Úvod do nelin. obvodů – shrnutí

V nelin. obvodech

neplatí princip superpozice
Ohmův zákon
nelze použít SKM

platí Kirchhoffovy zákony
rovnice formulujeme pro okamžité hodnoty

R V-A nebo A-V charakteristika

C C-V, V-C $u = f(q)$, $i = \frac{dq}{dt}$

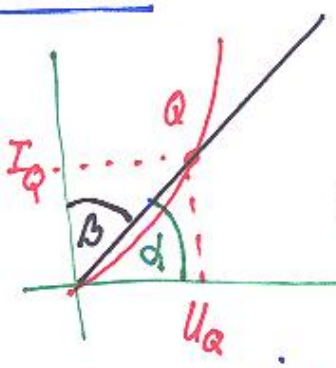
L Wb-A, A-Wb, $i = f(\Phi)$ $u = \frac{d\Phi}{dt}$

Parametry nelineárních prvků

Q – pracovní bod

① statický parametr

$$R_S = \frac{U_Q}{I_Q} = \operatorname{tg}\beta$$

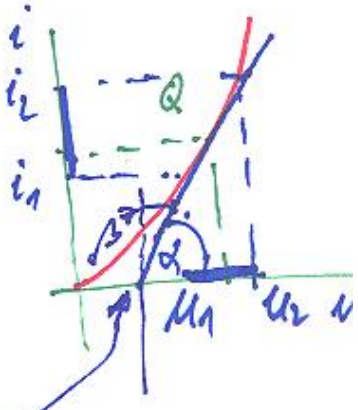


$$G_S = \frac{I_Q}{U_Q} = \operatorname{tg}\alpha$$

② dynamický parametr

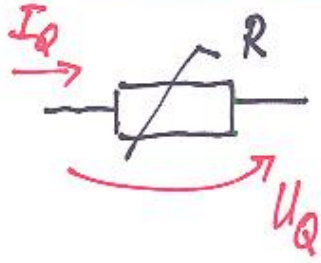
a) diferenciální $R_d = \frac{du}{di} = f(\beta)$

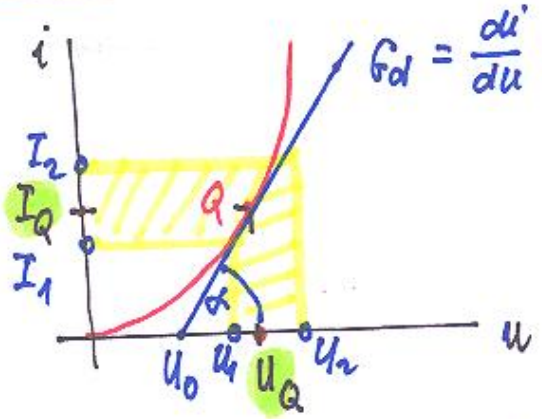
b) diferenční $R_\Delta = \frac{\Delta u}{\Delta i} = \frac{u_2 - u_1}{i_2 - i_1}$



$$G_\alpha = \frac{di}{du} = \operatorname{tg}\alpha$$

Linearizovaný model nelineárního odporu

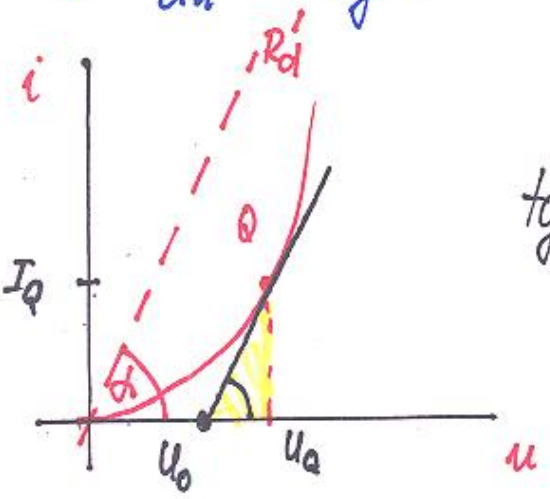




$$G_d = \frac{di}{du} = \frac{1}{R_d}$$

$$G_d = \frac{di}{du} = tg\,\alpha$$

v okolí U_Q se nelin. prvek nahradí lineárním odporem R_d'

