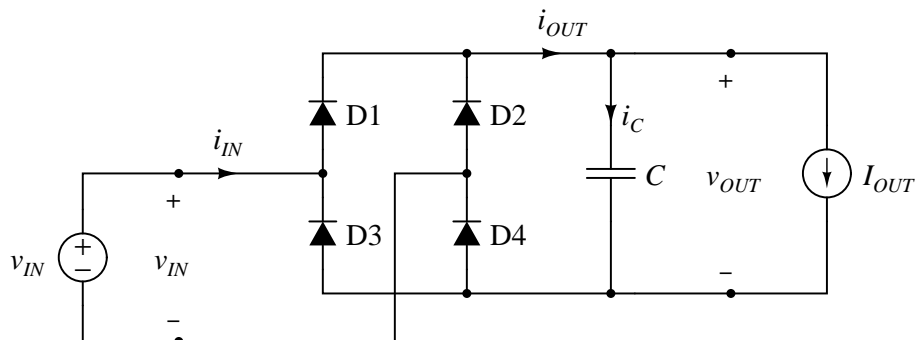
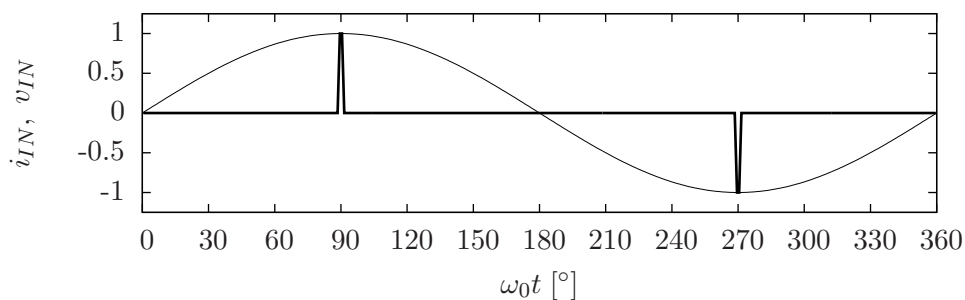


Monofazni ispravljači

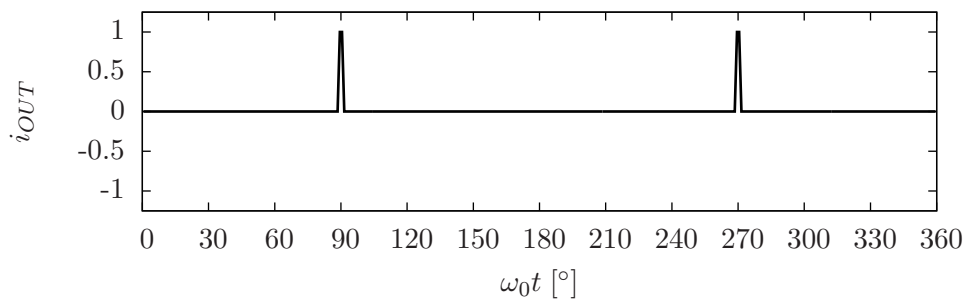
Monofazni ispravljač sa prostim kapacitivnim filtrom



Slika 1: Monofazni ispravljač sa prostim kapacitivnim filtrom.



Slika 2: Monofazni ispravljač sa prostim kapacitivnim filtrom, ulazni napon i ulazna struja.



Slika 3: Monofazni ispravljač sa prostim kapacitivnim filtrom, izlazna struja diodnog mosta.

$$v_{IN} = V_m \sin \omega_0 t$$

$$V_{OUTmax} = V_m$$

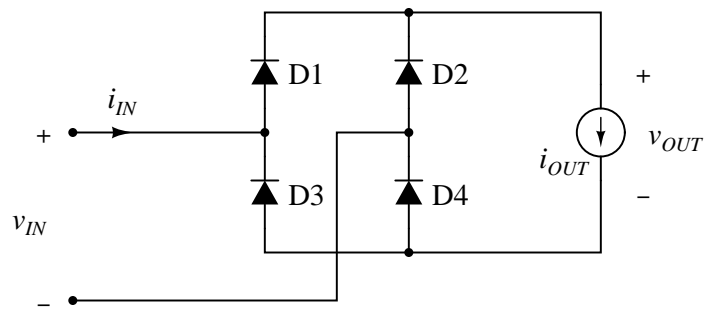
$$C (2\Delta v_{OUT}) = \frac{T_0}{2} I_{OUT}$$

