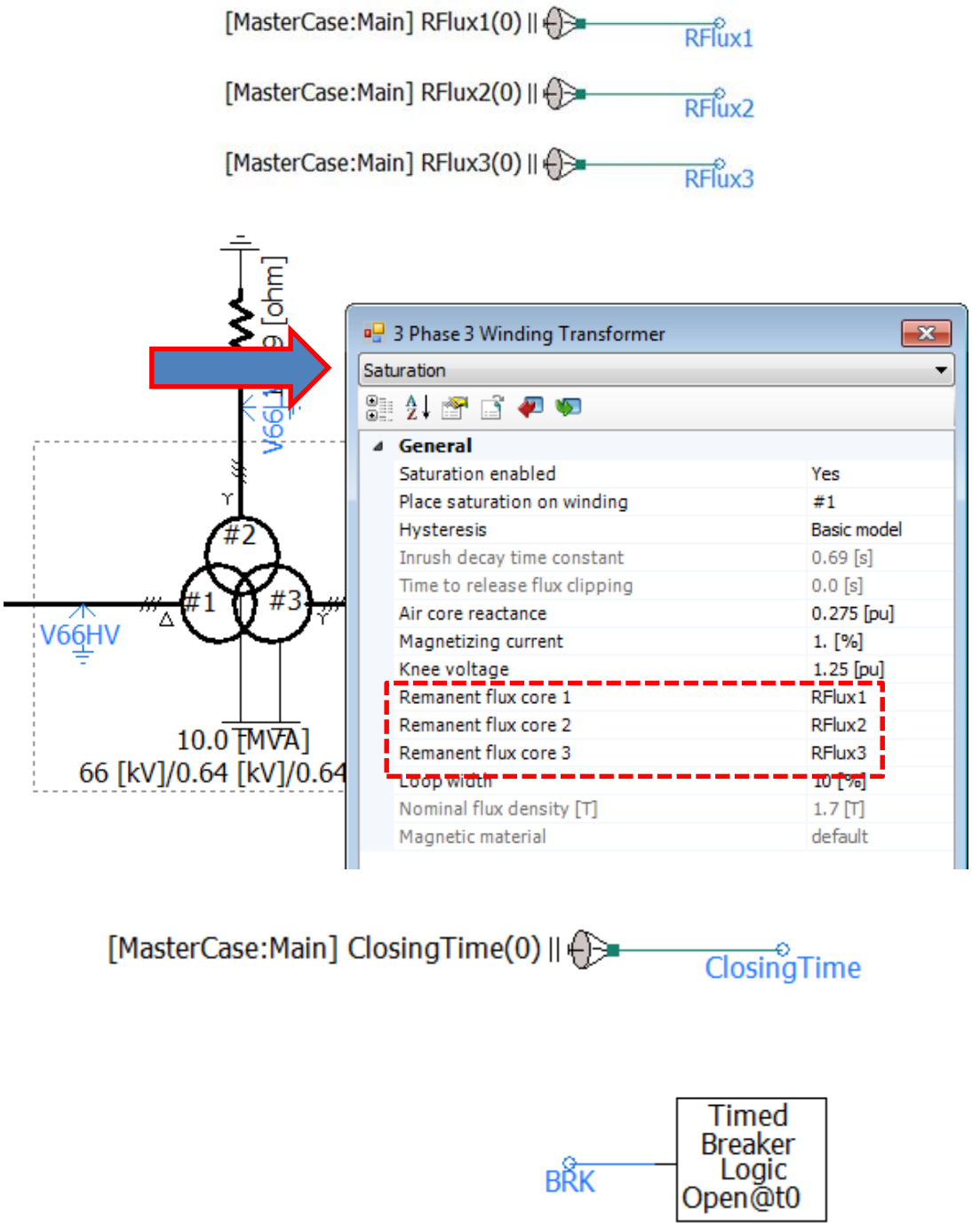

Figure 6: Input variables including the remanent flux and the closing time of the breaker from the Master Case

If the error shown in Figure 7 displays during the run, this may be resolved as per Appendix A.

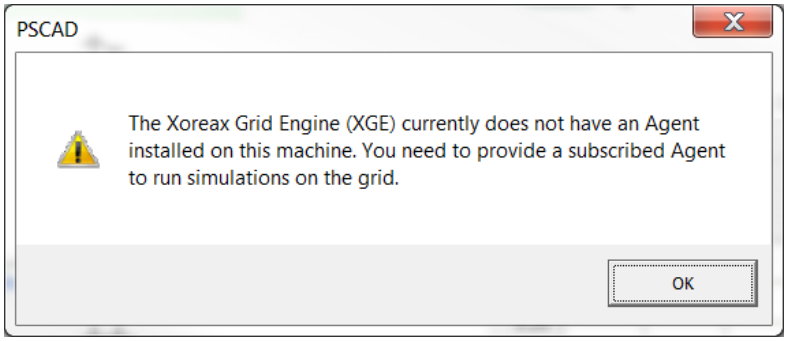

Figure 7: Xoreax Grid Engine error

To see the simulation results, sort out the steps as follows:

- Right-click on the slave case in the workspace, and from the popup window, select "Show In Folder" (see Figure 8).

