Backward-Forward Radial Loadflow 1.2 (HP 50g – HPGCC C Compiler 2.0)

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This program calculates per-unit voltages and MW/MVAR flows along a radial distribution line using the backward-forward sweep method. It simulates only balanced 3-phase systems (so-called single-phase loadflow). This program has been tested on the HP 50g.

To install, just upload the file bfs.hp using the HP calculator's PC connectivity software and then direct the connectivity program to "disconnect" the calculator. The program will now appear as a string on the stack's first level. Immediately store it to a variable by typing a variable name (say 'bfs') and then pressing the STO key.

To run the program, you will need to first install the ARM Toolbox library (SETUP.BIN included in the ZIP file) supplied with HPGCC to port 2 as follows (steps from the HPGCC ARMtoolbox documentation):

1. Transfer the file SETUP.BIN to your calculator.
2. Enter a (real) port number, where you want the lib to be stored, on the stack.
   (2.0 is recommended for flash ROM)
3. Push SETUP.BIN on the stack.
4. Press EVAL
5. Warm boot your machine (Hold down the ON key, then press F3, then release both).

With the ARM toolbox installed, run the program by pressing right-shift, LIB. Select the ARM Toolbox. The next step is to recall (RCL) the variable storing bfs so it is now listed as a string on the stack level 1. Then Press the PrRUN command (usually assigned to the first Function key F1) to run the program itself.

This updated version (1.2) allows the user to specify his own base MVA instead of fixing it at 100 MVA. It also substitutes the node kilometer segment length for each node segment in lieu of ID numbers. Also, the resistance and reactance values are in per-unit (p.u.) per kilometer rather than segment total p.u. resistance and reactance. There is also a bug correction to the lineflow computation routine after convergence has been achieved. The node voltage output string dumped to the stack now includes both the node per-unit voltage magnitudes and phase angles (in degrees) as well as a 2 column by n row matrix where n is the number of nodes including the source, the first column is the node's kilometer distance from source node 0 and the second column is the p.u. node voltage. The MVA segment flow versus node kilometer distance from source node 0 is also dumped in a similar format along with a separate MW and MVAR per segment flow dump. By removing the quotation marks enclosing the node voltage versus distance and segment MVA flow versus distance array strings, the said array strings become converted to numeric matrices which can now be plotted (p.u. voltage versus kilometer distance from source node 0, segment MVA line flow versus kilometer distance from source) using the included XYPLT User-RPL program also written by the author.

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