Report on matching PST and PSLF miniWECC models

RJ Hallett

7/10/2017

This purpose of this task was to match simulation results between MATLAB’s Power System Toolbox (PST) and GE’s Positive Sequence Load Flow (PSLF) software. The original PST power system file was named “d\_miniWECC\_V3C\_C3\_6\_C\_AlbertaSw.m,” while the original PSLF network data file was named “dmini-v3c1.sav,” and the PSLF dynamics data file was named “miniWECC\_V3.dyd.”

First the bus networks were compared and it was found that the line data, including transformers, did not need adjustments. Next power generation and loads were compared. In PSLF, the loads at buses 43 and 120 needed adjustment to match PST. Next, the power generated at generators 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 14, and 34 were changed in PSLF to match PST. Lastly the shunts on the bus matrix were fixed in PSLF. When the network was solved, it matched PST almost exactly. This solved, working version of the miniWECC is saved as “dmini-v3c1\_RJ7\_working.sav” and needs to be read-in at the start of every simulation.

To match the dynamics data from PST and PSLF, generator, power system stabilizer (pss), exciter, and governor models were compared. In PSLF two types of generator models were being used; “gensal” and “genrou”. In PST, there is one model and it closely resembles “genrou”. To adjust for this, all “gensal’s” were changed to “genrou’s” and the parameters from PST were entered. The original “genrou’s” parameters also needed changing to match PST parameters. After the generators models were corrected, the PSS models were looked at. The PSS models in PSLF (“pss2a”) were adjusted to match the PSS model in PST. PSS’s were turned off for several generators. Next the exciter models (“exst3”) were compared, but no differences were found. Then governor models were looked at. Comparing the two governor models it was realized that because of an additional block in PST’s model, PST needed to be changed to match PSLF’s model (“tgov1”) in this case. The time constants T4 and T5 for salient and gas generators were changed to the same constants used for steam generators; 0 and 0.01. Finally, in PST “lmod\_con = [ ],” and “rlmod\_con = [ ]” were commented out to turn off real and reactive load modulation. The final PSLF dynamics file was saved as “miniWECC\_V8\_RJ.dyd.” The final PST data file was saved as “d\_miniWECC\_V3C\_C3\_6\_C\_AlbertaSw\_LineOpen\_CurrentLoads.m” and is set up to open the line between buses 85 and 83 at 1.1 seconds.

To run a simulation in PSLF, first load the power flow file by clicking “getf,” and selecting “dmini-v3c1\_RJ7\_working.sav.” Solve the network by clicking ‘solve.’ Next read in the dynamics data by clicking “rdyd” and selecting “miniWECC\_V8\_RJ.dyd.” Click “init” to initialize a simulation. Finally click “run” to set up the event, and make sure that the drop down box under loads is changed from constant impedance to ZIP. The results will be saved in the channel file “pslf.chf.”



**Figure 1.** Generator speed comparison between models. Solid line is PST. Dashed is PSLF