

UNIVERZA V LJUBLJANI
FAKULTETA ZA GRADBENIŠTVO IN GEODEZIJO

SEBASTJAN BRATINA

MOJCA MARKOVIČ

IGOR PLANINC

**INTERAKCIJSKI DIAGRAMI NOSILNOSTI
AB PREČNIH PREREZOV PRI
DVOJNO EKSCENTRIČNI OSNI SILI**

LJUBLJANA, december 2006

Kazalo

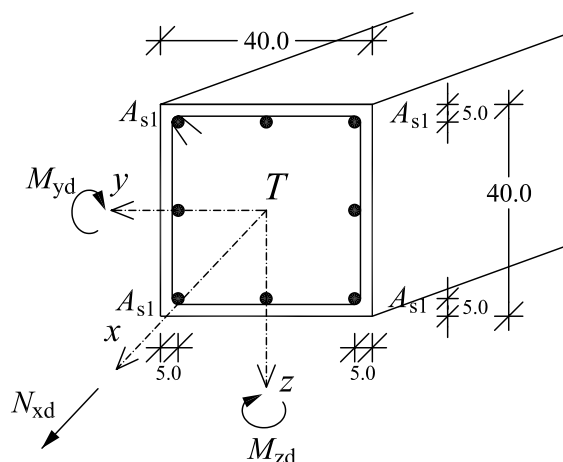
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1 Računski primeri

1.1 Kvadratni prečni prerez

V prvem računskem primeru bomo za kvadratni armiranobetonski prečni prerez, ki je prikazan na sliki (1), s pomočjo izdelanih interakcijskih diagramov izračunali potrebno vzdolžno armaturo za dano obremenitev. Geometrijski podatki AB prečnega prereza ter podatki o legi in razporeditvi armaturnih palic so prikazani na sliki (1). Računska obremenitev prečnega prereza je:

$$\begin{aligned}N_{xd} &= -500 \text{ kN}, \\M_{yd} &= 120 \text{ kNm}, \\M_{zd} &= 90 \text{ kNm}.\end{aligned}$$



Slika 1: Kvadratni AB prečni prerez, $b/h = 40/40$ cm.

Prečni prerez je izdelan iz betona kvalitete C25/30, kar pomeni, da je njegova karakteristična tlačna trdnost $f_{ck} = 2.5 \text{ kN/cm}^2$, in armature kvalitete S500 s karakteristično mejo tečenja $f_{yk} = 50.0 \text{ kN/cm}^2$. Računsko tlačno trdnost betona f_{cd} izračunamo z izrazom:

$$f_{cd} = \frac{f_{ck}}{\gamma_c} = \frac{2.5}{1.5} = 1.67 \text{ kN/cm}^2, \quad (1)$$

kjer je γ_c parcialni varnostni faktor za beton. Računsko trdnost armature pri meji tečenja f_{yd} pa izračunamo z izrazom:

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{50.0}{1.15} = 43.48 \text{ kN/cm}^2, \quad (2)$$

kjer je γ_s parcialni varnostni faktor za armaturo.

Normirana mejna obremenitev prečnega prereza je enaka:

$$n_d = \frac{N_{xd}}{bh\alpha f_{cd}} = \frac{-500}{40 \cdot 40 \cdot 0.85 \cdot 1.67} = -0.220, \quad (3)$$

$$m_{yd} = \frac{M_{yd}}{bh^2\alpha f_{cd}} = \frac{12000}{40 \cdot 40^2 \cdot 0.85 \cdot 1.67} = 0.132. \quad (4)$$

Razmerje normiranih upogibnih momentov m_{zd}/m_{yd} pa je:

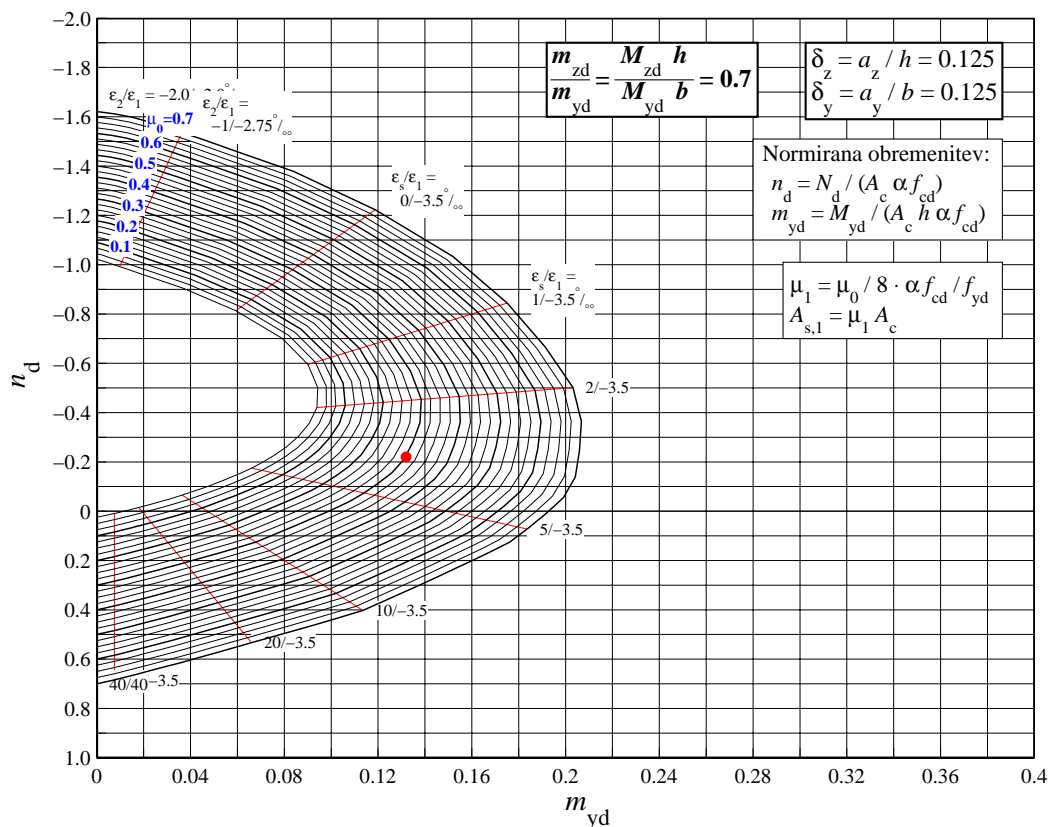
$$\frac{m_{zd}}{m_{yd}} = \frac{M_{zd}}{M_{yd}} \frac{h}{b} = \frac{90}{120} \frac{40}{40} = 0.75. \quad (5)$$

Parametra δ_z in δ_y , ki enolično določata lego armature, izračunamo z izrazoma:

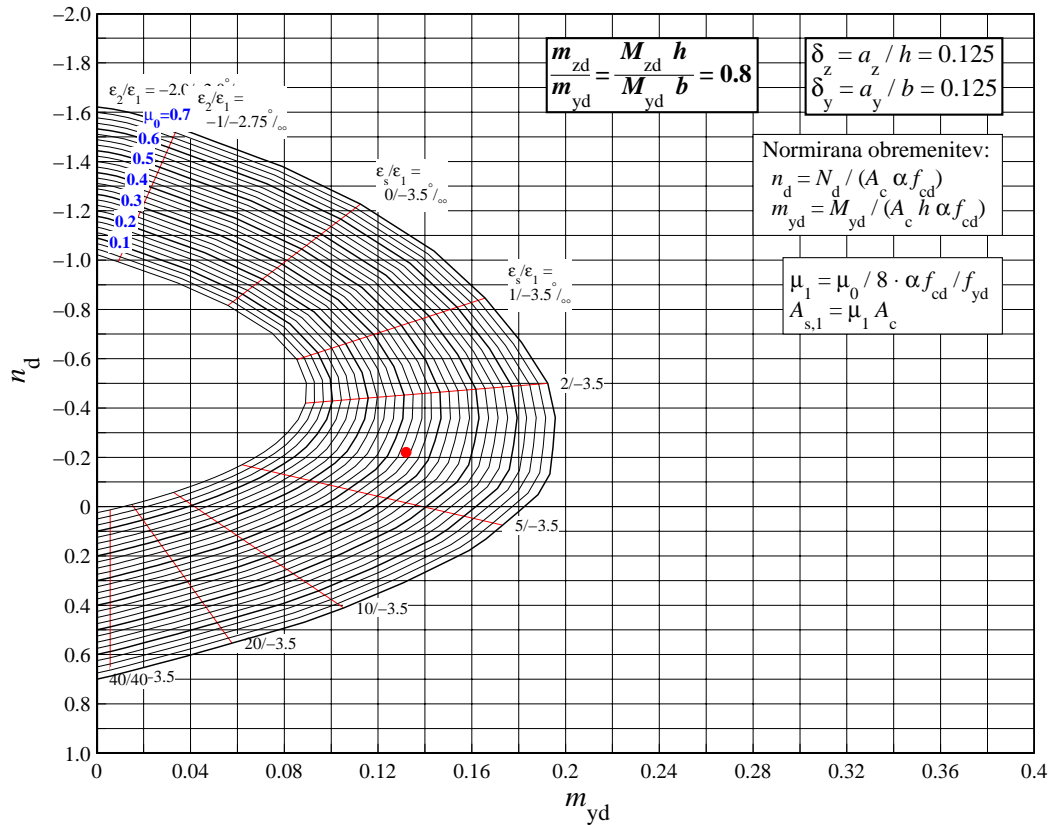
$$\delta_z = \frac{a_z}{h} = \frac{5}{40} = 0.125, \quad (6)$$

$$\delta_y = \frac{a_y}{b} = \frac{5}{40} = 0.125. \quad (7)$$

Ko poznamo število in lego armaturnih palic, kvaliteto armature ter razmerje normiranih upogibnih momentov prečnega prereza, na ustreznem normiranem interakcijskem diagramu poiščemo točko s koordinatama $n_d = -0.220$ in $m_{yd} = 0.132$, ki določa normirano obremenitev prečnega prereza. Ob predpostavki, da je obremenitev prečnega prereza (N_{xd}, M_{yd}, M_{zd}) ravno enaka mejni nosilnosti prečnega prereza ($N_{xRd}, M_{yRd}, M_{zRd}$) odčitamo reducirano potrebno stopnjo armiranja μ_0 . Ker za razmerje normiranih upogibnih momentov $m_{zd}/m_{yd} = 0.75$ interakcijski diagram v priročniku ne obstaja (razmerja $0.1 \rightarrow 1.0$ po koraku 0.1), izračunamo potrebno količino armature z uporabo dveh najbližjih normiranih interakcijskih diagramov ter dobljena rezultata linearno interpoliramo. Na ustreznih normiranih interakcijskih diagramih [(stran 90, slika (137)) in (stran 91, slika (138))] poiščemo točko, ki določa normirano obremenitev prečnega prereza, katere koordinate so $n_d = -0.220$ in $m_{yd} = 0.132$ ter odčitamo reducirano potrebno stopnjo armiranja μ_0 , ki znaša $\mu_0(0.8) = 0.340$ in $\mu_0(0.7) = 0.302$ (slika (2) in (3)).



Slika 2: Izbran interakcijski diagram.



Slika 3: Izbran interakcijski diagram.

Nato izračunamo potrebno stopnjo armiranja za posamezno armaturno palico μ_1 , ki je:

$$\mu_1(0.8) = \frac{\mu_0 \alpha f_{cd}}{8 f_{yd}} = \frac{0.340 \cdot 0.85 \cdot 1.67}{8 \cdot 43.48} = 1.39 \cdot 10^{-3}, \quad (8)$$

$$\mu_1(0.7) = \frac{\mu_0 \alpha f_{cd}}{8 f_{yd}} = \frac{0.302 \cdot 0.85 \cdot 1.67}{8 \cdot 43.48} = 1.23 \cdot 10^{-3}. \quad (9)$$

Ploščina prečnega prereza posamezne armaturne palice $A_{s,1}$, ki je potrebna, da podani AB prečni prerez prevzame obremenitev (N_{xd}, M_{yd}, M_{zd}), je glede na uporabljena interakcijska diagrama:

$$A_{s,1}(0.8) = \mu_1 A_c = 1.39 \cdot 10^{-3} \cdot 40 \cdot 40 = 2.224 \text{ cm}^2, \quad (10)$$

$$A_{s,1}(0.7) = \mu_1 A_c = 1.23 \cdot 10^{-3} \cdot 40 \cdot 40 = 1.968 \text{ cm}^2. \quad (11)$$

Dobljena rezultata $A_{s,1}(0.8) = 2.224 \text{ cm}^2$ in $A_{s,1}(0.7) = 1.968 \text{ cm}^2$ linearno interpoliramo. Potrebna ploščina prečnega prereza posamezne armaturne palice $A_{s,1}$ je torej

$$A_{s,1}(0.75) = \frac{A_{s,1}(0.7) + A_{s,1}(0.8)}{2} = \frac{2.224 + 1.968}{2} = 2.10 \text{ cm}^2. \quad (12)$$

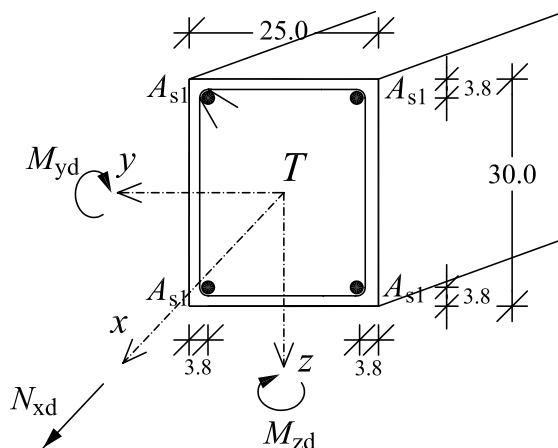
1.2 Pravokotni prečni prerez

V drugem računskem primeru nas zanima, kolikšna je potrebna vzdolžna armatura za pravokotni armiranobetonski prečni prerez pri dani obremenitvi. Geometrijski podatki o AB prečnem prerezu ter podatki o legi in razporeditvi armature so prikazani na sliki (4). Računska obremenitev prečnega prereza je:

$$N_{xd} = -400 \text{ kN},$$

$$M_{yd} = 72 \text{ kNm},$$

$$M_{zd} = 18 \text{ kNm}.$$



Slika 4: Pravokotni AB prečni prerez, $b/h = 25/30$ cm.