$$\Delta V_{OUT} = \frac{I_{OUT}}{4f_0 C}$$

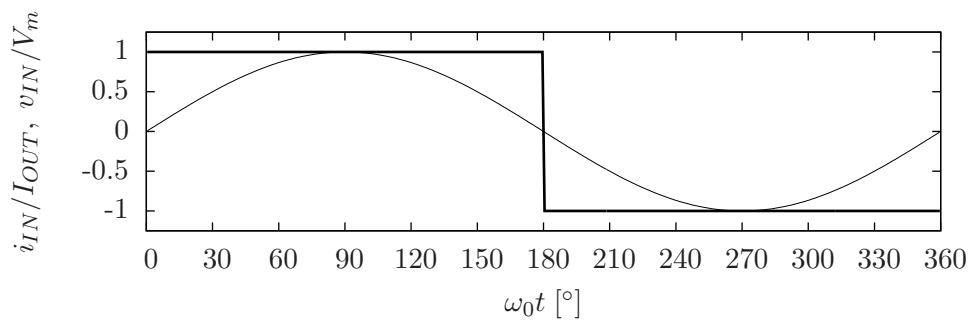
$$V_{OUT} = V_{OUTmax} - \Delta V_{OUT} = V_m - \frac{I_{OUT}}{4f_0C}$$

$$i_{IN} = \frac{I_{OUT}}{2f_0} \sum_{k=-\infty}^{\infty} \left(\delta \left(t - \frac{T_0}{4} - kT_0 \right) - \delta \left(t - \frac{3T_0}{4} - kT_0 \right) \right)$$

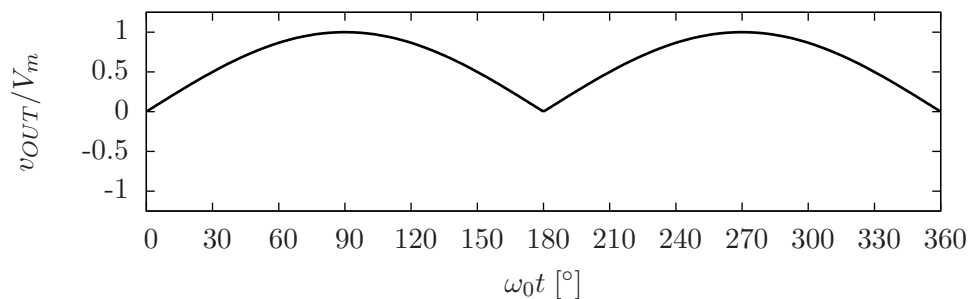
Nekontrolisan strujom opterećen monofazni ispravljač



Slika 4: Nekontrolisan strujom opterećen monofazni ispravljač.



Slika 5: Nekontrolisan strujom opterećen monofazni ispravljač, ulazni napon i ulazna struja.



Slika 6: Nekontrolisan strujom opterećen monofazni ispravljač, izlazni napon.

