Convert

[Z]

$$[Z]=[G_0]^{-1}.[[I]-[S]]^{-1}.[[S].[Z_0]+[Z_0^*]].[G_0]$$

$$[S]=[G_0].[[Z]-[Z_0^*]].[[Z]+[Z_0]]^{-1}.[G_0]^{-1}$$

[Y]

$$[Y]=[G_0]^{-1}.[[S].[Z_0]+[Z_0^*]]^{-1}.[[I]-[S]].[G_0]$$

$$[S]=[G_0].[[I]-[Z_0^*].[Y]].[[I]+[Z_0].[Y]]^{-1}.[G_0]^{-1}$$

with $[G_0]=\mathrm{diag}(g_1,...,g_i,...g_N)$ and $g_i=\frac{1}{\sqrt{|\Re\{Z_0^{(i)}\}|}}$

Normalize *(from Z_0 to Z'_0)*

$$[S']=[A]^{-1}.[[S]-[\rho^*]].[[I]-[\rho].[S]]^{-1}.[A^*]$$

With diagonal matrices...

$$[A]=[G'_0]^{-1}.[G_0].[[I]-[\rho^*]]^{-1}$$

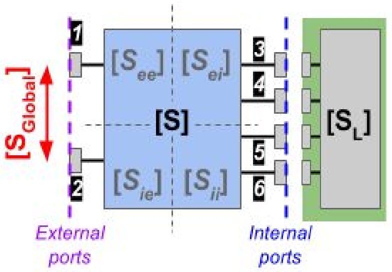
$$[\rho]=[Z'_0-Z_0].[Z'_0+Z_0^*]^{-1}$$

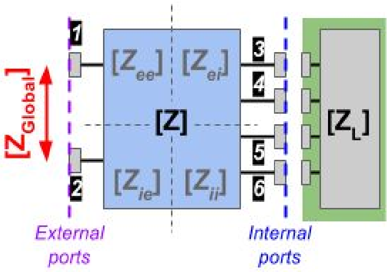
$$[G_0]=\mathrm{diag}(g_1,...,g_i,...g_N)$$

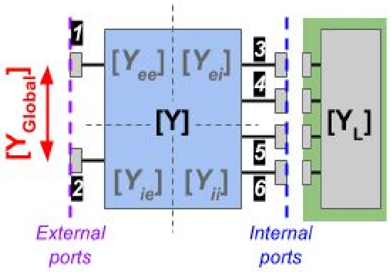
with $g_i=\frac{1}{\sqrt{|\Re\{Z_0^{(i)}\}|}}$

Reference impedance matrices are diagonal

Reduce







Embedding equations

$$[S_{Global}] = [S_{ee}] + [S_{ei}].([I] - [S_L].[S_{ii}])^{-1}.[S_L].[S_{ie}]$$

$$[Z_{Global}] = [Z_{ee}] - [Z_{ei}].([Z_{ii}] + [Z_L])^{-1}.[Z_{ie}]$$

$$[Y_{Global}] = [Y_{ee}] - [Y_{ei}].([Y_{ii}] + [Y_L])^{-1}.[Y_{ie}]$$