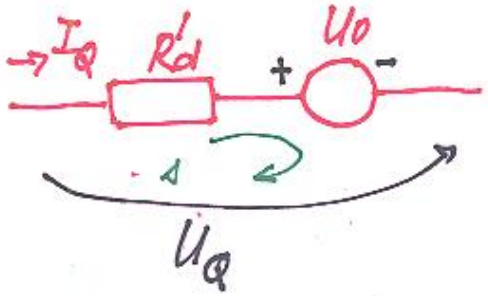


$$tg\,\alpha = \frac{I_Q}{U_Q - U_0} = \frac{1}{R_d}$$

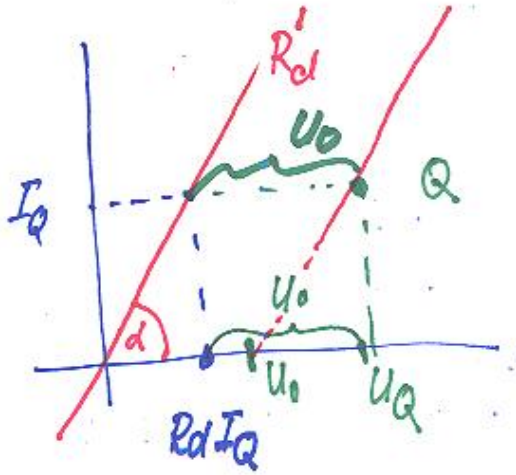
$$R_d I_Q = U_Q - U_0$$

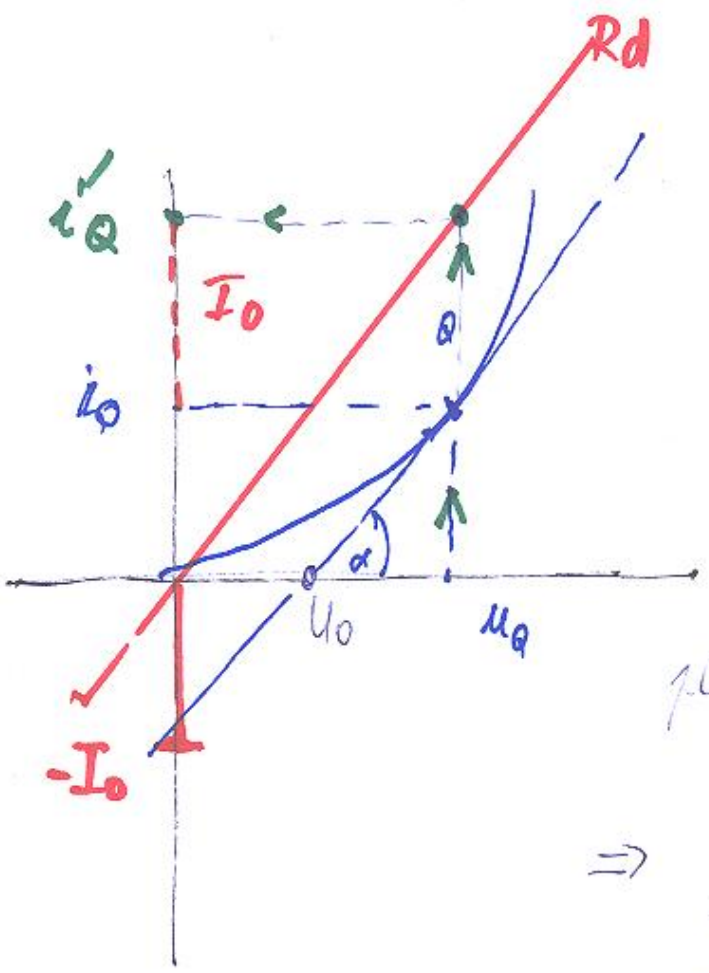
$$U_Q = U_0 + R_d I_Q$$

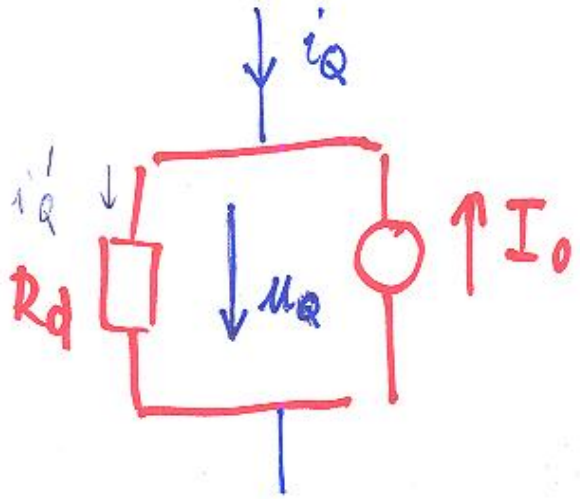
R_d' je lineární prvek



s: $R_d I_Q + U_0 = U_Q$





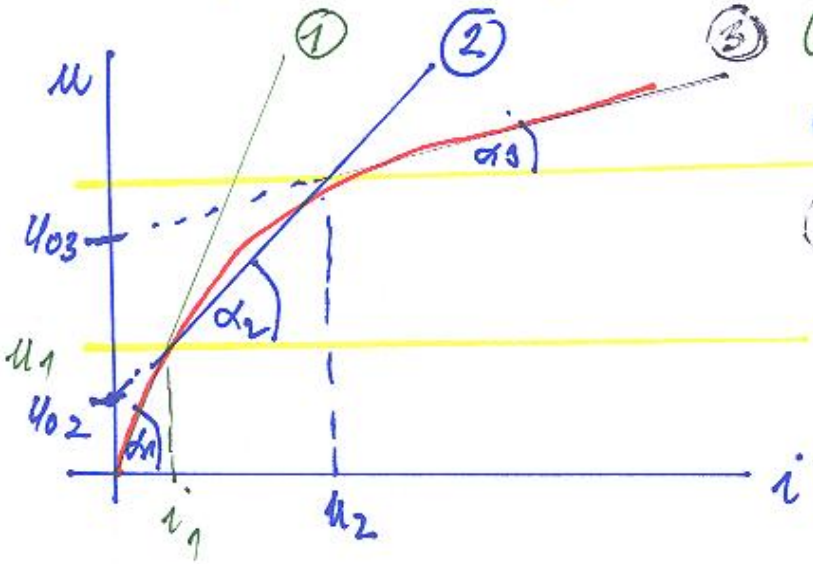


$$\text{tg}\,\alpha = \frac{i_Q}{U_Q - U_0} = \frac{-I_0}{U_0} = \frac{1}{R_d}$$

$$\Rightarrow \quad -I_0 = U_0 \, G_d$$

Linearizace po částech

Mohou-li se hodnoty měnit v celém rozsahu (měřicí pouze v okolí bodu Q)



① pro $u \in \langle 0, u_1 \rangle$

② pro $u \in \langle u_2, u_1 \rangle$

③ pro $u > u_2$

R_{d1}, R_{d2}, R_{d3}

U_{01} U_{02} U_{03}