$$I_{1m} = \frac{4}{\pi} I_{OUT}$$

$$I_{1RMS} = \frac{1}{\sqrt{2}} I_{1m} = \frac{2\sqrt{2}}{\pi} I_{OUT}$$

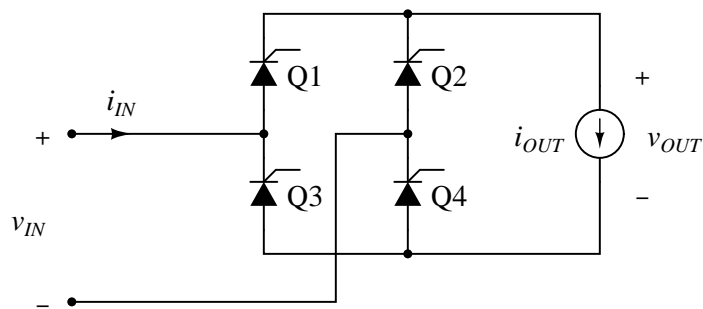
$$I_{RMS} = I_{OUT}$$

$$\cos\varphi_1 = 1$$

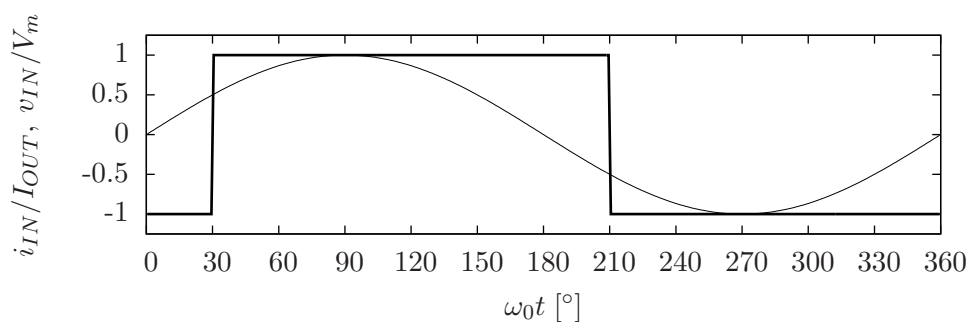
$$PF = \frac{I_{1RMS}}{I_{RMS}} \cos\varphi_1 = \frac{2\sqrt{2}}{\pi} \approx 90.032\%$$

$$THD = \sqrt{\left(\frac{I_{RMS}}{I_{1RMS}}\right)^2 - 1} = \sqrt{\frac{\pi^2}{8} - 1} \approx 48.34\%$$

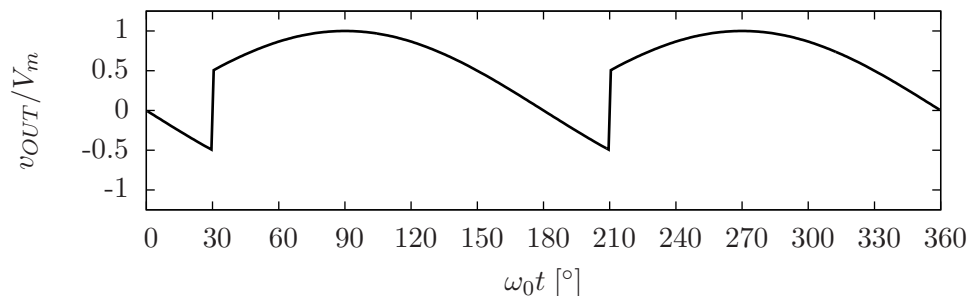
Potpuno kontrolisan monofazni tiristorski most



Slika 7: Potpuno kontrolisan monofazni tiristorski most.



Slika 8: Potpuno kontrolisan monofazni tiristorski most, ulazna struja i ulazni napon.



Slika 9: Potpuno kontrolisan monofazni tiristorski most, izlazni napon.

$$V_{OUT} = \frac{1}{\pi} \int_{\alpha}^{\pi+\alpha} V_m \sin(\omega_0 t) d(\omega_0 t) = \frac{2}{\pi} V_m \cos \alpha$$

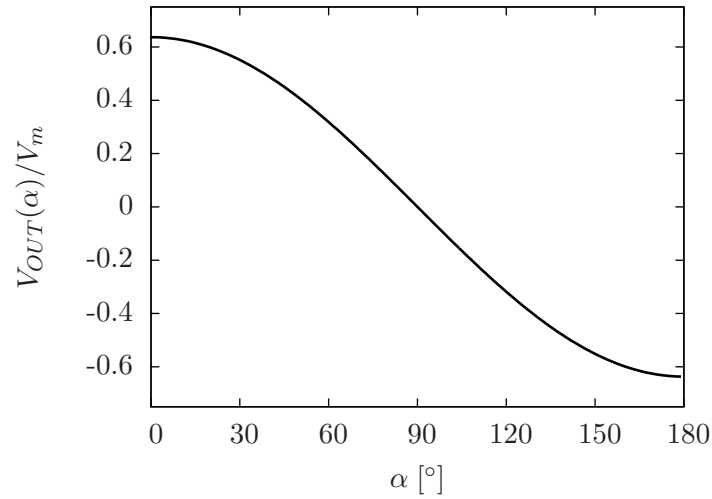
$$I_{1RMS} = \frac{1}{\sqrt{2}} I_{1m} = \frac{2\sqrt{2}}{\pi} I_{OUT}$$