Pri dimenzioniranju prečnega prereza uporabimo beton kvalitete C30/37 ($f_{cd} = 2.0 \text{ kN/cm}^2$) in armaturo kvalitete S500 ($f_{yd} = 43.48 \text{ kN/cm}^2$). Tudi sedaj s pomočjo izdelanih interakcijskih diagramov izračunamo potrebno količino armature.

Normirana mejna obremenitev je:

$$n_d = \frac{N_{xd}}{bh\alpha f_{cd}} = \frac{-400}{25 \cdot 30 \cdot 0.85 \cdot 2.0} = -0.314, \quad (13)$$

$$m_{yd} = \frac{M_{yd}}{bh^2\alpha f_{cd}} = \frac{7200}{25 \cdot 30^2 \cdot 0.85 \cdot 2.0} = 0.188. \quad (14)$$

Razmerje normiranih upogibnih momentov m_{zd}/m_{yd} pa je:

$$\frac{m_{zd}}{m_{yd}} = \frac{M_{zd} h}{M_{yd} b} = \frac{18 \cdot 30}{72 \cdot 25} = 0.3. \quad (15)$$

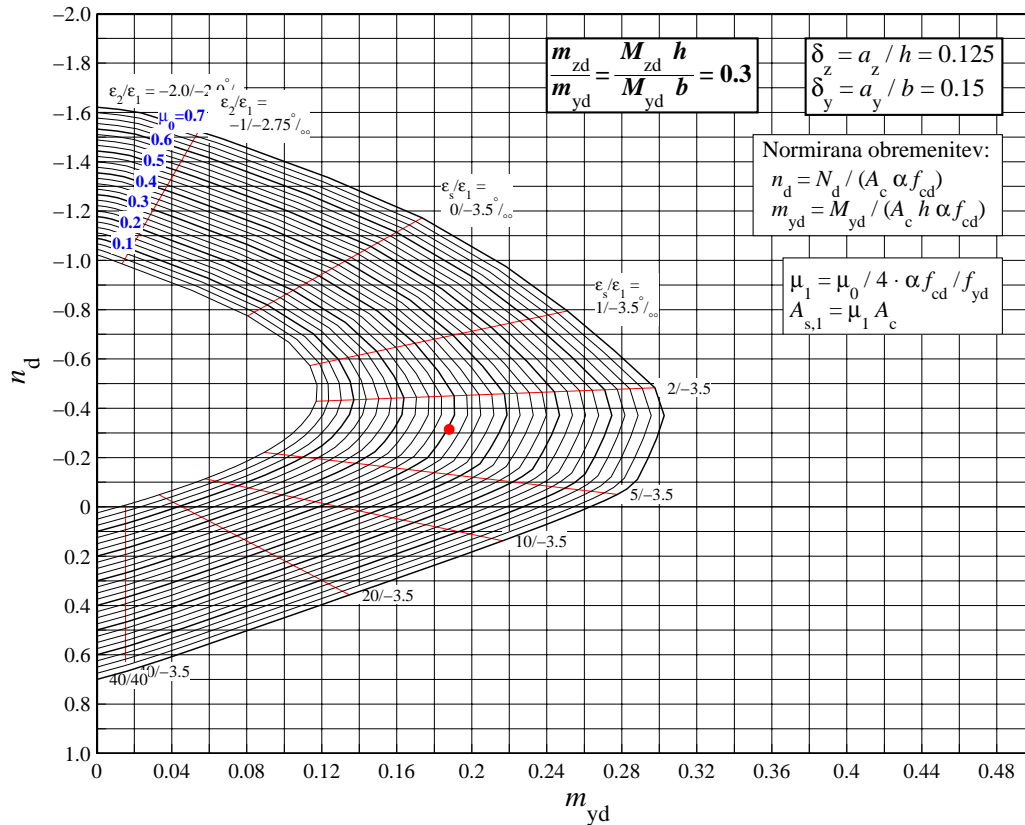
Legi armature je enolično določena s parametroma δ_z in δ_y , ki sta:

$$\delta_z = \frac{a_z}{h} = \frac{3.8}{30} = 0.1267 \approx 0.125, \quad (16)$$

$$\delta_y = \frac{a_y}{b} = \frac{2.8}{25} = 0.152 \approx 0.150. \quad (17)$$

Na ustreznem normiranem interakcijskem diagramu (stran 40, slika (53)) poiščemo točko, ki jo določa normirana obremenitev prečnega prereza ($n_d = -0.314$, $m_{yd} = 0.188$), ter nato odčitamo reducirano stopnjo armiranja μ_0 , ki je $\mu_0 = 0.304$ (glej sliko (5)). Na koncu izračunamo še stopnjo armiranja za posamezno armaturno palico μ_1 , ki je enaka

$$\mu_1 = \frac{\mu_0 \alpha f_{cd}}{4 f_{yd}} = \frac{0.304 \cdot 0.85 \cdot 2.0}{4 \cdot 43.48} = 2.97 \cdot 10^{-3}. \quad (18)$$



