

Can I Do Unbalanced Power Flow?

From OpenDSSWiki

Question

I want to do unbalanced power flow calculation using OpenDSS, and have been gathering the papers or books written by you for a couple of days. But I only found a little useful information about this algorithm on the Internet. Do you have some papers about the unbalanced power flow calculation?

Answer

Balanced or unbalanced, the algorithm is the same. OpenDSS models unbalanced circuits having nearly arbitrary unbalances. By default everything can be unbalanced. I would suggest that you not think of OpenDSS as a power flow program, although most of the time you may use it to solve a power flow problem. It is better to think of it as a Simulator.

There is a section in the User's Manual that explains how the solution of the power flow problem works. It is a very simple fixed-point solution method based on nodal admittance equations. If you are looking for something more complicated, you won't find it. Once the system Y matrix is built, the solution is nearly set in concrete. Of course, the Load models are nonlinear, so the solver will generally have to iterate to find the power flow solution. But we have found that it does so quite reliably for distribution systems -- even those with some severe unbalances.

There are a couple of "tricks" we have employed over the years to better ensure convergence. The fixed point method requires a reasonably good guess at the voltages in order to converge well. The code that controls the solution is in Solution.Pas. SolveSnap is a key function in that module. If you trace through this code, you will learn how we initialize the solution and perform the iterations. Of course, for daily simulations, etc., the solver simply uses the previous solution as the starting point for the solution. This usually works quite well. For a large circuit, it may take a second or two for the initial solution. Thereafter, the program will often perform several solutions per second. This is one of the keys to performing annual simulations efficiently.

The Y matrix is built in Ymatrix.Pas.

SolutionAlgs.Pas contains the algorithms for various solution modes such as Yearly, Daily, etc.

--Rdugan 21:45, 29 August 2010 (UTC)

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