$$I_{RMS} = I_{OUT}$$

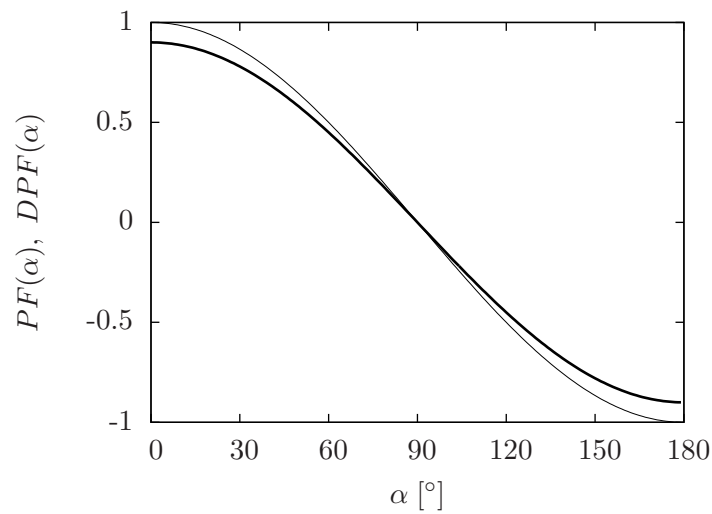
$$\cos \varphi_1 = \cos \alpha$$

$$PF = \frac{I_{1RMS}}{I_{RMS}} \cos \varphi_1 = \frac{2\sqrt{2}}{\pi} \cos \alpha \approx 90.032\% \cos \alpha$$

$$THD = \sqrt{\left(\frac{I_{RMS}}{I_{1RMS}}\right)^2 - 1} = \sqrt{\frac{\pi^2}{8} - 1} \approx 48.34\%$$

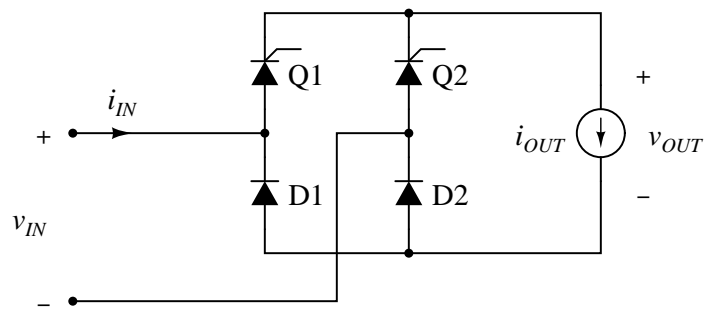


Slika 10: Potpuno kontrolisan monofazni tiristorski most, zavisnost izlaznog napona od ugla uključenja tiristora.

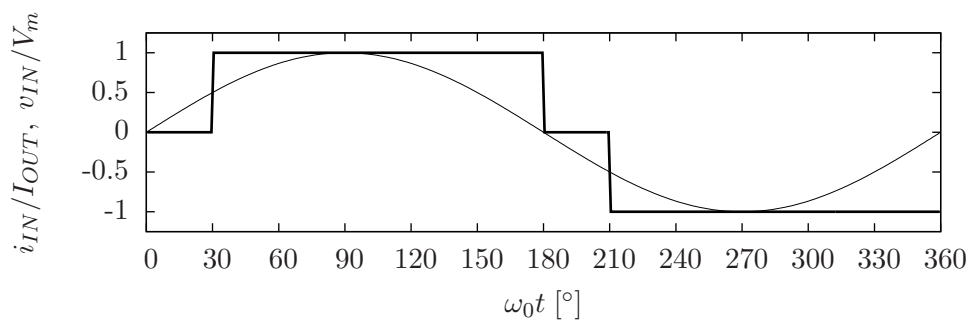


Slika 11: Potpuno kontrolisan monofazni tiristorski most, zavisnost PF (puna linija) i DPF (tanka linija) od ugla uključenja tiristora.

