

UPOŠTEVANJE SIMETRIJE PROBLEMA

- da lahko problem obravnavamo kot simetrični problem morajo biti simetrični:

1) geometrija obravnavanega območja

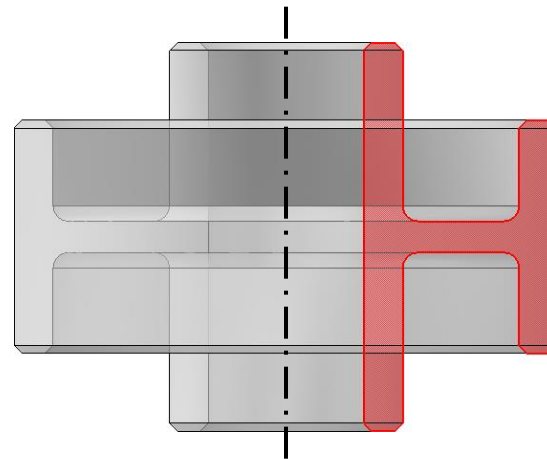
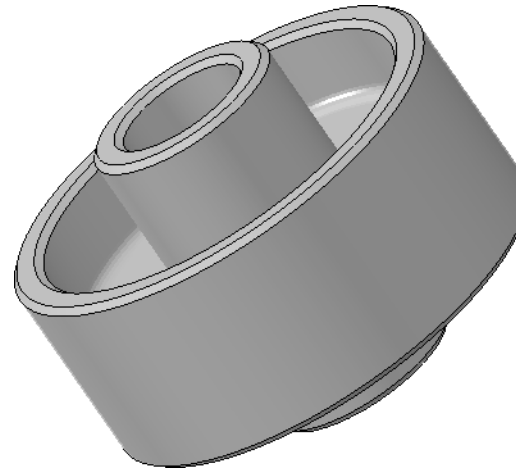
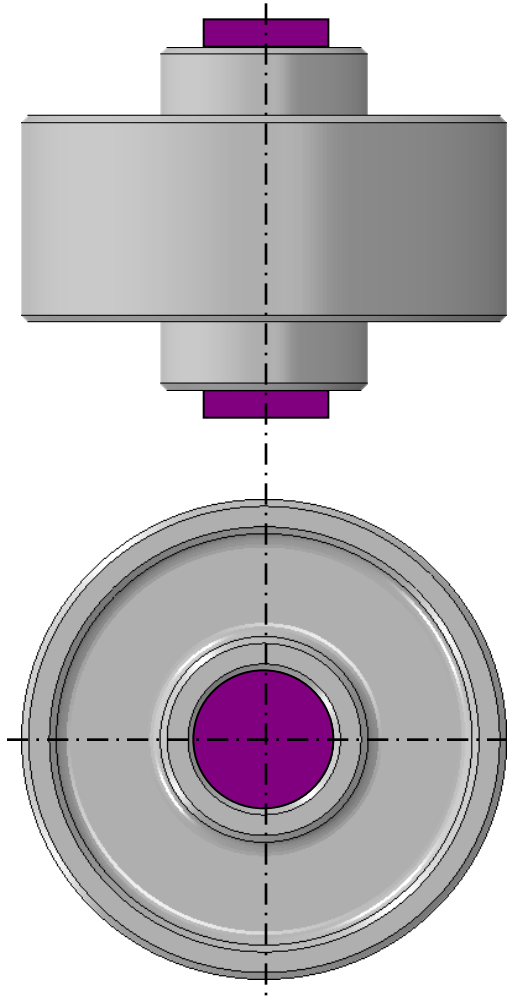
2) materialne lastnosti

3) predpisani robni pogoji

4) obremenitev obravnavanega območja

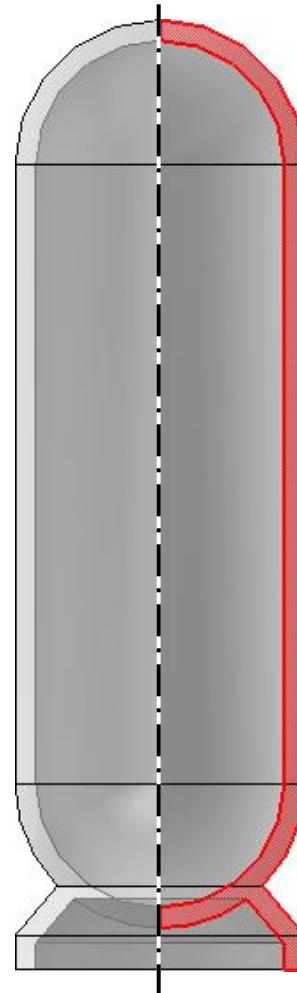
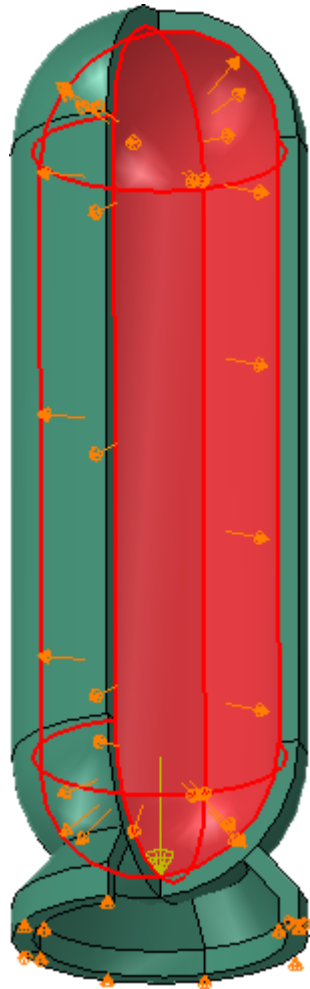
- osno simetrični problemi

vztrajnik



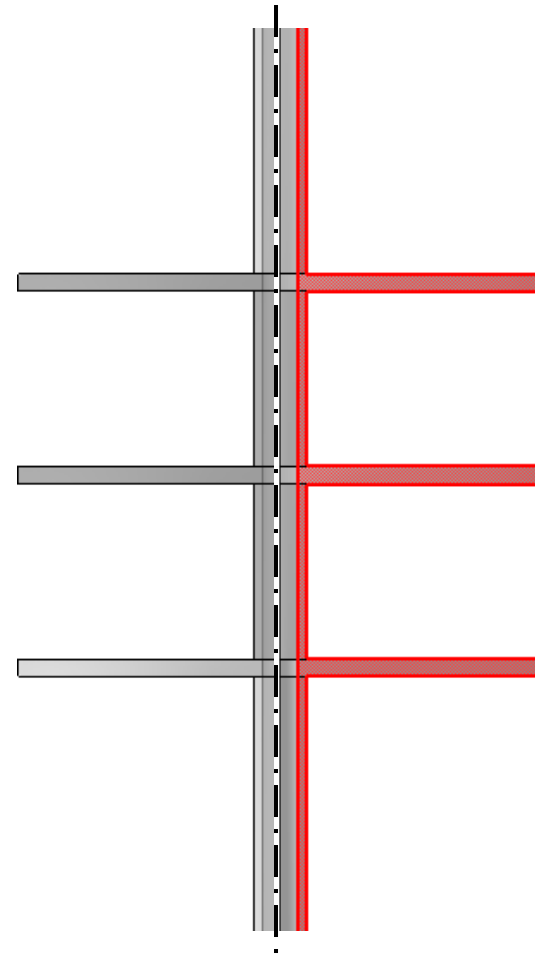
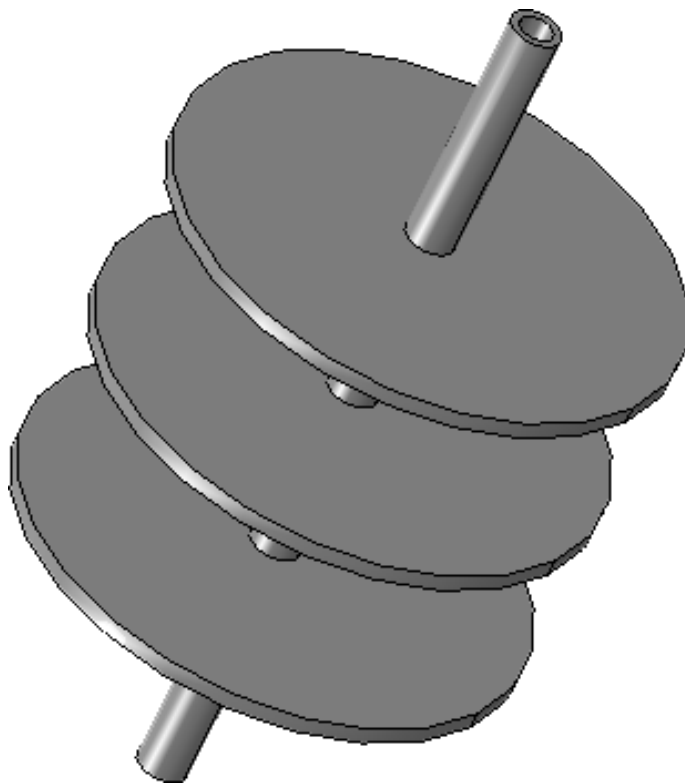
- osno simetrični problemi

