

SAVIJANJE KRUZNIH PLOCA

-rotaciono simetrično opterećenje i granicni uslovi:

DJ:

$$\frac{d^4 w}{dr^4} + \frac{2}{r} \frac{d^3 w}{dr^3} - \frac{1}{r^2} \frac{d^2 w}{dr^2} + \frac{1}{r^3} \frac{dw}{dr} = \frac{Z(r)}{K}$$

$$w = w_0 + w_1 \quad w_1 = A + B \ln r + C r^2 + D r^2 \ln r$$

$$w_1 = C_1 + C_2 \ln \rho + C_3 \rho^2 + C_4 \rho^2 \ln \rho \quad (\rho = r/a)$$

$$M = - \int \frac{dr}{r} \int Z(r) \cdot r \cdot dr$$

$$w_0 = - \frac{1}{K} \int \frac{dr}{r} \int M \cdot r \cdot dr - \text{partikularni integral}$$

$$Z(r) = Z_0 = \text{const} \Rightarrow w_0 = \frac{Z_0 a^4}{64K} r^4$$

SILE U PRESEKU:

$$Mr = -K \left(\frac{d^2 w}{dr^2} + \frac{1}{r} \frac{dw}{dr} \right)$$

$$Mj = -K \left(\frac{1}{r} \frac{dw}{dr} + \frac{1}{r^2} \frac{d^2 w}{dr^2} \right)$$

$$Tr = -K \left(\frac{d^3 w}{dr^3} - \frac{1}{r^2} \frac{dw}{dr} + \frac{1}{r} \frac{d^2 w}{dr^2} \right)$$

-proizvoljno opterećenje:

$$\text{DJ: } \left(\frac{d^2}{dr^2} + \frac{1}{r} \frac{d}{dr} + \frac{1}{r^2} \frac{d^2}{dj^2} \right) \left(\frac{d^2 w}{dr^2} + \frac{1}{r} \frac{dw}{dr} + \frac{1}{r^2} \frac{d^2 w}{dj^2} \right) = \frac{Z(r, j)}{K}$$

$$w = w_0 + w_1$$

$$w_1 = w_0(r) + \sum_{m=0}^{\infty} W_m(r) \cdot \cos(mj) + \sum_{m=1}^{\infty} \bar{W}_m(r) \cdot \cos(mj)$$

$w_0(r)$ -izraz za rotaciono simetrično opt(m=0), nista ne zavisi od φ

-smena $r = e^t \Rightarrow \text{DJ} \Rightarrow j$ -na sa konstantnim koeficijentima

$$m > 1: W_m = A_m \cdot r^m + B_m \cdot r^{-m} + C_m \cdot r^{m+2} + D_m \cdot r^{-m+2}$$

$$m = 1: W_1 = A_1 \cdot r + B_1 \cdot r^3 + C_1 \cdot \frac{1}{r} + D_1 \cdot r \ln r$$

$$m = 0: W_0 = A_0 + B_0 \cdot r^2 + C_0 \cdot \ln r + D_0 \cdot r^2 \ln r$$