Implicit Generator Transformer (GT) Modeling

- The generator transformer can be modeled as a part of generator data in PSS/E
- Still having the HV side bus as voltage controlled node
- webNetUse models all transformers, i.e. including the generator transformer, explicitly
- If the generator transformer is modeled then, the generator bus i.e. the LV bus can be made as voltage controlled node
- Generally in webNetUse, we ignore the generator transformer and put a generator at HV bus and have that bus as voltage controlled node

Effect of implicit GT modeling

- In webNetUse if the generator is attached directly at HV bus, the active and reactive power at HV bus is still solved correctly and the results are identical with PSS/E
- The only difference is at calculating the reactive power loading of the generator
- There is a significant reactive power absorption in the GT
- Hence, when performing load flow 'with enforcing Q limit' the combined Generator and Generator Transformer Qmax and Qmin limits at the HV bus must be used
- If the generator capability at the generator terminal is used (as in PSS/E) the solution might not converge

Zero impedance line models

- In PSS/E the transmission lines with very small impedance can be defined as lines with 'zero impedance'
- The threshold value of the line impedance for making 'zero impedance' line is user settable with default value 0.001 pu
- webNetUse does not allow any line to be with 'zero impedance', however, line impedance as low as 0.000001 pu can be entered

Effect of zero impedance line models

- As far as the load flow solution is considered, there is no practical effect even if you consider a line with low impedance as 'zero impedance' line
- But, while checking whether a PSS/E case that is imported in webNetUse is well defined case with a converged solution or not, one has to be careful
- Because of 'zero impedance' line in PSS/E the bus voltages at the two buses connected by such lines are identical and hence no power can flow in this line in webNetUse
- The power mismatch at these buses is very high, and it might give impression that the PSS/E result is not converged
- It is easy to identify such cases, as the mismatch always occurs in pairs and at neighbouring busses, so such nodes can be identified and ignored

Load scaling at low voltages

- When a PSS/E load flow solution converges with a voltage magnitude very low at some busses, the loads at such busses is reduced by an elliptical function of voltage
- The voltage threshold at which scaling is done is a settable parameter with default value of 0.7 pu
- webNetUse does not scale the loads that are defined as constant power loads

Effect of load scaling

- In case the voltage is too low at some busses the load scaling would help in achieving convergence of the load flow. If the scaling is not performed then load flow would not converge both in PSS/E and in webNetUse
- When importing a PSS/E solved case to webNetUse it is necessary that this scaling is applied explicit to the load where the bus voltage is below the threshold on 0.7
- This is done by default, by the webNetUse import function. The load at which it is done is printed in the log report
- The load flow result after load scaling in webNetUse differs slightly in power mismatch, but the difference is significant in the voltage magnitude at that bus
- This is due to the fact that such nodes are at tip of nose curve and dv/dp is very high at such nodes