tlačna posoda



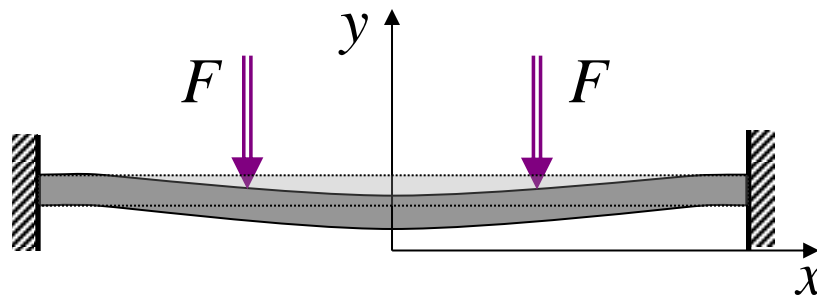
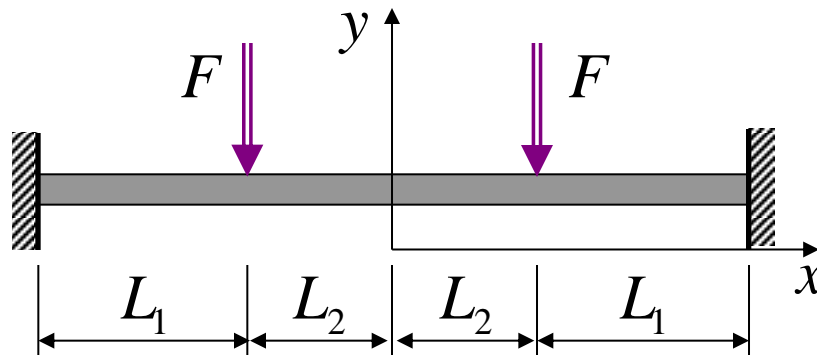
- osno simetrični problemi

hladilnik



- zrcalno simetrični problemi

- določitev simetrijskih robnih pogojev



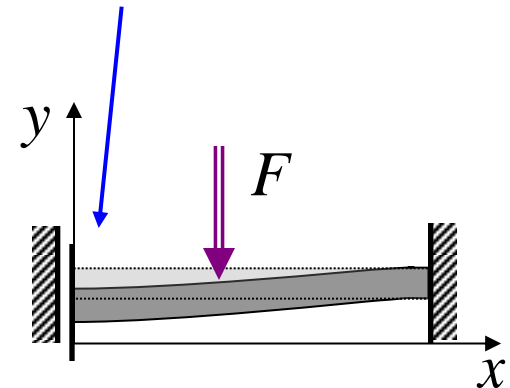
simetrijski robni pogoji v primeru,
ko je simetrijska ravnina (y,z):

$$u_x = 0$$

$$\varphi_y = 0$$

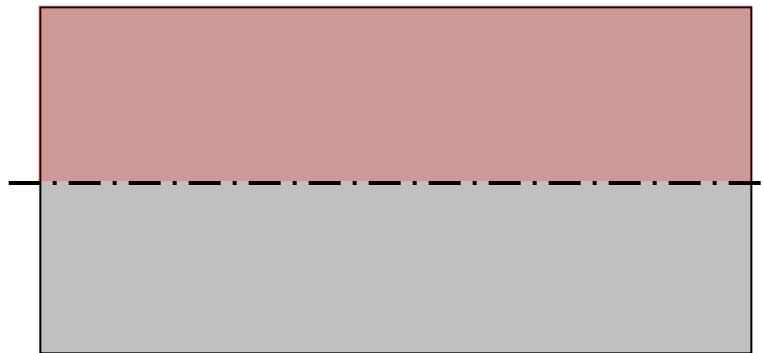
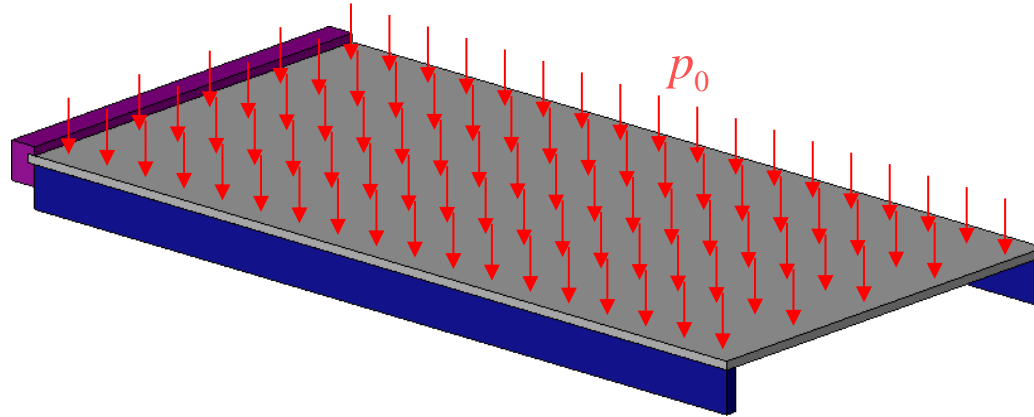
$$\varphi_z = 0$$