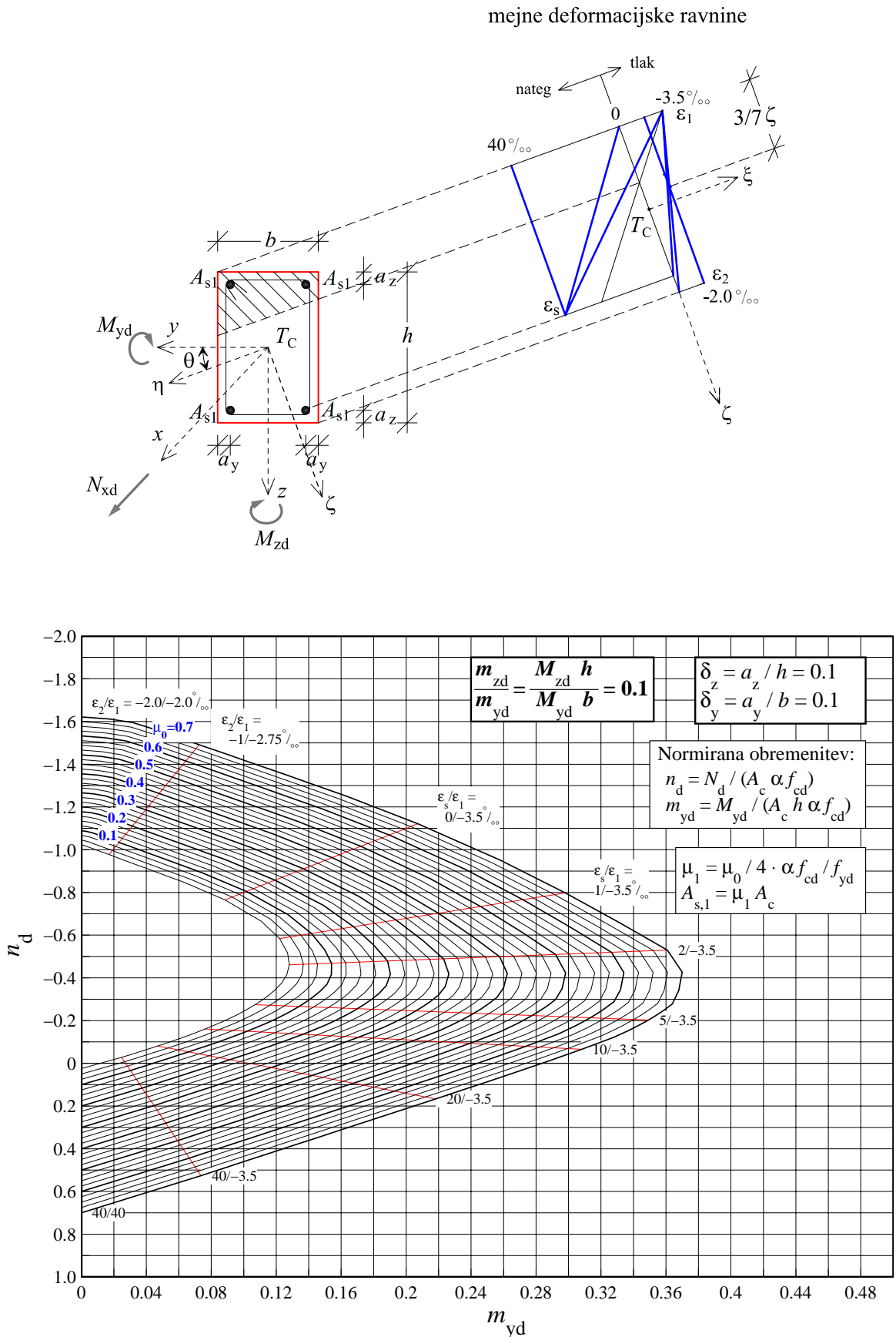
Slika 5: Izbran interakcijski diagram.

Prečni prerez posamezne armaturne palice $A_{s,1}$, ki je potreben, da podani AB prečni prerez prevzame projektirano obremenitev (N_{xd}, M_{yd}, M_{zd}), je:

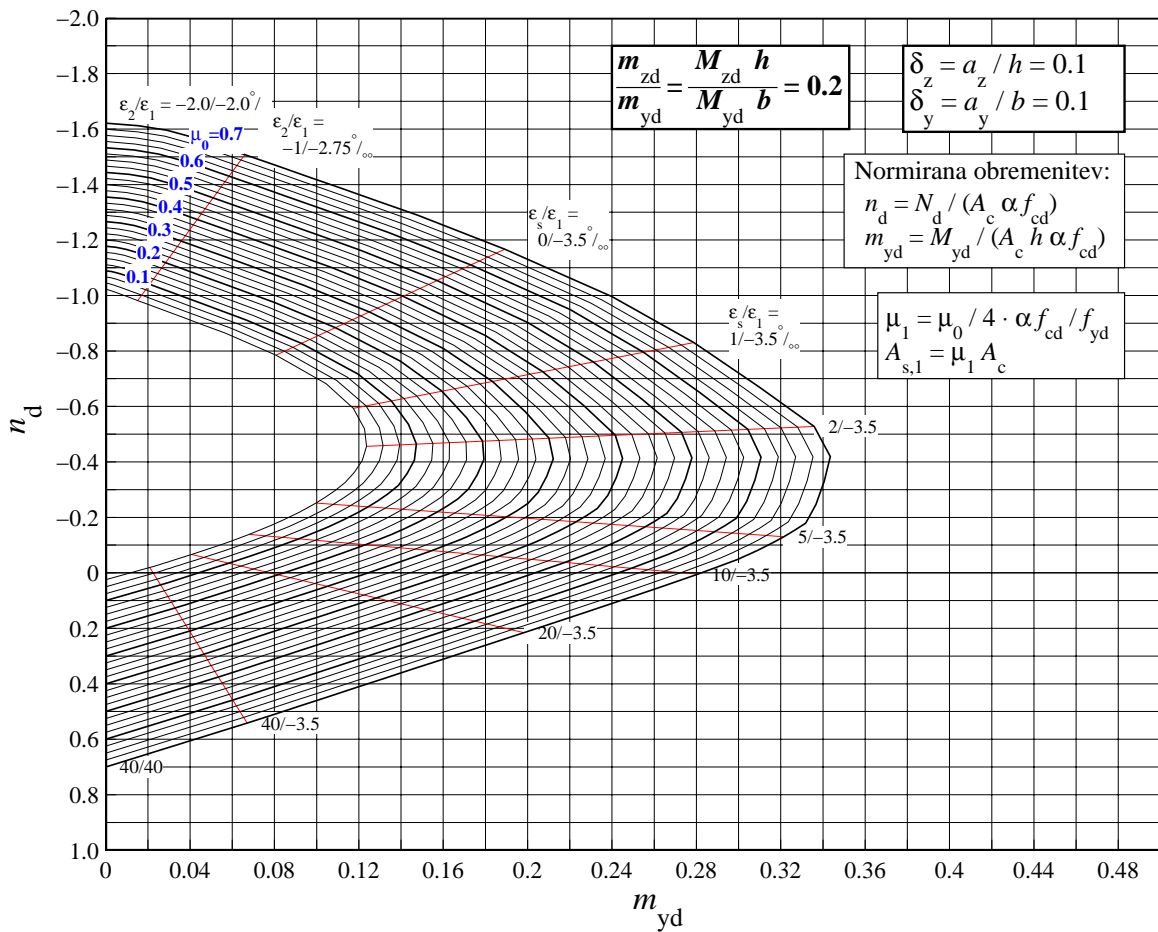
$$A_{s,1} = \mu_1 A_c = 2.97 \cdot 10^{-3} \cdot 25 \cdot 30 = 2.23 \text{ cm}^2. \quad (19)$$