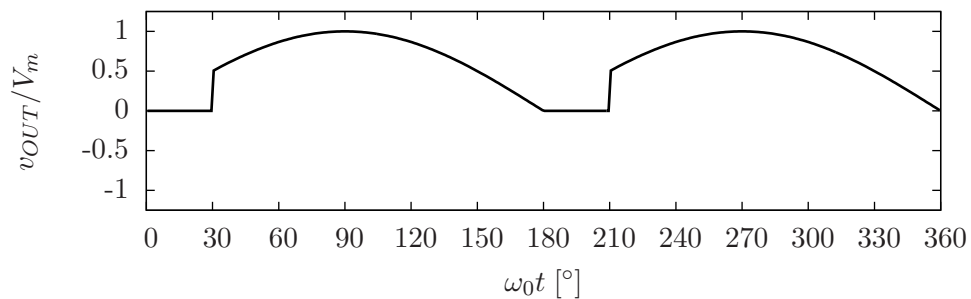
Polukontrolisan monofazni tiristorski most



Slika 12: Polukontrolisan monofazni tiristorski most.



Slika 13: Polukontrolisan monofazni tiristorski most, ulazna struja i ulazni napon.



Slika 14: Polukontrolisan monofazni tiristorski most, izlazni napon.

$$V_{OUT} = \frac{1}{\pi} \int_{\alpha}^{\pi} V_m \sin(\omega_0 t) d(\omega_0 t) = \frac{1}{\pi} V_m (1 + \cos \alpha)$$

$$P_{OUT} = V_{OUT} I_{OUT} = \frac{1}{\pi} V_m I_{OUT} (1 + \cos \alpha)$$

$$I_{RMS} = I_{OUT} \sqrt{\frac{\pi - \alpha}{\pi}}$$

$$S = V_{RMS} I_{RMS} = V_m I_{OUT} \sqrt{\frac{\pi - \alpha}{2\pi}}$$

$$P = P_{IN} = P_{OUT} = \frac{1}{\pi} V_m I_{OUT} (1 + \cos \alpha)$$

$$PF = \frac{P}{S} = \sqrt{\frac{2}{\pi(\pi - \alpha)}} (1 + \cos \alpha)$$

$$I_{1S} = \frac{2}{\pi} I_{OUT} \int_{\alpha}^{\pi} \sin(\omega_0 t) d(\omega_0 t) = \frac{2}{\pi} I_{OUT} (1 + \cos \alpha)$$

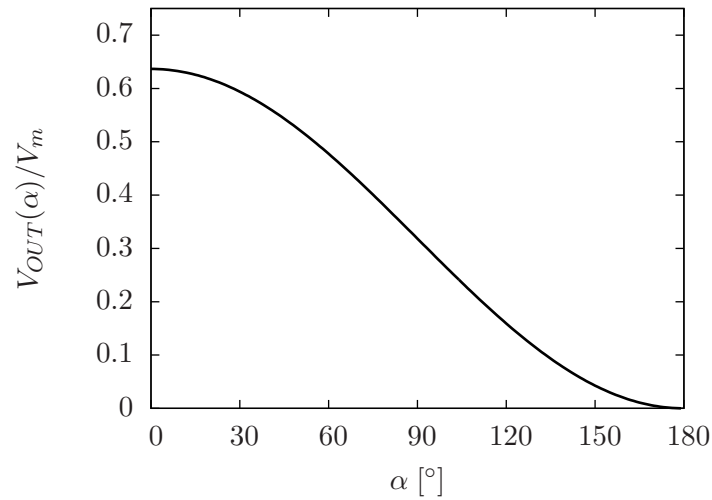
$$I_{1C} = \frac{2}{\pi} I_{OUT} \int_{\alpha}^{\pi} \cos(\omega_0 t) d(\omega_0 t) = -\frac{2}{\pi} I_{OUT} \sin \alpha$$