≡



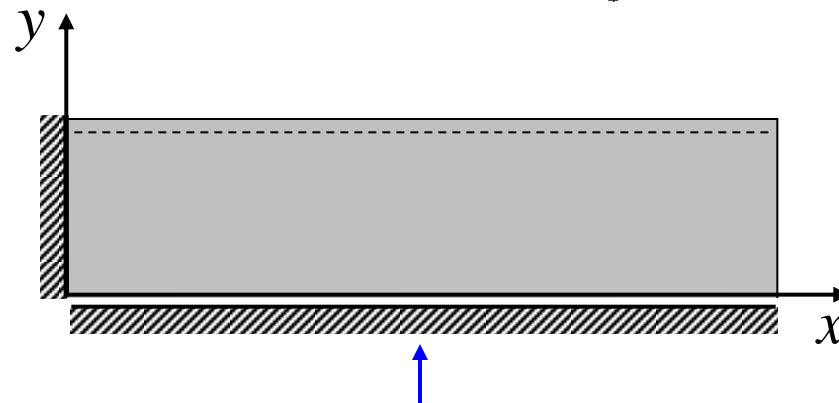
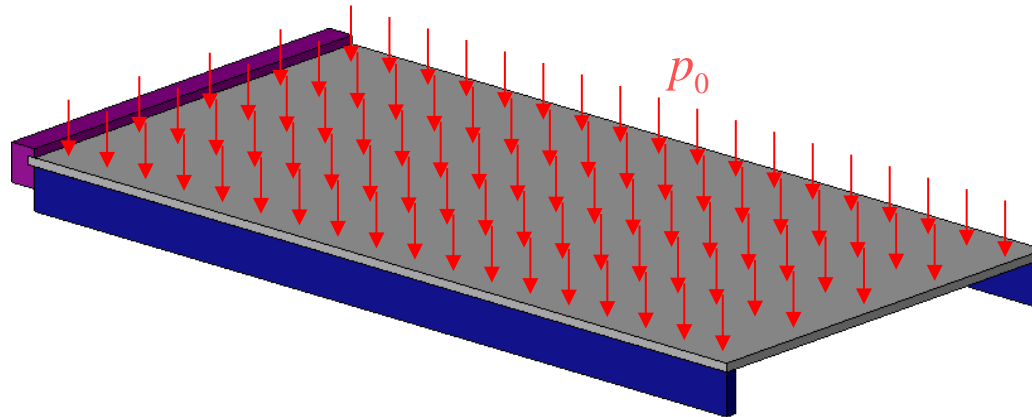
- zrcalno simetrični problemi

plošča



- zrcalno simetrični problemi

plošča

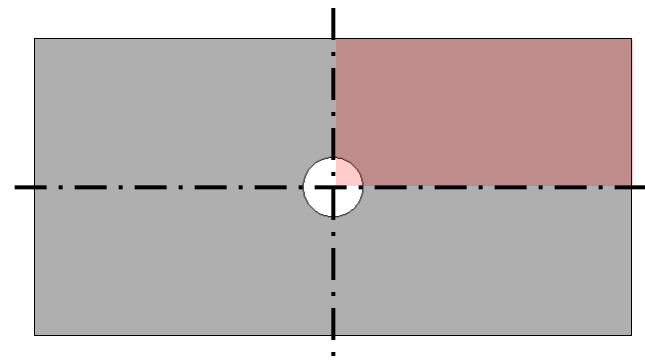
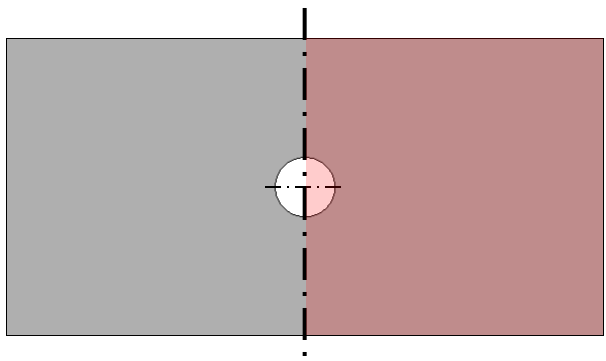
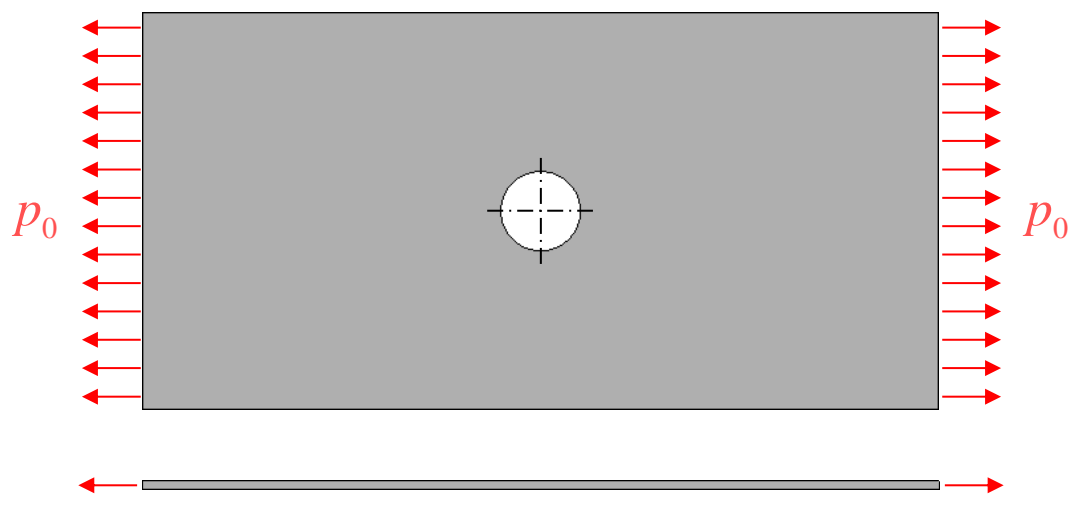


simetrijski robni pogoji v primeru, ko je simetrijska ravnina (x,z):