2 Interakcijski diagrami mejne nosilnosti pri dvojno ekscentrični osni sili

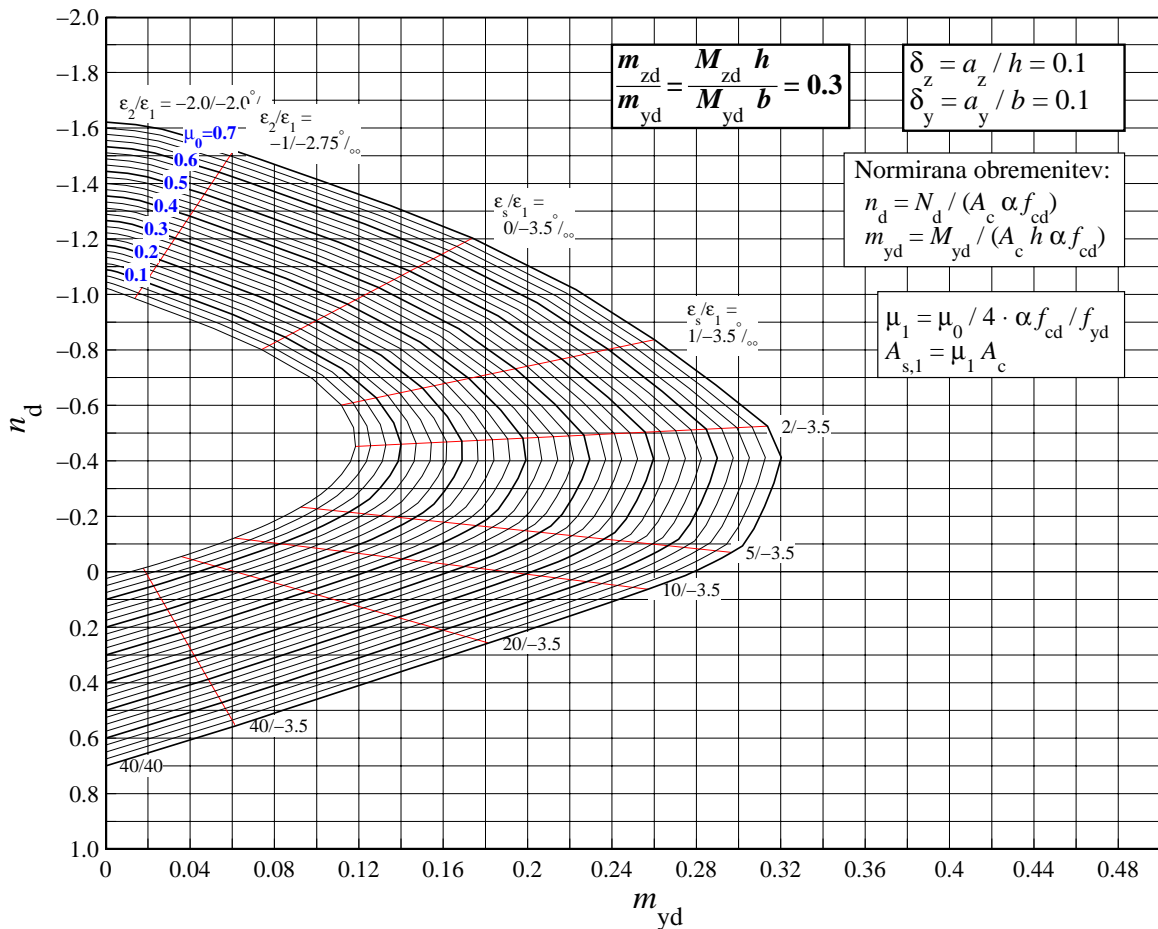
2.1 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.1, \delta_y = 0.1$), S500



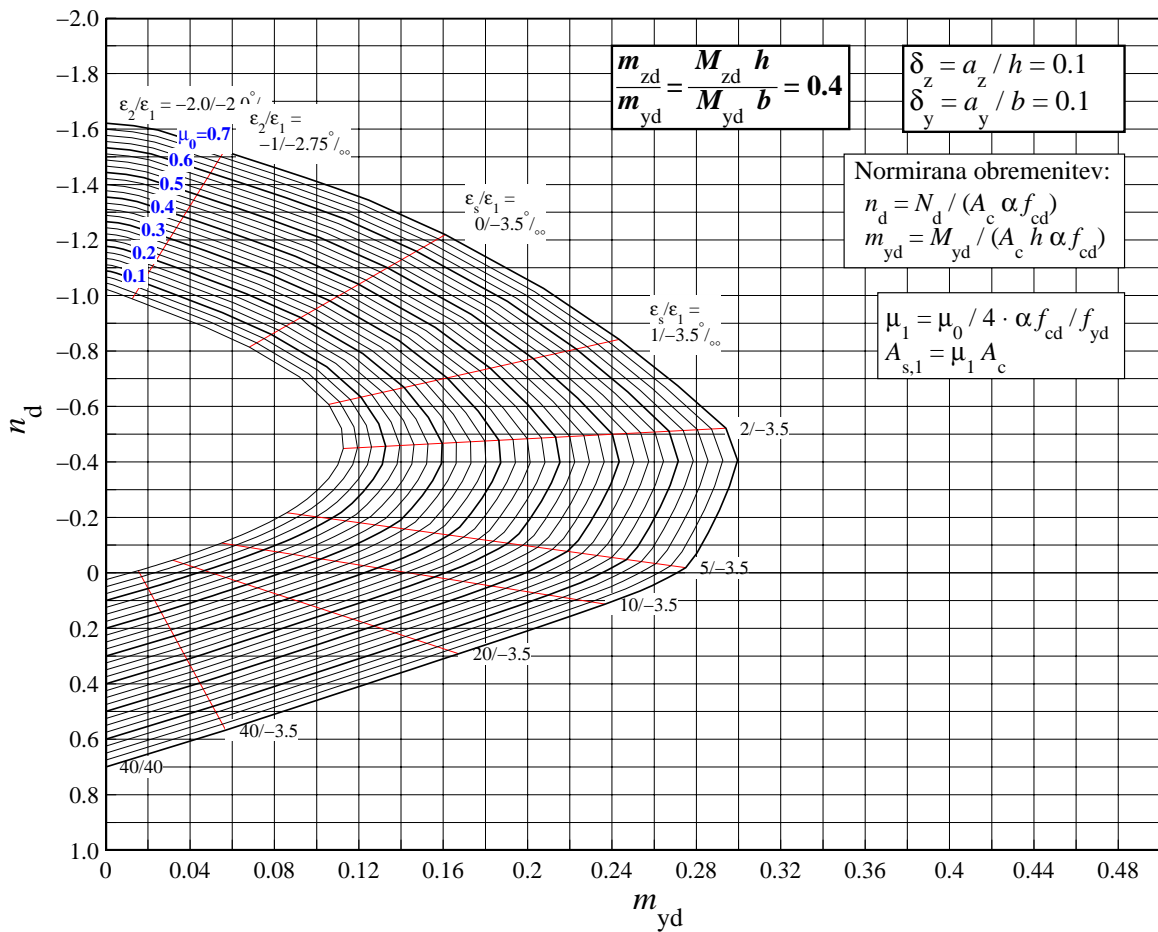
Slika 1: Pravokotni prerez: $\delta_z = 0.1, \delta_y = 0.1$, 4 palice.



