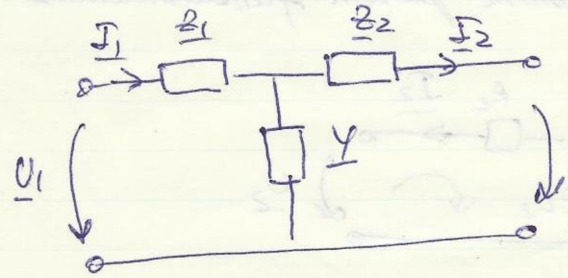
11.2. Schemele echivalente ale cuadripolilor liniari

Cele mai utilizate sunt schemele în T și π.



$$\underline{U}_1 = \underline{Z}_1\left(\underline{I}_2 + \underline{Y}\left(\underline{Z}_2\underline{I}_2 + \underline{U}_2\right)\right) + \underline{Z}_2\underline{I}_2 + \underline{U}_2$$

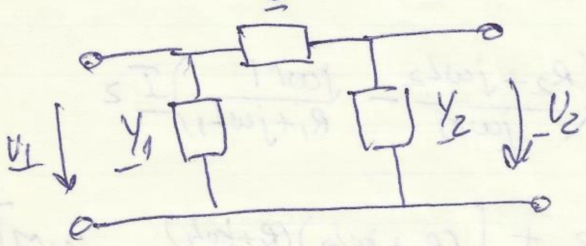
$$= \underline{Z}_1\underline{I}_2 + \underline{Z}_1\underline{Z}_2\underline{Y}\underline{I}_2 + \underline{Z}_1\underline{Y}\underline{U}_2 + \underline{Z}_2\underline{I}_2 + \underline{U}_2$$

$$\underline{U}_1 = \underbrace{\left(1 + \underline{Z}_1\underline{Y}\right)}_{\underline{A}}\underline{U}_2 + \underbrace{\left(\underline{Z}_1 + \underline{Z}_2 + \underline{Z}_1\underline{Z}_2\underline{Y}\right)}_{\underline{B}}\underline{I}_2$$

$$\underline{I}_1 = \underline{I}_2 + \underline{Y}\left(\underline{Z}_2\underline{I}_2 + \underline{U}_2\right) =$$

$$= \underbrace{\underline{Y}}_{\underline{C}}\underline{U}_2 + \underbrace{\left(1 + \underline{Z}_2\underline{Y}\right)}_{\underline{D}}\underline{I}_2$$

Schema echiv. în π



$$\Rightarrow \quad \underline{A} = 1 + \underline{Z}\,\underline{Y}_2$$
$$\underline{B} = \underline{Z}$$
$$\underline{C} = \underline{Y}_1 + \underline{Y}_2 + \underline{Y}_1\underline{Y}_2\underline{Z}$$
$$\underline{D} = 1 + \underline{Z}\,\underline{Y}_1$$

Ca urmare se pot deduce parametrii cuadripolului echivalent în T sau în π

Datorită relațiilor de echivalență între sistemele de ecuații se pot deduce relații între parametrii cuadripolului.

Astfel, pt ec. în admitanțe avem:

$$\underline{I}_1 = \underline{Y}_{11}\,\underline{U}_1 + \underline{Y}_{12}\,\underline{U}_2 \qquad \Big| : \underline{Y}_{11}$$

$$\underline{I}_2 = \underline{Y}_{21}\,\underline{U}_1 + \underline{Y}_{22}\,\underline{U}_2 \qquad \Big| : \underline{Y}_{21}$$

$$\frac{\underline{I}_1}{\underline{Y}_{11}} = \underline{U}_1 + \frac{\underline{Y}_{12}}{\underline{Y}_{11}}\,\underline{U}_2$$

$$\frac{\underline{I}_2}{\underline{Y}_{21}} = \underline{U}_1 + \frac{\underline{Y}_{22}}{\underline{Y}_{21}}\,\underline{U}_2$$

$$\frac{\underline{I}_1}{\underline{Y}_{11}} - \frac{\underline{I}_2}{\underline{Y}_{21}} = \left(\frac{\underline{Y}_{12}}{\underline{Y}_{11}} - \frac{\underline{Y}_{22}}{\underline{Y}_{21}}\right)\underline{U}_2$$

$$\underline{I}_1 = \frac{\underline{Y}_{21}\,\underline{Y}_{12} - \underline{Y}_{11}\,\underline{Y}_{22}}{\underline{Y}_{21}}\,\underline{U}_2 + \frac{\underline{Y}_{11}}{\underline{Y}_{21}}\,\underline{I}_2$$

$$\Rightarrow \underline{C} = \frac{\underline{Y}_{21}\,\underline{Y}_{12} - \underline{Y}_{11}\,\underline{Y}_{22}}{\underline{Y}_{21}} \qquad \underline{D} = \frac{\underline{Y}_{11}}{\underline{Y}_{21}} \qquad (7)$$

Din a II-a ec.:

$$\underline{Y}_{21}\,\underline{U}_1 = \underline{I}_2 - \underline{Y}_{22}\,\underline{U}_2$$

$$\underline{U}_1 = -\frac{\underline{Y}_{22}}{\underline{Y}_{21}}\,\underline{U}_2 + \frac{1}{\underline{Y}_{21}}\,\underline{I}_2 \Rightarrow \left.\begin{aligned} \underline{A} &= -\frac{\underline{Y}_{22}}{\underline{Y}_{21}} \\ \underline{B} &= \frac{1}{\underline{Y}_{21}} \end{aligned}\right\} \quad (8)$$