$$u_y = 0 \quad , \quad \varphi_x = 0 \quad , \quad \varphi_z = 0$$

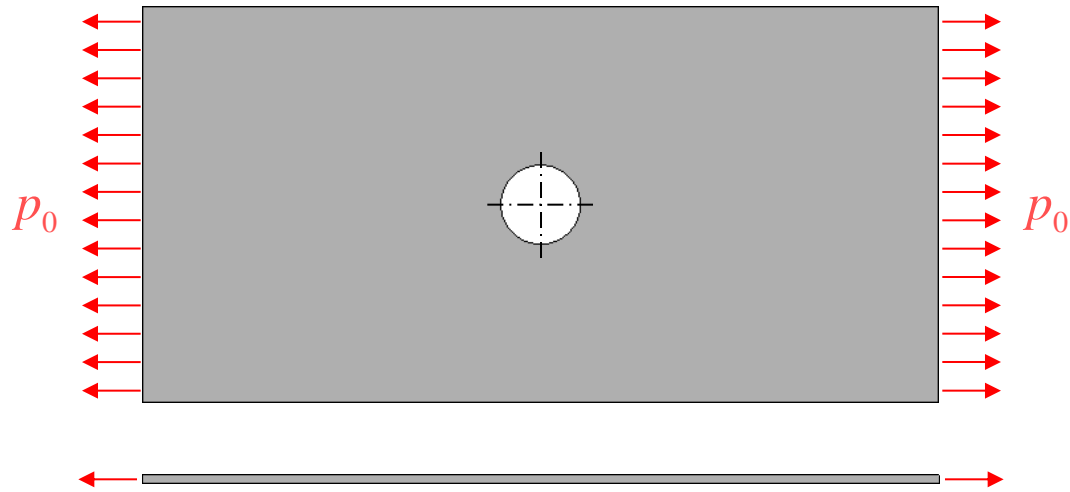
• zrcalno simetrični problemi

plošča z izvrtino



- zrcalno simetrični problemi

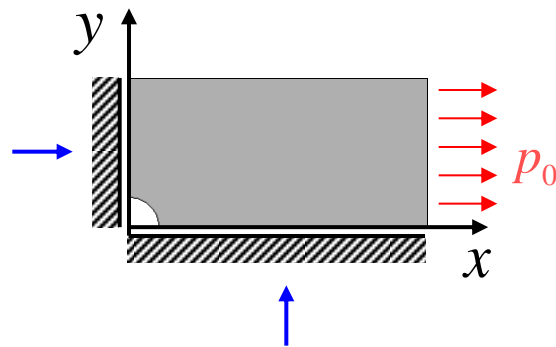
plošča z izvrtino



$$u_x = 0$$

$$\varphi_y = 0$$

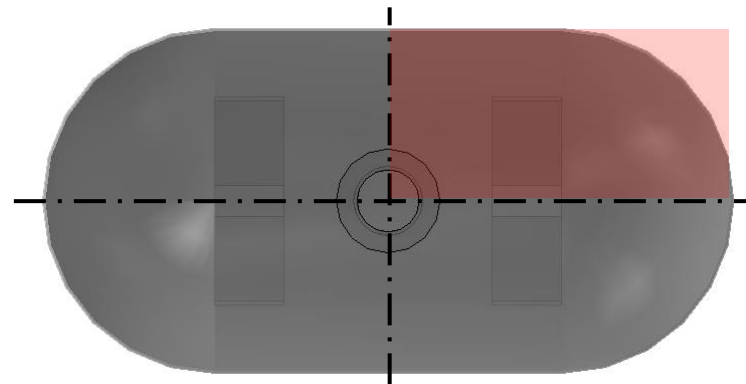
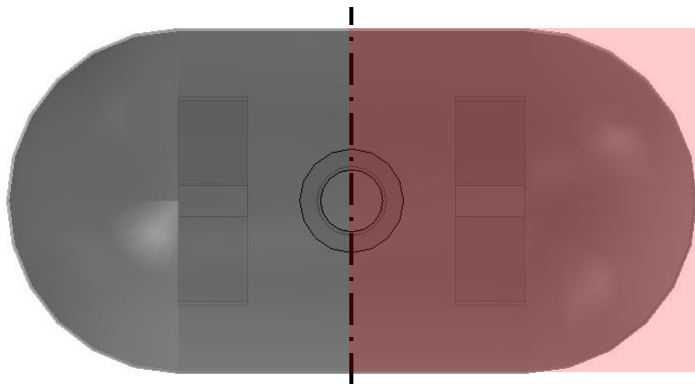
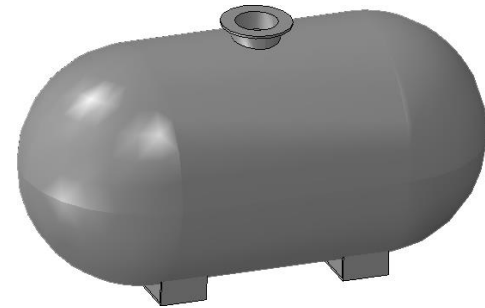
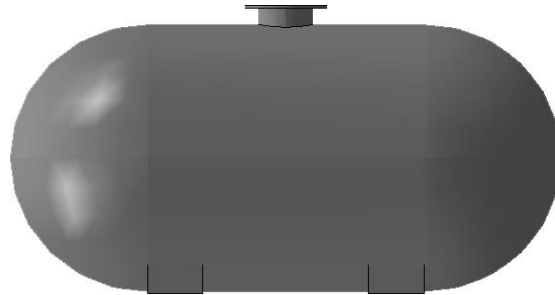
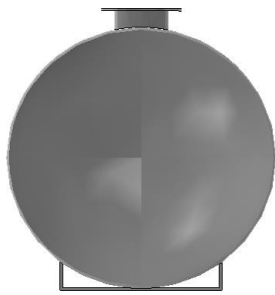
$$\varphi_z = 0$$



$$u_y = 0, \varphi_x = 0, \varphi_z = 0$$

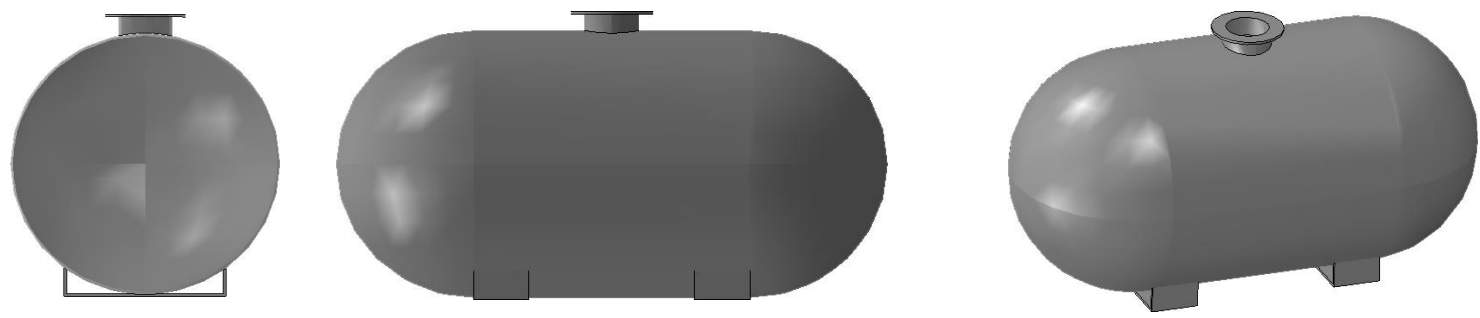
- zrcalno simetrični problemi

cisterna



• zrcalno simetrični problemi

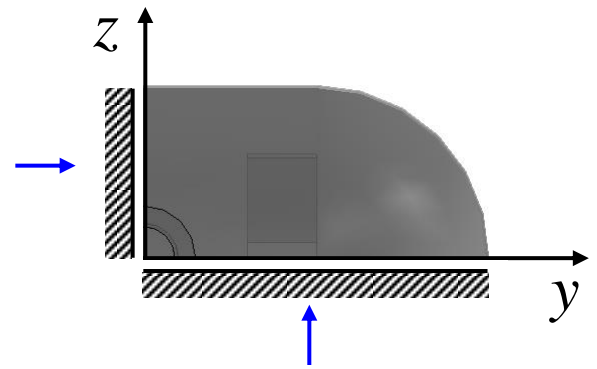
cisterna



$$u_y = 0$$

$$\varphi_x = 0$$

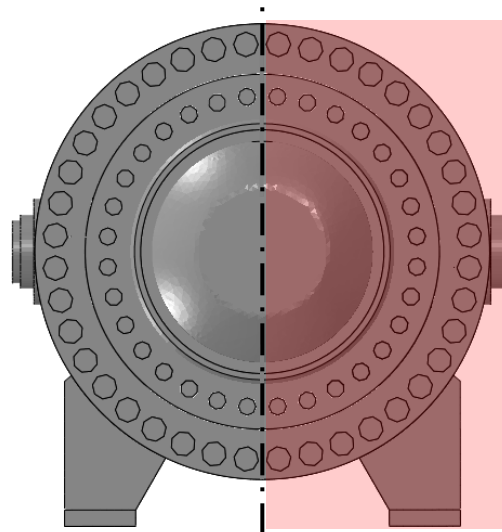
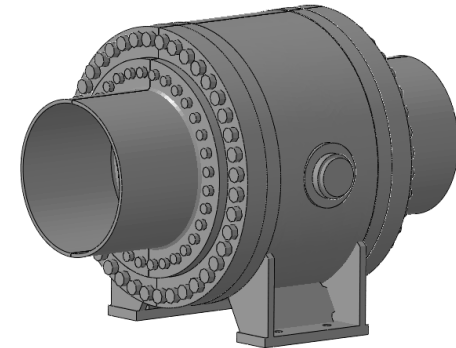
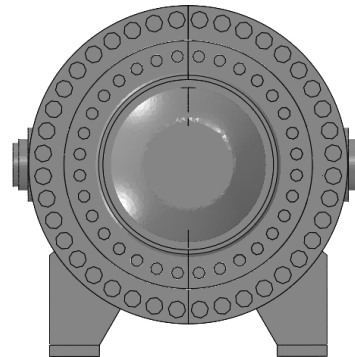
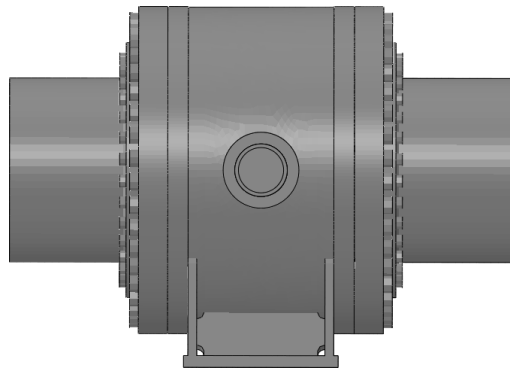
$$\varphi_z = 0$$



