AC Analysis

The AC analysis is a small signal analysis in the frequency domain. Basically this type of simulation uses the same algorithms as the DC analysis (section 3.1 on page ▢). The AC analysis is a linear modified nodal analysis. Thus no iterative process is necessary. With the Y-matrix of the components, i.e. now a complex matrix, and the appropriate extensions it is necessary to solve the equation system (4.1) similar to the (linear) DC analysis.

$$[A] \cdot [x] = [z] \quad \text{with} \quad A = \begin{bmatrix} Y & B \\ C & D \end{bmatrix} \tag{4.1}$$

Non-linear components have to be linearized at the DC bias point. That is, before an AC simulation with non-linear components can be performed, a DC simulation must be completed successfully. Then, the MNA stamp of the non-linear components equals their entries of the Jacobian matrix, which was already computed during the DC simulation. In addition to this real-valued elements, a further stamp has to be applied: The Jacobian matrix of the non-linear charges multiplied by $j\omega$ (see also section 10.7).

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