

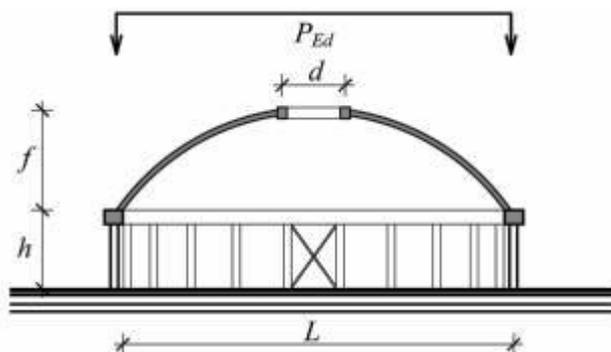
Bonus questions 2.

1/1

Exercise 1. Spherical dome with an opening

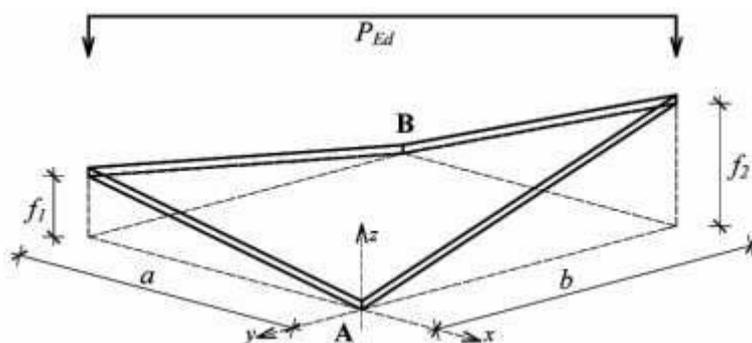
Determine the force in the **compression ring** of the spherical dome! The cross-section of the ring is 30x30cm. The thickness of the shell is $t=20\text{cm}$. Dead loads are: self-weight of the structure (pay attention to the opening!), self-weight of the ring beam.

Data: $\rho_{cd}=25\text{ kN/m}^3$, $L=30\text{ m}$, $d=2,0\text{ m}$, $f=6,0\text{ m}$

**Exercise 2. Hyperbolic paraboloid with 4 skew edges**

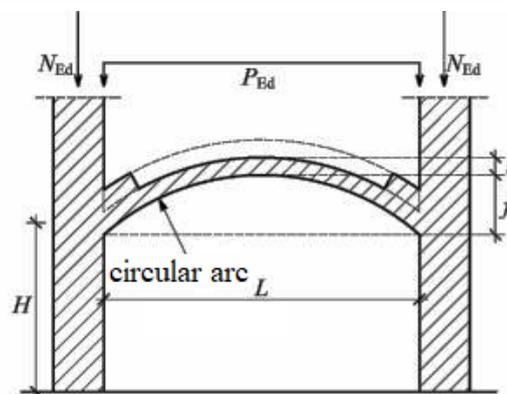
Determine the horizontal component of the reaction force aligned with axis 'x' in point A.

Data: $P_{Ed}=2,4\text{ kN/m}^2$; $a=5\text{ m}$; $b=4\text{ m}$;
 $f_1=1\text{ m}$ $f_2=2\text{ m}$

**Exercise 3. Masonry vault**

Determine the minimal thickness (t) of the masonry vault with a plastic analysis, based on the resistance of the cross section for combined bending and axial compression in the quarter point ($L/4$). The plastic hinges are assumed to form at the springings and at mid-span with a height of f .

Data: $P_{Ed}=20,0\text{ kN/m}^2$; $L=6,0\text{ m}$; $f=1,5\text{ m}$. The strength of the brick is: $f_{c,d}=1,2\text{ N/mm}^2$.

**Exercise 4. Choose the true statements for a hyperbolic paraboloid!**

- The base curve is a hyperbola.
- The base curve is a parabola.
- The surface is hyperbolic.
- The surface is parabolic.
- It has straight generatrix.

Exercise 5. Choose the true statements regarding the edge of shells!

- An edge beam is an unattractive part of a shell.
- In a hemispherical shell, the direction of the internal forces along the parallel circles is opposite to the direction of the force in the edge beam.
- In case of edge disturbance, the deformation of the shell and the edge beam is conflicting which results in extra stresses.
- Edge disturbance is a phenomenon of flat spherical shells.
- Normal stresses in the edges of a hyperbolic paraboloid cannot balance vertical forces.