$$u_z = 0, \varphi_x = 0, \varphi_y = 0$$

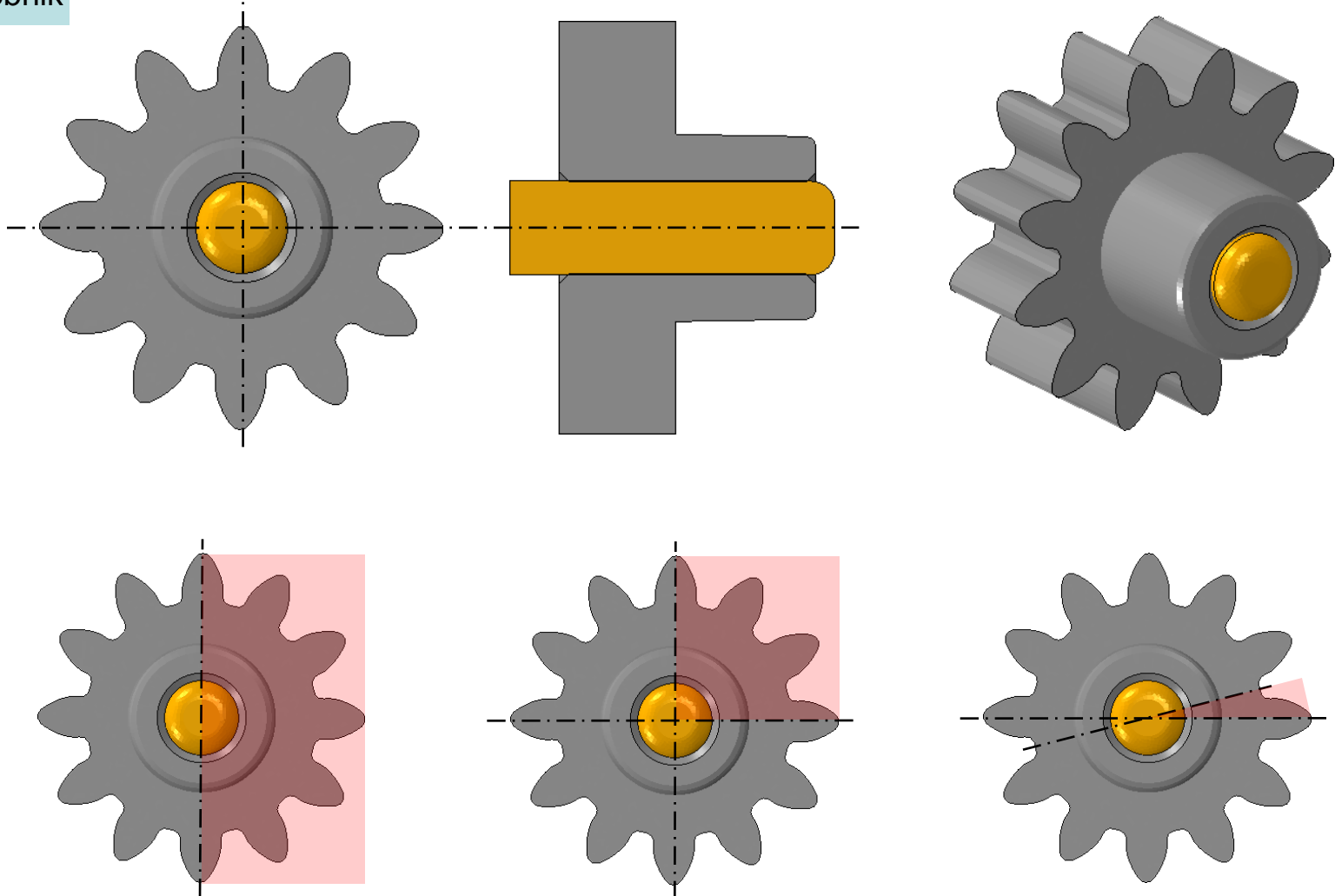
- zrcalno simetrični problemi

zasun



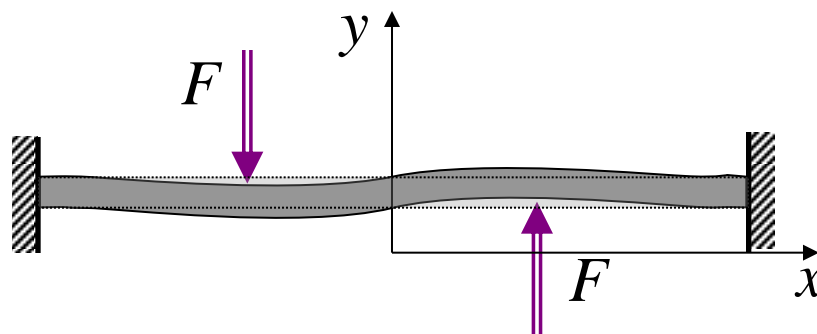
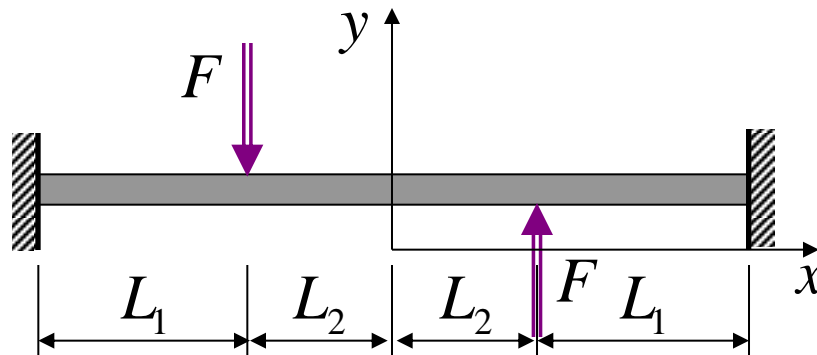
- zrcalno simetrični problemi

zobnik



- asimetrični problemi

- določitev asimetrijskih robnih pogojev

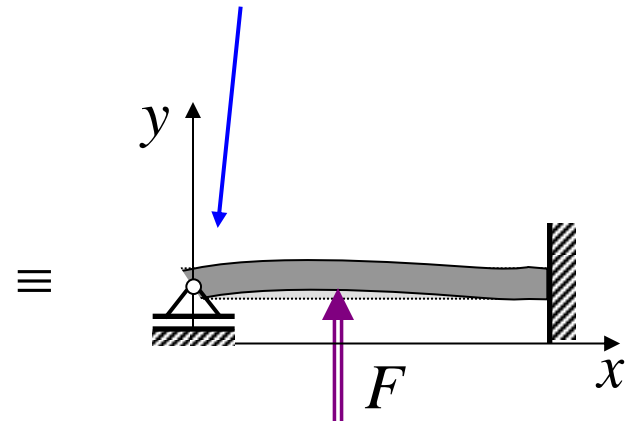


asimetrijski robni pogoji v primeru, ko je asimetrijska ravnina (y,z):