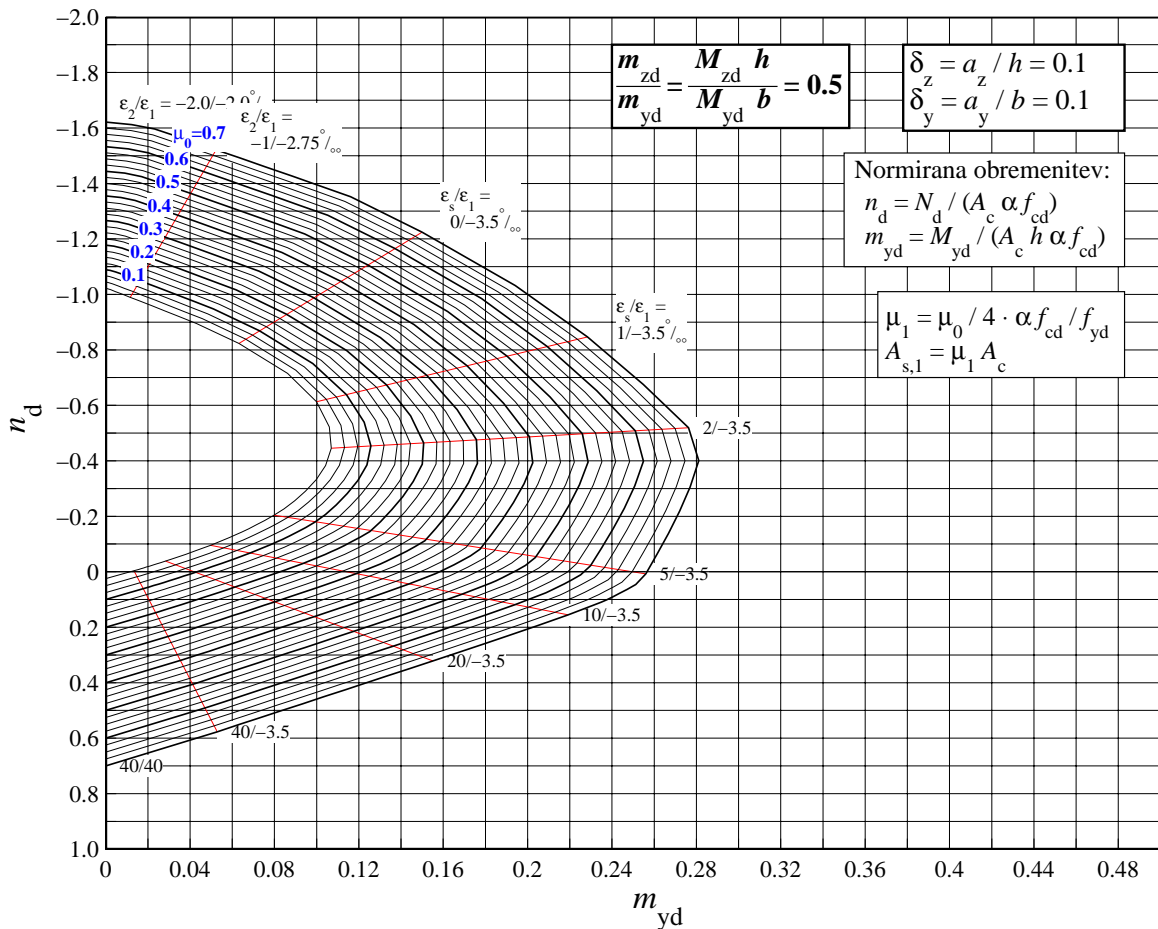
Slika 2: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



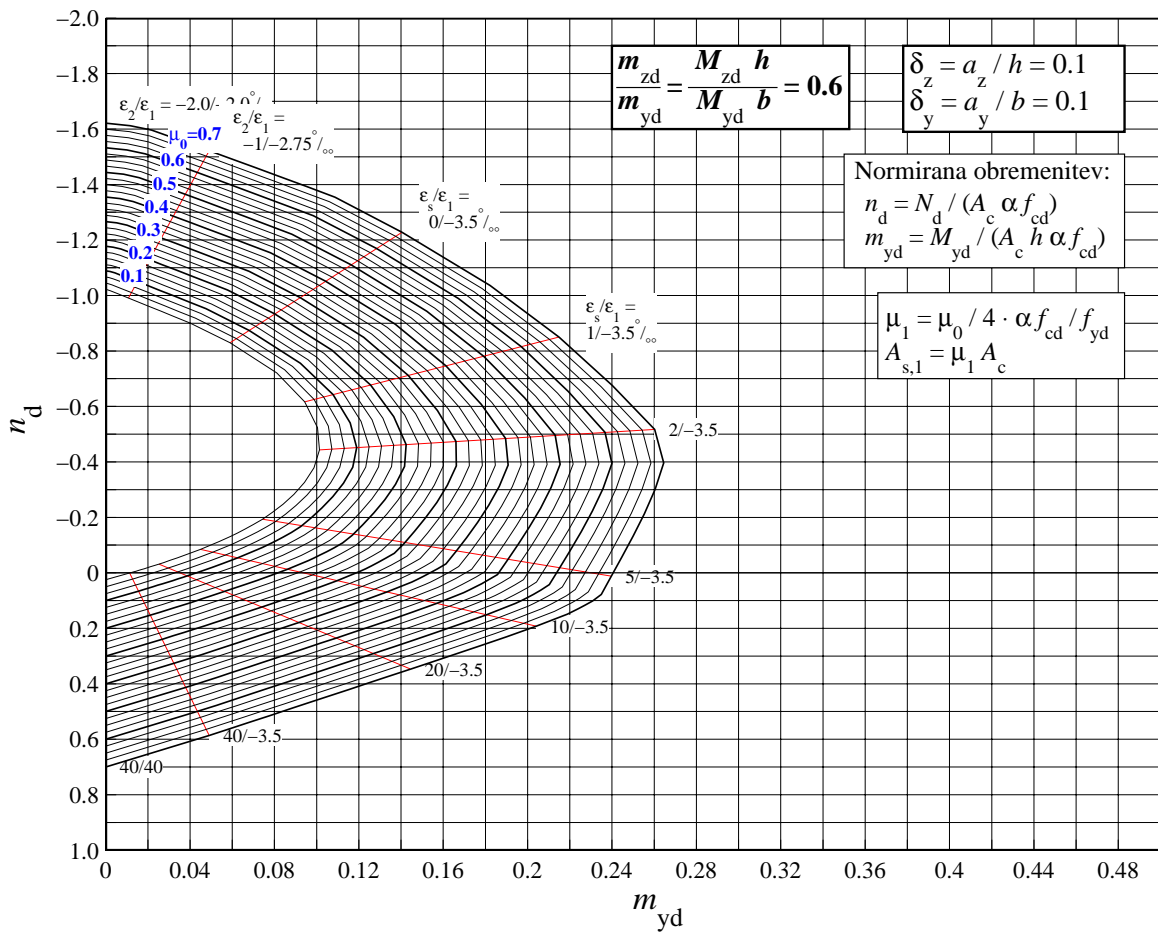
Slika 3: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



