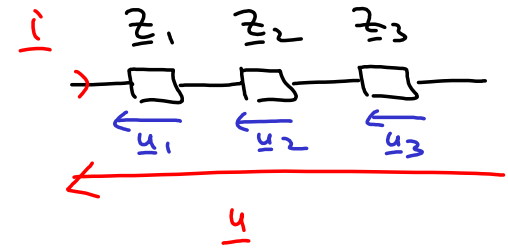
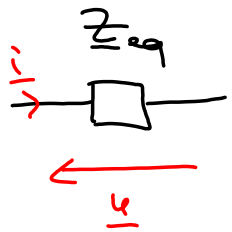
B Règles d'associations

B.1 Association en série



$\equiv$

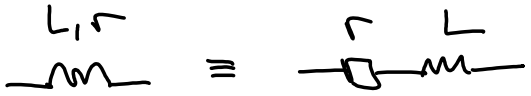


Loi d'additivité des tensions :

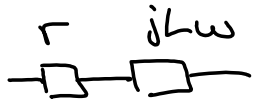
$$\underline{u} = \underline{u}_1 + \underline{u}_2 + \underline{u}_3$$
$$= \underline{Z}_1 \underline{i} + \underline{Z}_2 \underline{i} + \underline{Z}_3 \underline{i}$$
$$= (\underline{Z}_1 + \underline{Z}_2 + \underline{Z}_3)\underline{i}$$
$$\underline{u} = \underline{Z}_{eq}\, \underline{i}$$

où $\boxed{\underline{Z}_{eq} = \underline{Z}_1 + \underline{Z}_2 + \underline{Z}_3}$

Exemple : bobine « réelle »



En RSF et en notation complexe :



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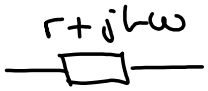
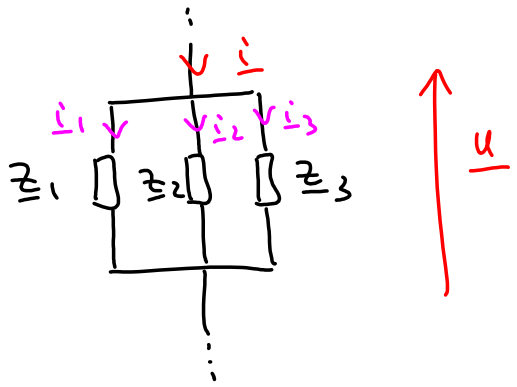


B.2 Association en parallèle



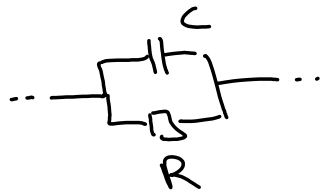
$\equiv$

Loi des nœuds :

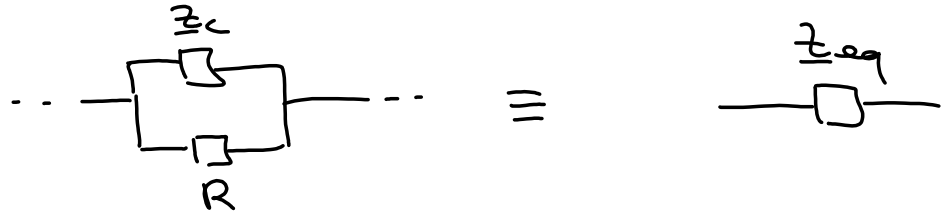
$$\underline{i} = \underline{i}_1 + \underline{i}_2 + \underline{i}_3$$
$$= \underline{Y}_1 \underline{u} + \underline{Y}_2 \underline{u} + \underline{Y}_3 \underline{u}$$
$$= (\underline{Y}_1 + \underline{Y}_2 + \underline{Y}_3)\underline{u}$$
$$\underline{i} = \underline{Y}_{eq}\, \underline{u}$$

où $\boxed{\underline{Y}_{eq} = \underline{Y}_1 + \underline{Y}_2 + \underline{Y}_3}$

Exemple :



En RSF et en notation complexe :



où $\underline{Y}_{eq} = \frac{1}{R} + \underline{Y}_C$

$= \frac{1}{R} + \frac{1}{\underline{Z}_C}$

$= \frac{1}{R} + jC\omega$

$= \frac{1}{R} + \frac{jRC\omega}{R}$

$$\underline{Y}_{eq} = \frac{1 + jRC\omega}{R}$$

Ainsi : $\underline{Z}_{eq} = \frac{1}{\underline{Y}_{eq}}$

$$\underline{Z}_{eq} = \frac{R}{1 + jRC\omega}$$