$$u_y = 0$$

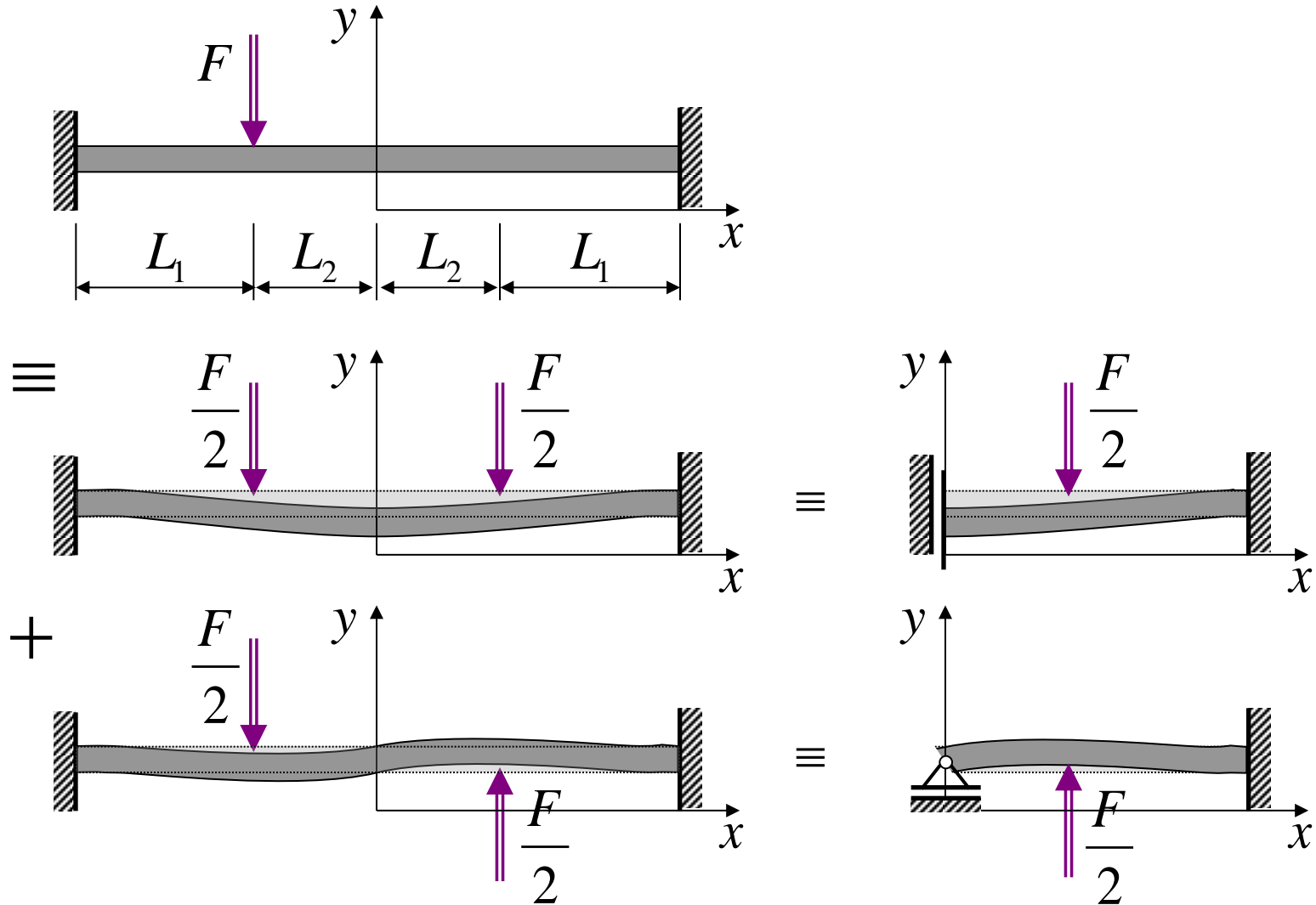
$$u_z = 0$$

$$\varphi_x = 0$$



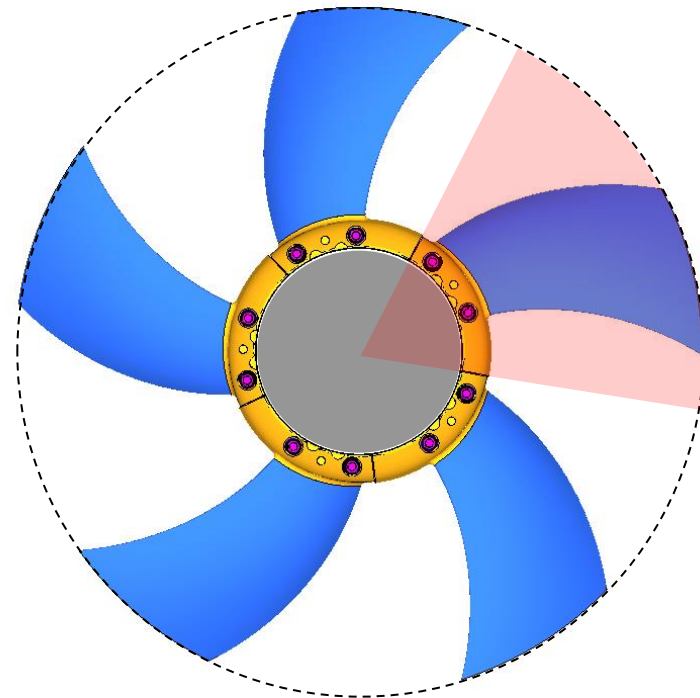
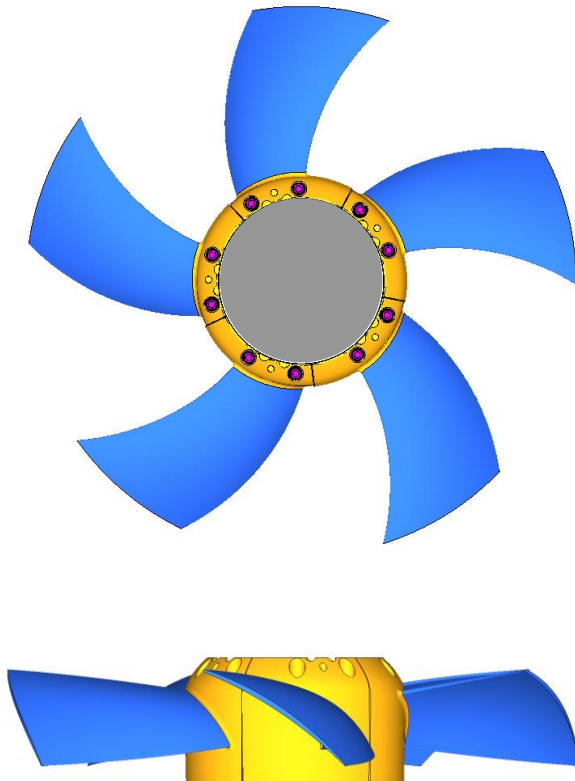
• asimetrični problemi

