# Rezolvarea iterativa a CCP

Solutia iterativa a problemei:
Sedefineste functia care furnizeaza corectia valorii efective si a argumentului tensiunii pentru noul pas de iteratie.

$$\Delta V(l,V,\delta) := \left[\sum_k \left[Jinv_{l+N\_bus-2,\,k-1}\cdot\left(Pb_k - f_p(k,V,\delta)\right)\right]\right] \ldots$$
$$+\sum_k \left[Jinv_{l+N\_bus-2,\,k+N\_bus-2}\cdot\left(if\left(It_k = 1, 0, Qb_k - f_q(k,V,\delta)\right)\right)\right]$$

$$\Delta\delta(l,V,\delta) := \sum_k Jinv_{l-1,\,k-1}\cdot\left(Pb_k - f_p(k,V,\delta)\right) \ldots$$
$$+\left[\sum_k \left[Jinv_{l-1,\,k+N\_bus-2}\cdot\left(if\left(It_k = 1, 0, Qb_k - f_q(k,V,\delta)\right)\right)\right]\right]$$

**Solutia iterativa**

Se defineste nr. maxde iteratii.

$Max\_it := 6$

Se defineste coeficientul de accelerare, $\lambda$. Acesta este subunitar si imbunatateste convergenta. Utilizatorul poate sa-i modifice valoarea pentru a vedea efectele abaterilor lasfarsitul iteratiilor. $\lambda := 1$

Se defineste indexul de iteratie.

$Iter := 1..Max\_it$

$m := 2..N\_bus$

$Num_1 := 0$

Iteratii:

$$\begin{pmatrix} Num_{Iter+1} \\ V_m \\ \delta_m \end{pmatrix} := \begin{pmatrix} Num_{Iter} + 1 \\ V_m + \Delta V(m,V,\delta)\cdot\lambda \\ \delta_m + \Delta\delta(m,V,\delta)\cdot\lambda \end{pmatrix}$$

Abaterea de putere:

$$\varepsilon := \left[\sum_{m}\left[\left(Pb_m - f_p(m,V,\delta)\right)^2 + \mathrm{if}\left[It_m = 1, 0, \left(Qb_m - f_q(m,V,\delta)\right)^2\right]\right]\right]^{\frac{1}{2}}$$

$\varepsilon = 0.103$

Valorile efective si argumentele tensiunilor:

$$V = \begin{pmatrix} 1.04 \\ 0.958 \\ 1.02 \\ 0.914 \\ 0.971 \end{pmatrix}$$

$$\frac{\delta}{deg} = \begin{pmatrix} 0 \\ -6.307 \\ -3.575 \\ -11.144 \\ -6.193 \end{pmatrix}$$

Puterea activa/reactiva a nodului de echilibru:

$Ps := f_p(1, V, \delta) + Bus_{1,3}$

$Qs := f_q(1, V, \delta) + Bus_{1,4}$

$Ps = 2.349$

$Qs = 1$

## Pierderile pe linii

Se defineste numarul liniilor ca in tabloul **Series**.

$m := 2$

$i := Is_m$

$j := Js_m$

$$ys := \frac{1}{Series_{m,3}}$$

$ysh := Series_{m,4}$

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Puterea activa dinspre nodul de plecare spre nodul de sosire:

$$Pij := -\left(V_i \cdot V_j \cdot |ys| \cdot \cos\left(\arg(ys) + \delta_j - \delta_i\right)\right) + \left(V_i\right)^2 \cdot |ys| \cdot \cos(\arg(ys)) \ ... \\ + \left(V_i\right)^2 \cdot |ysh| \cdot \cos(\arg(ysh))$$

Puterea activa dinspre nodul de sosire spre nodul de plecare:

$$Pji := -\left(V_j \cdot V_i \cdot |ys| \cdot \cos\left(\arg(ys) + \delta_i - \delta_j\right)\right) + \left(V_j\right)^2 \cdot |ys| \cdot \cos(\arg(ys)) \ ... \\ + \left(V_j\right)^2 \cdot |ysh| \cdot \cos(\arg(ysh))$$

Pierderile de putere activa pe linie:

$$Ploss := Pij + Pji$$

$$Ploss = 0.03$$

Puterea reactiva dinspre nodul de plecare spre nodul de sosire:

$$Qij := V_i \cdot V_j \cdot |ys| \cdot \sin\left(\arg(ys) + \delta_j - \delta_i\right) - \left(V_i\right)^2 \cdot |ys| \cdot \sin(\arg(ys)) \ ... \\ + -\left[\left(V_i\right)^2 \cdot |ysh| \cdot \sin(\arg(ysh))\right]$$

Puterea reactiva dinspre nodul de sosire spre nodul de plecare:

$$Qji := V_j \cdot V_i \cdot |ys| \cdot \sin\left(\arg(ys) + \delta_i - \delta_j\right) - \left(V_j\right)^2 \cdot |ys| \cdot \sin(\arg(ys)) \ ... \\ + -\left[\left(V_j\right)^2 \cdot |ysh| \cdot \sin(\arg(ysh))\right]$$

Pierderile de putere reactiva pe linie:

$$Qloss := Qij + Qji$$

$$Qloss = 0.095$$