$$I_{1m} = \frac{2\sqrt{2}}{\pi} I_{OUT} \sqrt{1 + \cos \alpha}$$

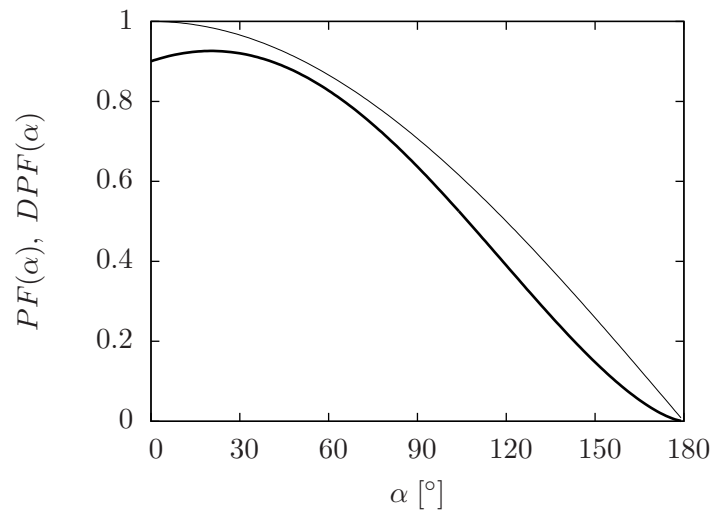
$$I_{1RMS} = \frac{2}{\pi} I_{OUT} \sqrt{1 + \cos \alpha}$$

$$DPF = \cos \varphi_1 = \sqrt{\frac{1 + \cos \alpha}{2}} = \cos \frac{\alpha}{2}$$

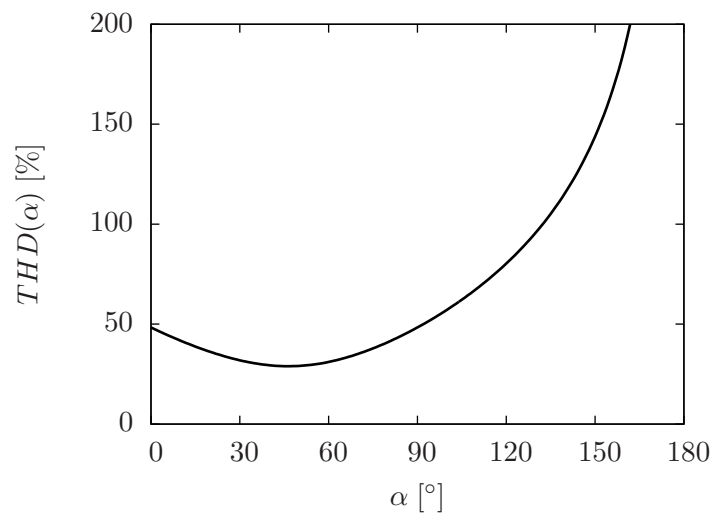
$$THD = \sqrt{\frac{\pi(\pi - \alpha)}{4(1 + \cos \alpha)}} - 1$$



Slika 15: Polukontrolisan monofazni tiristorski most, zavisnost izlaznog napona od ugla uključenja tiristora.

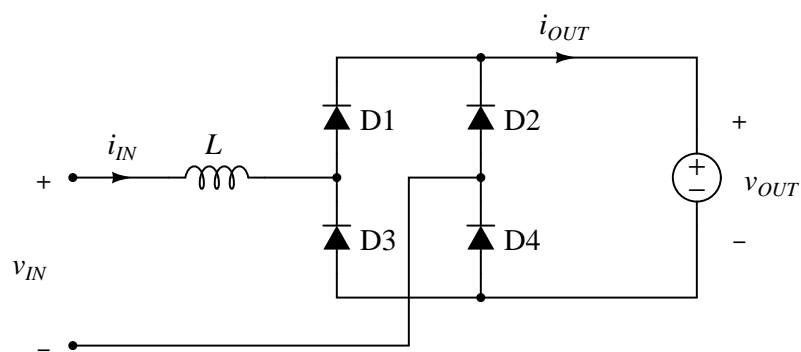


Slika 16: Polukontrolisan monofazni tiristorski most, zavisnost PF (puna linija) i DPF (tanka linija) od ugla uključenja tiristora.



Slika 17: Polukontrolisan monofazni tiristorski most, zavisnost THD od ugla uključenja tiristora.

Nekontrolisan naponom opterećen monofazni ispravljač



Slika 18: Nekontrolisan naponom opterećen monofazni ispravljač.