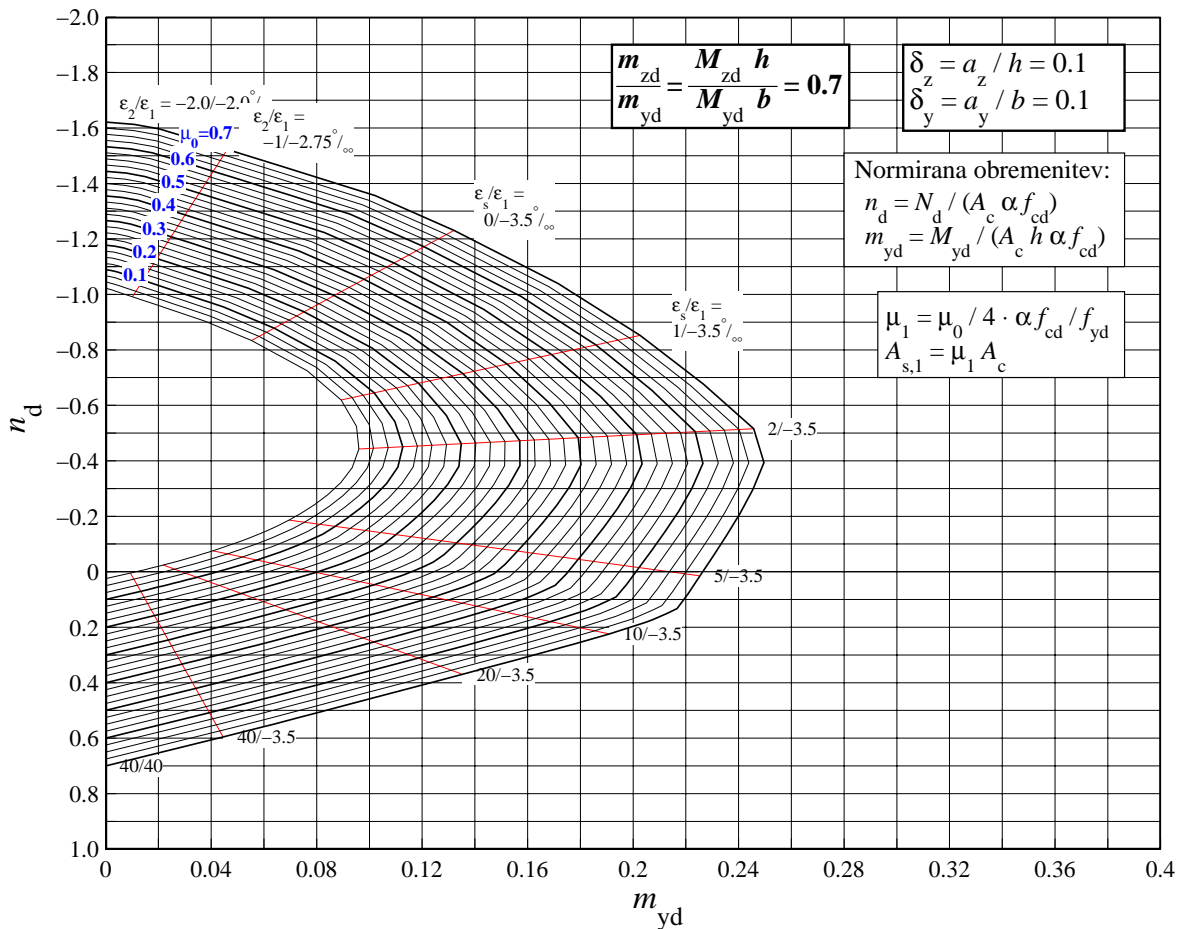
Slika 4: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



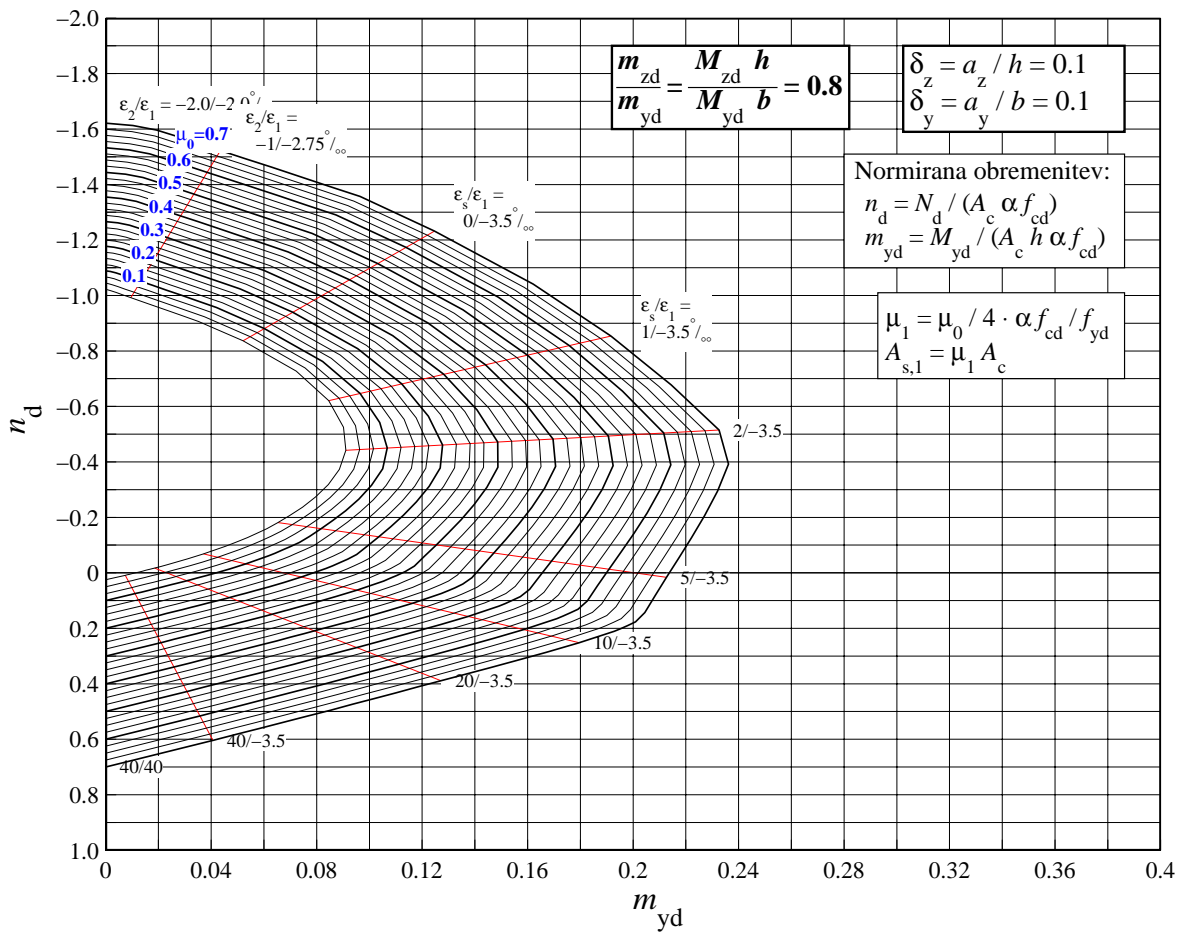
Slika 5: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



