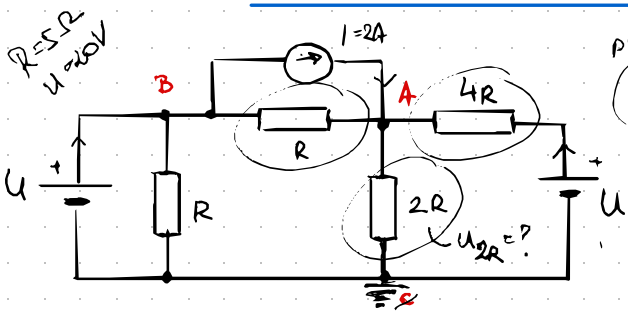
11.2. METODA POTENCIJALA ČVOROVA



potencijal te točke — oduzimamo potence koji su u susjedstvu

$\varphi_1(y_{11}) - \varphi_2(y_{12}) - \varphi_3(y_{13}) = \sum I$

svi $\frac{1}{z}$ s kojima je ta točka direktno povezana

suma struja

1) odaberemo proizvoljni čvor koji ćemo uzemljiti

↳ uzemljili smo C jer su s te strane mjerenja na izlazima pa je lakše

$\varphi_C = 0 \rightarrow \varphi_B = \varphi_C + U = U$

$$\varphi_A \cdot \left(\frac{1}{R} + \frac{1}{2R} + \frac{1}{4R}\right) - \varphi_B \cdot \frac{1}{R} - \varphi_C \cdot \left(\frac{1}{2R} + \frac{1}{4R}\right) = I + \frac{U}{4R}$$

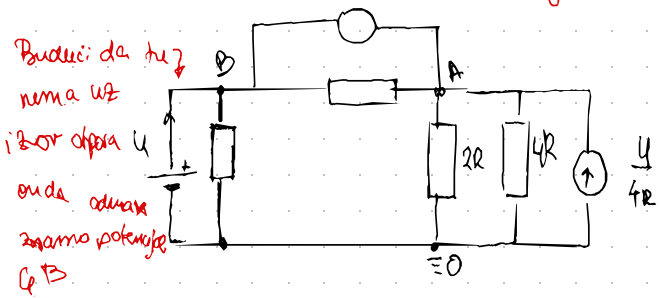
(0 → 0)

Y koji je povezan na tu točku

Y koji povezuje traženi potencijal i onaj koji oduzimamo

1 računamo ekvivalentne struje

prelazimo strujni izvor



$$\varphi_A \left(\frac{4+2+1}{4R}\right) - 20V \cdot \frac{1}{R} = 2A + \frac{20}{4R}$$

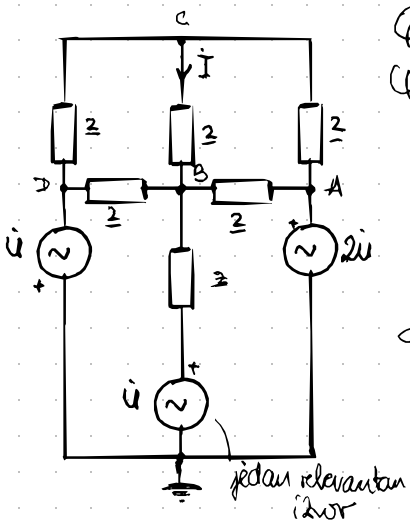
$$\varphi_A \cdot \frac{7}{4R} - \frac{20}{R} = 2 + \frac{5}{R} \rightarrow \varphi_A \left(2 + \frac{25}{R}\right) \cdot \frac{4R}{7}$$

$$\varphi_A = \frac{8R}{7} + \frac{100}{7} = \frac{140}{7}$$

$\varphi_A = 20V$

$\varphi_A - \varphi_C = 20V$

ZI 18./19.) (3) $\dot{U} = 110V \quad \underline{Z} = j5\Omega \quad \dot{I} = ?$



$\varphi_A = 2u$

$\varphi_D = -u$

B) $\varphi_B\left(\frac{1}{\underline{Z}} + \frac{1}{\underline{Z}} + \frac{1}{\underline{Z}} + \frac{1}{\underline{Z}}\right) - \varphi_D\left(\frac{1}{\underline{Z}}\right) - \varphi_A\left(\frac{1}{\underline{Z}}\right) - \varphi_C\left(\frac{1}{\underline{Z}}\right) - \varphi_0\left(\frac{1}{\underline{Z}}\right) = u \cdot \underline{Z}$

c) $\varphi_C \cdot \left(\frac{3}{\underline{Z}}\right) - \varphi_D \frac{1}{\underline{Z}} - \varphi_B \frac{1}{\underline{Z}} - \varphi_A \frac{1}{\underline{Z}} = 0$

(Gnije poredan sa izvorom do neke druge točke)

$\varphi_B \cdot \frac{4}{\underline{Z}} - [-u] \cdot \frac{1}{\underline{Z}} - [2u] \cdot \frac{1}{\underline{Z}} - \varphi_C \cdot \left(\frac{1}{\underline{Z}}\right) = \frac{u}{\underline{Z}} \quad / \cdot \underline{Z}$

$4\varphi_B + u - 2u - \varphi_C = u$

$4\varphi_B - \varphi_C = 2u$

$\varphi_C \cdot \frac{3}{\underline{Z}} - [-u] \cdot \frac{1}{\underline{Z}} - \varphi_B \frac{1}{\underline{Z}} - [2u] \frac{1}{\underline{Z}} = 0 \quad / \underline{Z}$

$3\varphi_C + u - \varphi_B - 2u = 0$

$3\varphi_C - \varphi_B = u \rightarrow \varphi_B = 3\varphi_C - u$

$4(3\varphi_C - u) - \varphi_C = 2u$

$12\varphi_C - 4u - \varphi_C = 2u$

$11\varphi_C = 6u$

$\varphi_C = \frac{110 \cdot 6}{11} \rightarrow \varphi_C = 60V \quad \varphi_B = 70V$

$I = \frac{U}{R} \rightarrow u = \Delta\varphi$

$\varphi_C - \varphi_B = u$

$R = j5\Omega$

$\underline{I} = \frac{-10V}{j5\Omega} = +2i$