nesimetrično obremenjeni nosilec



- ciklično simetrični problemi

ventilator



- ciklično simetrični problemi

- določitev cikličnih simetrijskih robnih pogojev

$$u_n^A = u_n^B$$

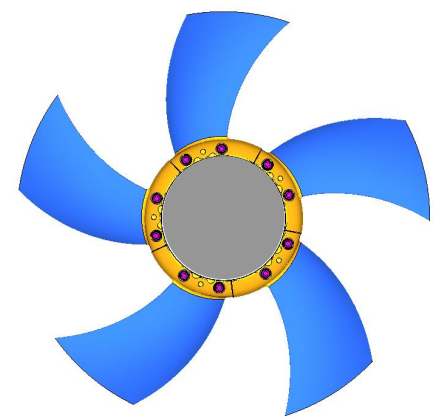
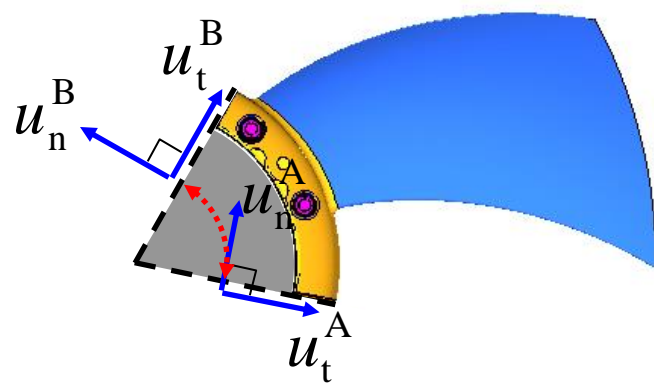
$$u_t^A = u_t^B$$

$$u_z^A = u_z^B$$

$$\varphi_n^A = \varphi_n^B$$

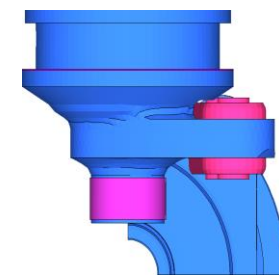
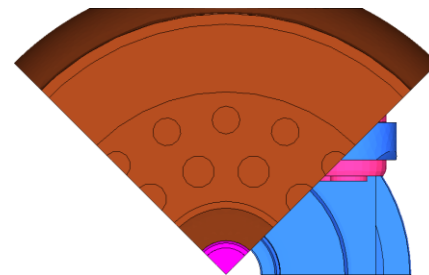
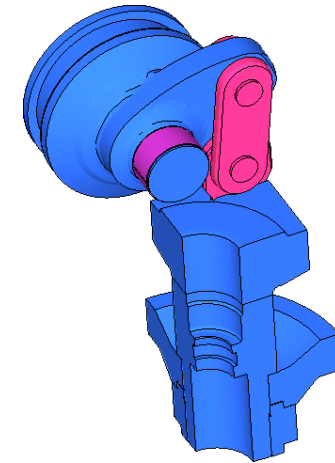
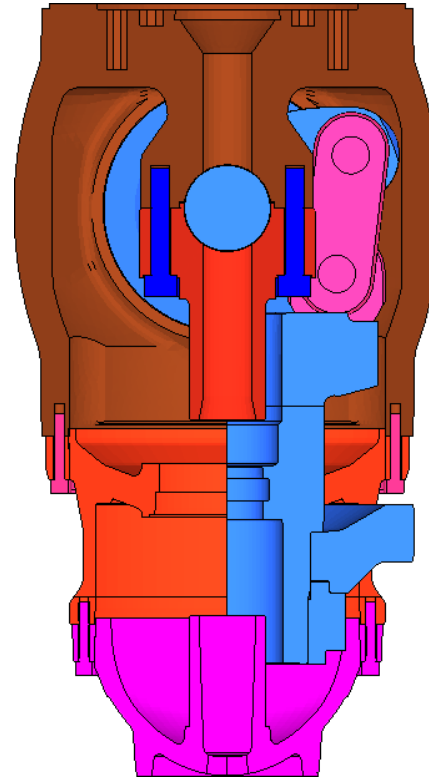
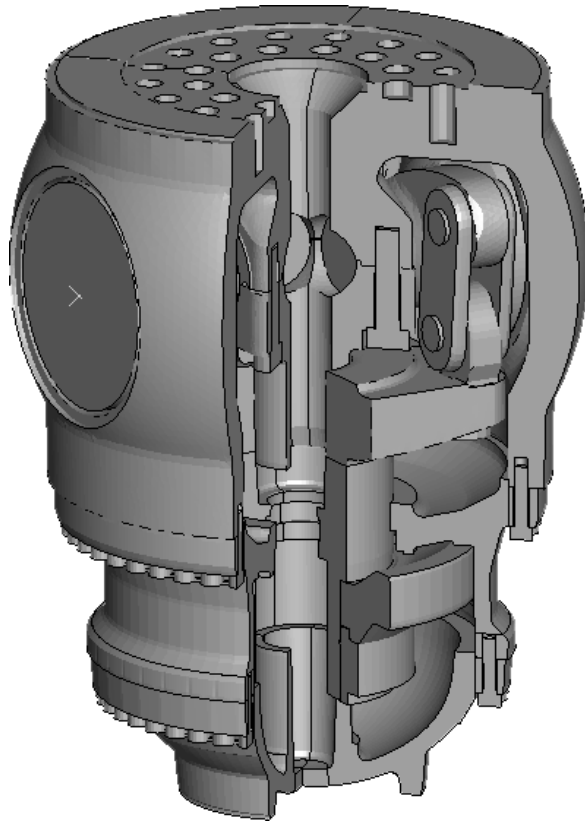
$$\varphi_t^A = \varphi_t^B$$

$$\varphi_z^A = \varphi_z^B$$



- ciklično simetrični problemi

glava gonilnika



- ciklično simetrični problemi

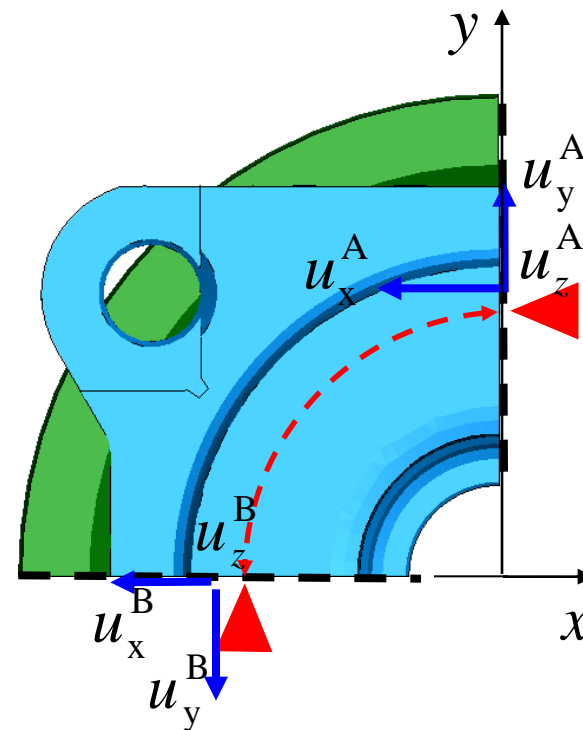
glava gonilnika

definiranje robnih pogojev v Kartezijevem koordinatnem sistemu:

$$u_x^A = u_y^B, \quad \varphi_x^A = \varphi_y^B$$

$$u_y^A = -u_x^B, \quad \varphi_y^A = -\varphi_x^B$$

$$u_z^A = u_z^B, \quad \varphi_z^A = \varphi_z^B$$



- ciklično simetrični problemi

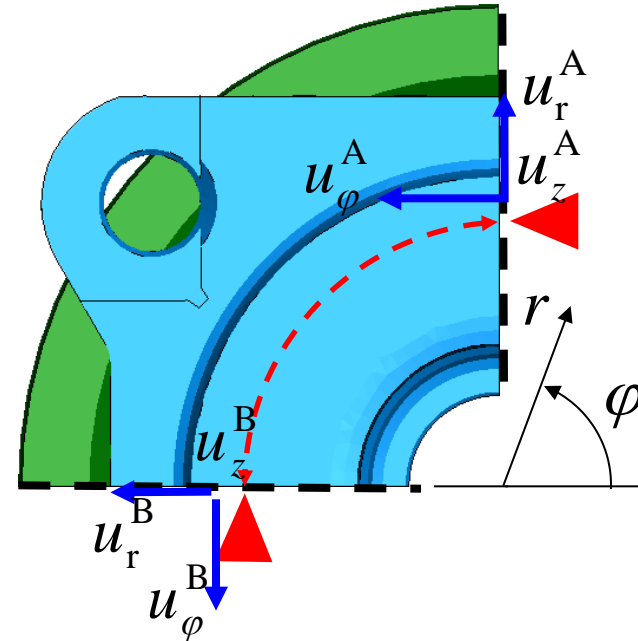
glava gonilnika

definiranje robnih pogojev v polarnem koordinatnem sistemu:

$$u_r^A = u_r^B, \quad \varphi_r^A = \varphi_r^B$$

$$u_\varphi^A = u_\varphi^B, \quad \varphi_\varphi^A = \varphi_\varphi^B$$

$$u_z^A = u_z^B, \quad \varphi_z^A = \varphi_z^B$$



- ciklično simetrični problemi

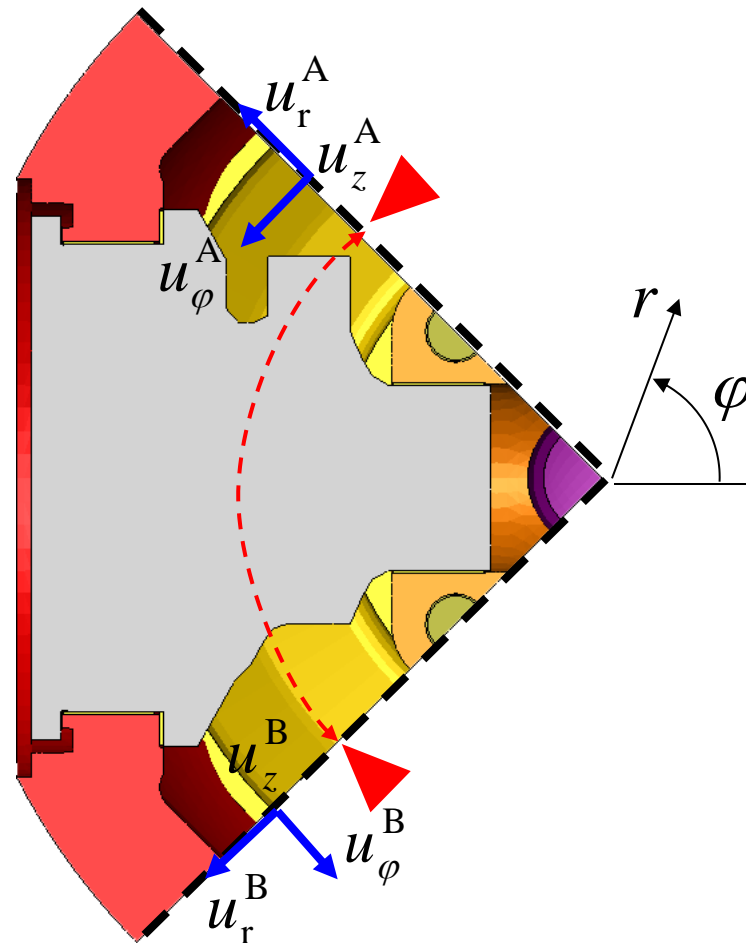
glava gonilnika

definiranje robnih pogojev v polarnem koordinatnem sistemu:

$$u_r^A = u_r^B, \quad \varphi_r^A = \varphi_r^B$$

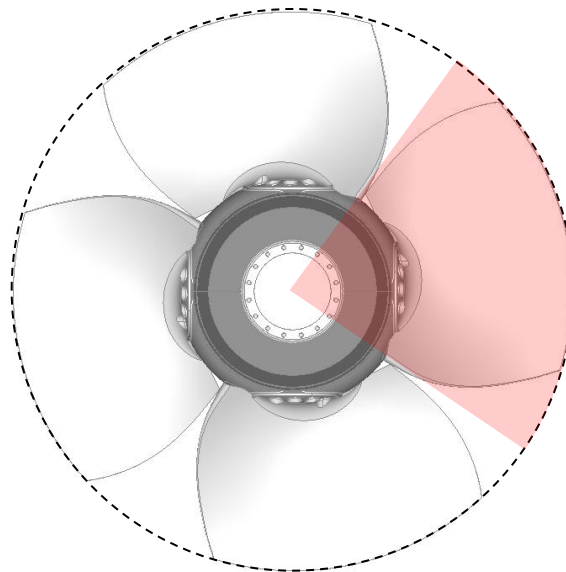
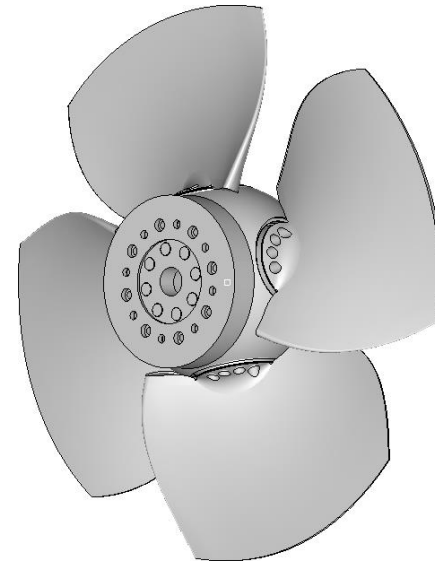
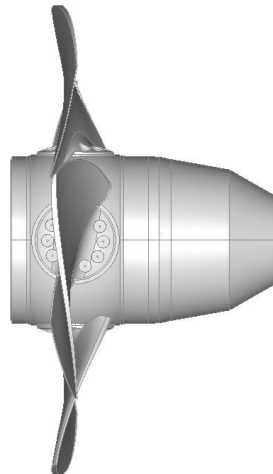
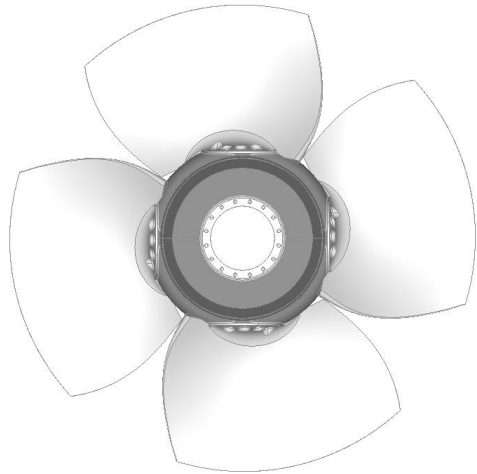
$$u_\varphi^A = u_\varphi^B, \quad \varphi_\varphi^A = \varphi_\varphi^B$$

$$u_z^A = u_z^B, \quad \varphi_z^A = \varphi_z^B$$



- ciklično simetrični problemi

vodna turbina



- ciklično simetrični problemi

ventilator

