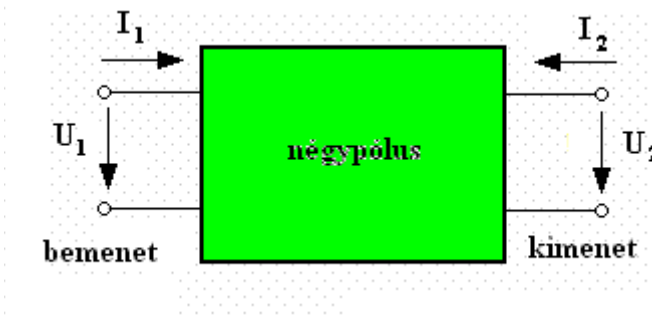


# NÉGYPÓLUSOK



## 1. Impedancia ( z ) paraméterek

$$u_1 = z_{11} \cdot i_1 + z_{12} \cdot i_2$$

$$u_2 = z_{21} \cdot i_1 + z_{22} \cdot i_2$$

Bemeneti impedancia (nyitott kimenet):

$$z_{11} = \left. \frac{u_1}{i_1} \right|_{i_2 = 0}$$

Átviteli impedancia (nyitott bemenet):

$$z_{12} = \left. \frac{u_1}{i_2} \right|_{i_1 = 0}$$

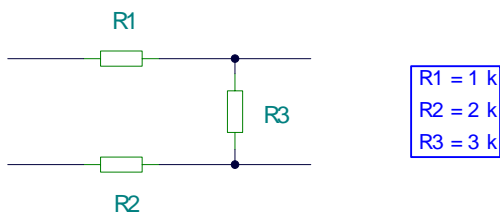
Átviteli impedancia (nyitott kimenet):

$$z_{21} = \left. \frac{u_2}{i_1} \right|_{i_2 = 0}$$

Kimeneti impedancia (nyitott bemenet):

$$z_{22} = \left. \frac{u_2}{i_2} \right|_{i_1 = 0}$$

**Feladat:**



$$z_{11} = \frac{I_1 \cdot (R_1 + R_3 + R_2)}{I_1} = 1 \cdot k + 3 \cdot k + 2 \cdot k = 6 \cdot k$$

$$z_{12} = \frac{I_2 \cdot R_3}{I_2} = R_3 = 3 \cdot k$$

$$z_{21} = \frac{I_1 \cdot R_3}{I_1} = R_3 = 3 \cdot k$$

$$z_{22} = \frac{I_2 \cdot R_3}{I_2} = R_3 = 3 \cdot k$$

## 2. Admittancia ( y ) paraméterek

$$i_1 = y_{11} \cdot u_1 - y_{12} \cdot u_2$$

$$i_2 = y_{21} \cdot u_1 + y_{22} \cdot u_2$$

Bemeneti admittancia (rövidrezárt kimenet):

$$y_{11} = \left. \frac{i_1}{u_1} \right|_{u_2 = 0}$$

Átviteli admittancia (rövidrezárt bemenet):

$$y_{12} = \left. -\frac{i_1}{u_2} \right|_{u_1 = 0}$$

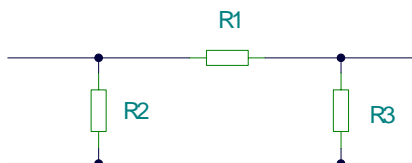
Átviteli admittancia (rövidrezárt kimenet):

$$y_{21} = \left. -\frac{i_2}{u_1} \right|_{u_2 = 0}$$

Kimeneti admittancia (rövidrezárt bemenet):

$$y_{22} = \left. \frac{i_2}{u_2} \right|_{u_1 = 0}$$

**Feladat:**



R1 = 1 k
R2 = 2 k
R3 = 3 k

$$y_{11} = \frac{i_1}{i_1 \cdot (R_1 \times R_2)} = \frac{3}{2} = 1.5 \cdot mS$$

$$y_{12} = -\frac{u_2}{R_1} = \frac{1}{R_1} = 1 \cdot mS$$

### 3. Hibrid ( h ) paraméterek

$$u_1 = h_{11} \cdot i_1 + h_{12} \cdot u_2$$

$$i_2 = -h_{21} \cdot i_1 + h_{22} \cdot u_2$$

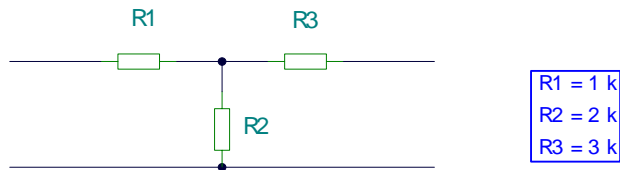
Bemeneti impedancia (rövidrezárt kimenet):  $h_{11} = \left. \frac{u_1}{i_1} \right|_{u_2 = 0}$

Feszültségvisszahatás (nyitott bemenet):  $h_{12} = \left. \frac{u_1}{u_2} \right|_{i_1 = 0}$

Áramerősítési tényező (rövidrezárt kimenet):  $h_{21} = \left. \frac{i_2}{i_1} \right|_{u_2 = 0}$

Kimenő admittancia (nyitott bemenet):  $h_{22} = \left. \frac{i_2}{u_2} \right|_{i_1 = 0}$

**Feladat:**



$$h_{12} = \frac{u_2 \cdot \frac{R_2}{R_2 + R_3}}{u_2} = \frac{R_2}{R_2 + R_3} = \frac{2 \cdot k}{2 \cdot k + 3 \cdot k} = 0.4$$