Description of Line Parameters output file

1   Line parameters output file format

The output file generated from Line Parameters has two main sections:
- ❑ Conductor characteristics.
- ❑ Line parameters.

1.1   Conductor characteristics

The information contained on the conductors in the data tab is printed for the record more or less in its original form, with the following exceptions:
- ❑ In place of height at tower and midspan, the average height is listed as y-coordinate.
- ❑ The order of the conductors in the "Conductor Data" table is arbitrary, while the order in the listing will always be as follows: conductors first encountered with phase numbers 1,2,3, ... , followed by conductors with already-existing phase numbers (= 2nd, 3rd, 4th, ... conductors in bundles or parallel circuits), followed by ground wires (wire number = 0).
- ❑ While a single conductor card may specify M conductors with the bundle option, all M conductors will be listed separately in the output.

1.2   Line parameters

Since all matrices are symmetric, only values in and below the diagonal (lower triangular) are printed.

All matrices are complex, except the susceptance (or capacitance) matrices for the system of physical conductors and for the system of equivalent phase conductors. Real and imaginary parts are printed above each other, as indicated below.
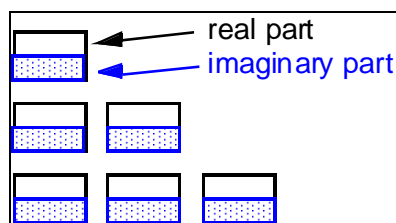
The following matrices can be printed:
- ❑ Impedance matrices: The matrix elements of the impedance matrices per kilometer or per mile are defined as follows:
  - $Z_{i,k}$ the mutual impedance between i and k,
  - $Z_{i,i}$ the self impedance of i, with current returning through ground (and through ground wires if there are any and if they have been eliminated).
- ❑ Capacitance matrices: The matrix elements of the susceptance (or capacitance) matrices per kilometre or mile are defined as follows:
  - $\omega C_{i,k}$ the *negative* value of susceptance between i and k,

- $\omega C_{i,i}$ the sum of all susceptances from i to all other conductors and to ground.

❑ Symmetrical components matrices: Note that the matrices for symmetrical components have their rows ordered in the sequence "zero (0), positive (1), negative (2) of first three-phase circuit, (0), (1), (2) of second three-phase circuit, etc.", whereas the columns have (1) and (2) exchanged and are thus ordered "(0), (2), (1) of first circuit, (0), (2), (1) of second circuit, etc.". This trick makes these matrices symmetrical again, as indicated below.
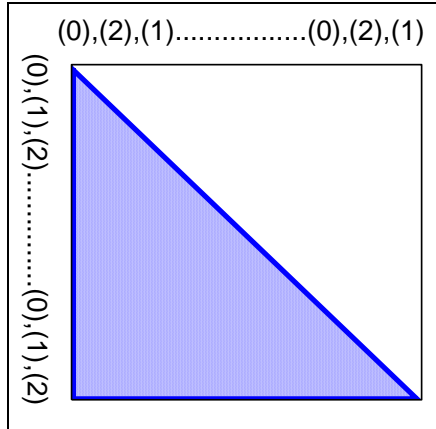
From this modified row and column numbering, it follows that:

- $Z_{1,1} = Z_{2,2}$ within any three phase circuit.

- $Z_{1,0} = Z_{0,2}$ within any three phase circuit etc... But

- $Z_{1,0} = Z_{0,1}$ etc...

If there are only two equivalent phase conductors, a two-pole DC line is assumed. In this case, zero sequence refers to the operation where equal currents go into both poles and return through ground (and through ground wires if they exist and were eliminated), and positive sequence refers to the operation where the current goes into one pole and returns through the other.

For three or more equivalent phase conductors, only three-phase circuits are assumed, with numbers 1,2,3 forming the first circuit, numbers 4,5,6 forming the next circuit, etc. If the number of phases were 7 or 8, the last one or two phases would simply be ignored. If the number were 9, then three three-phase circuits would be assumed.