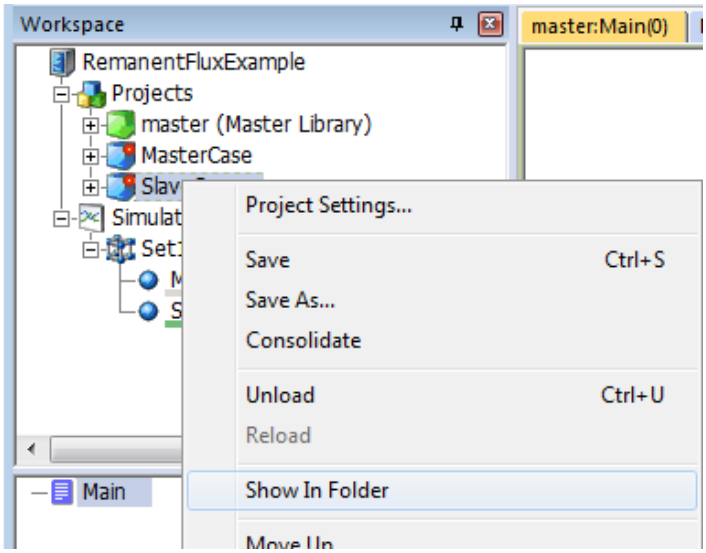

Figure 8: Displaying the project folder

- Double-click on the SlaveCase folder to see the simulation results in the folder (see Figure 9).

Figure 9: Displaying the simulation results

Appendix A: Resolving Simulation Errors

If the error shown in Figure 10 appears when running the simulation set, set the Process Execution field as follows to resolve this:

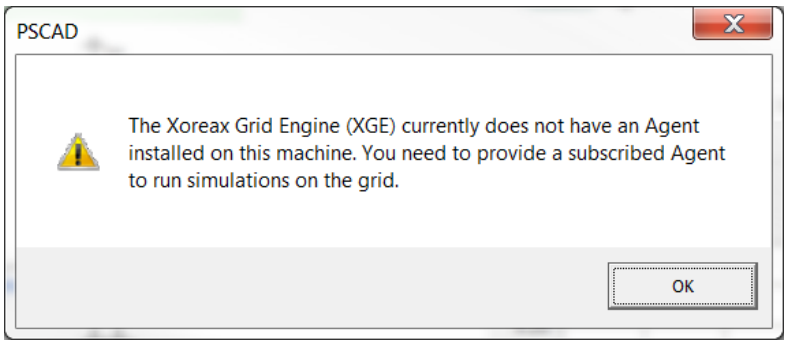

Figure 10: Xoreax Grid Engine error

- Set the Process Execution field as per Figure 11.

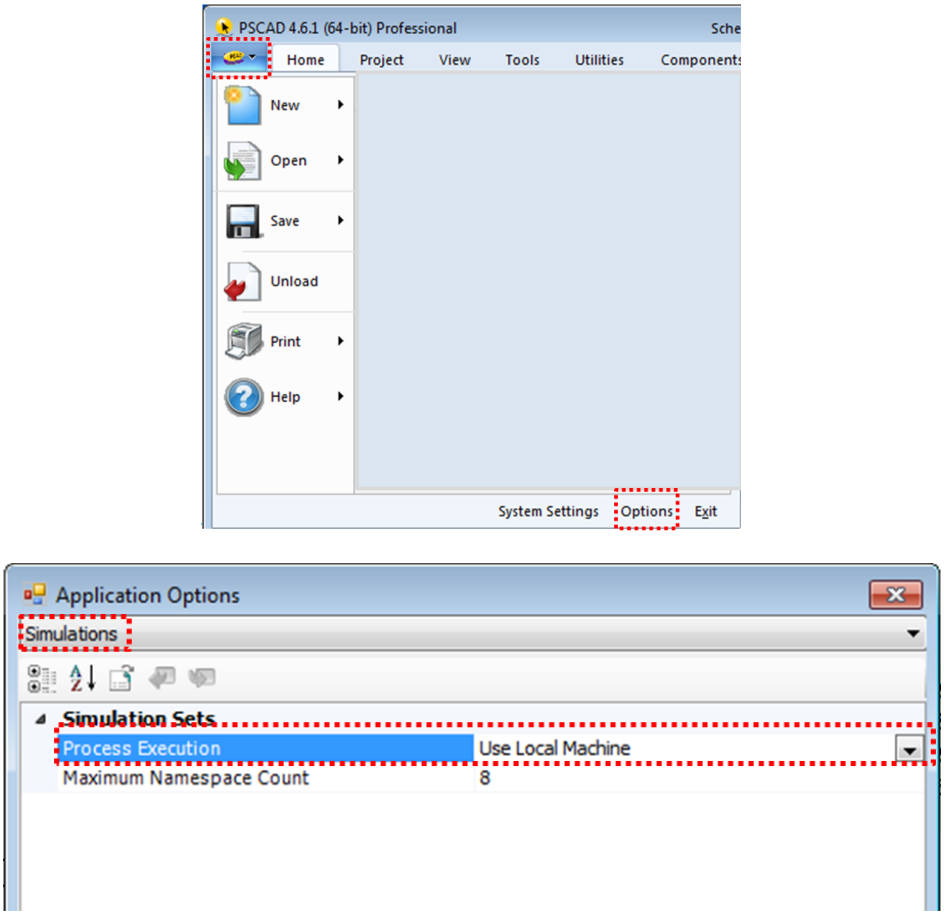

Figure 11: Setting the Process Execution field