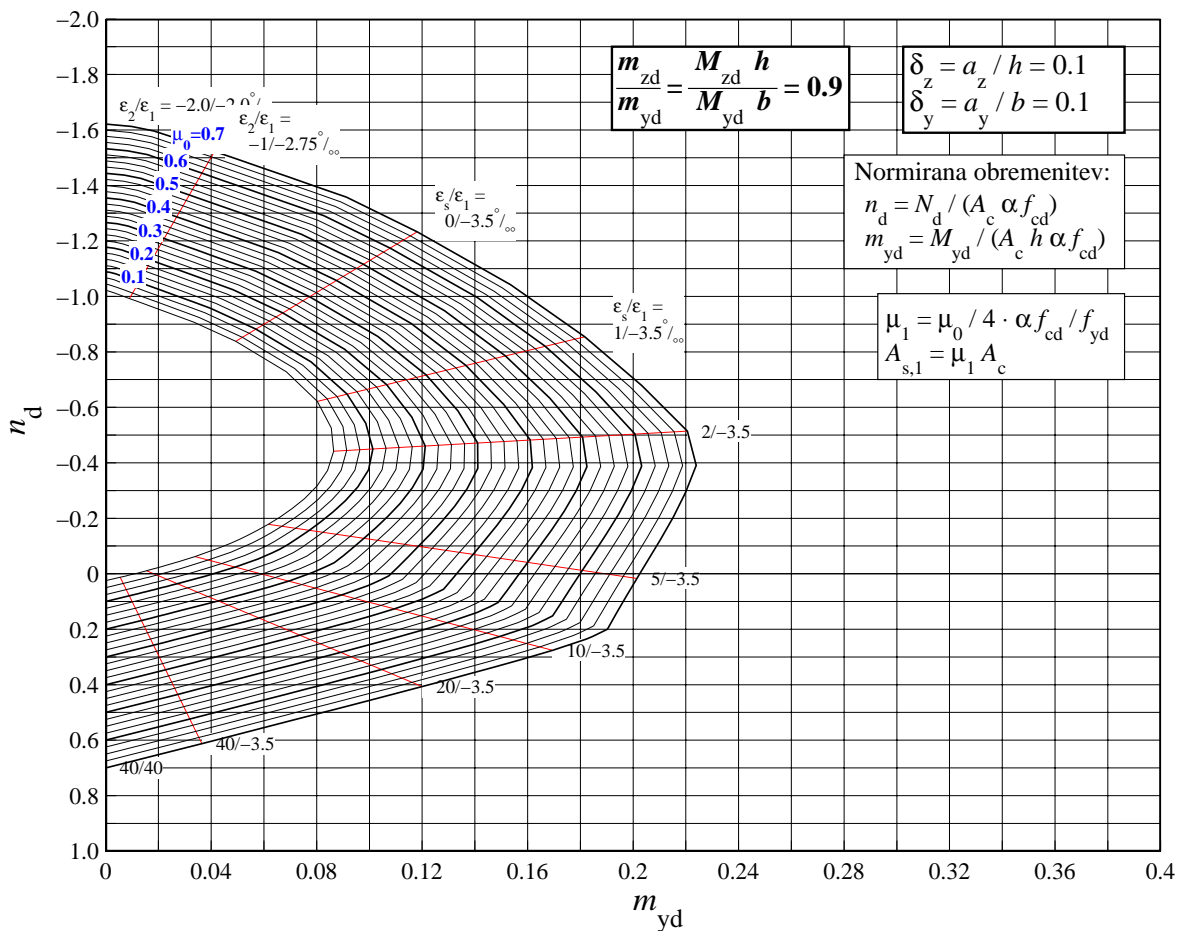
Slika 6: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



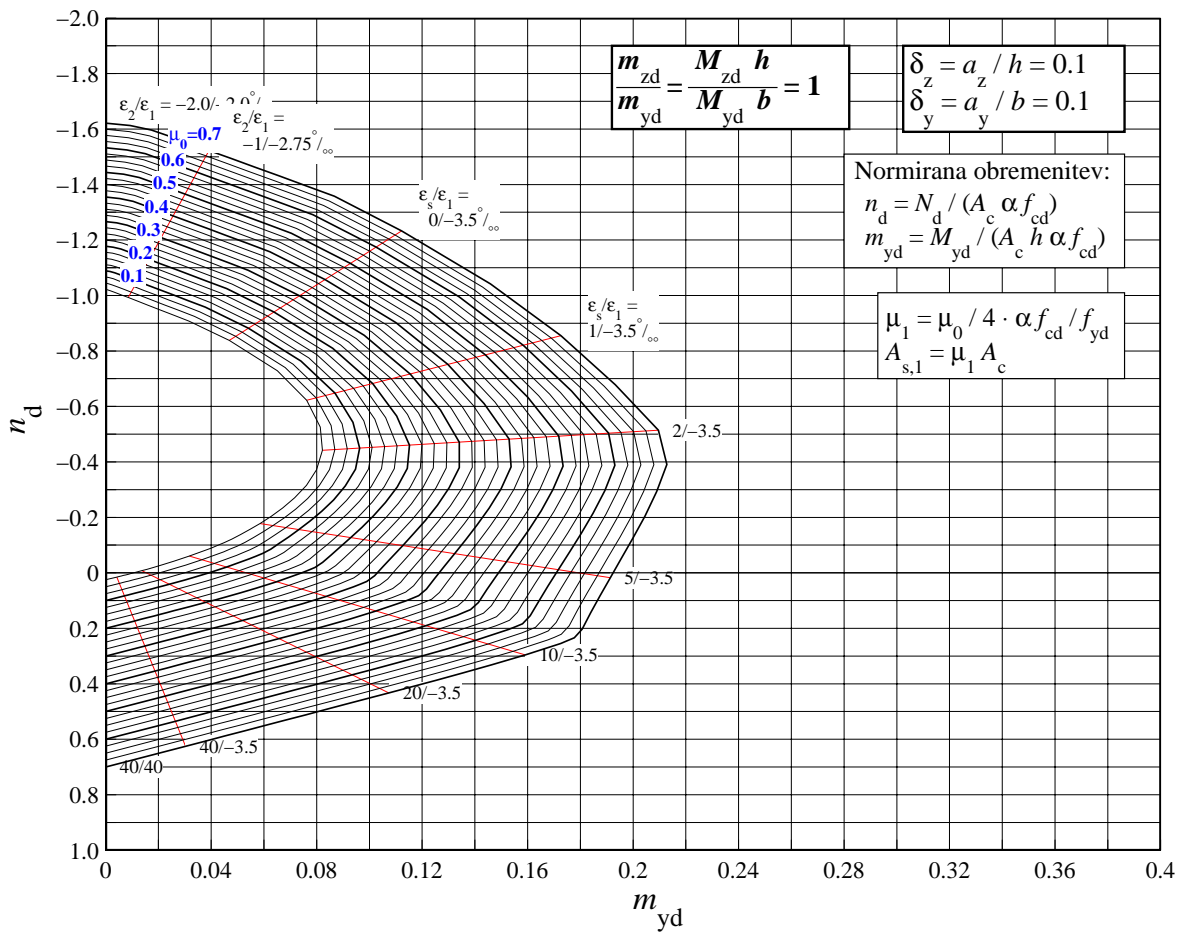
Slika 7: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.



Slika 8: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.

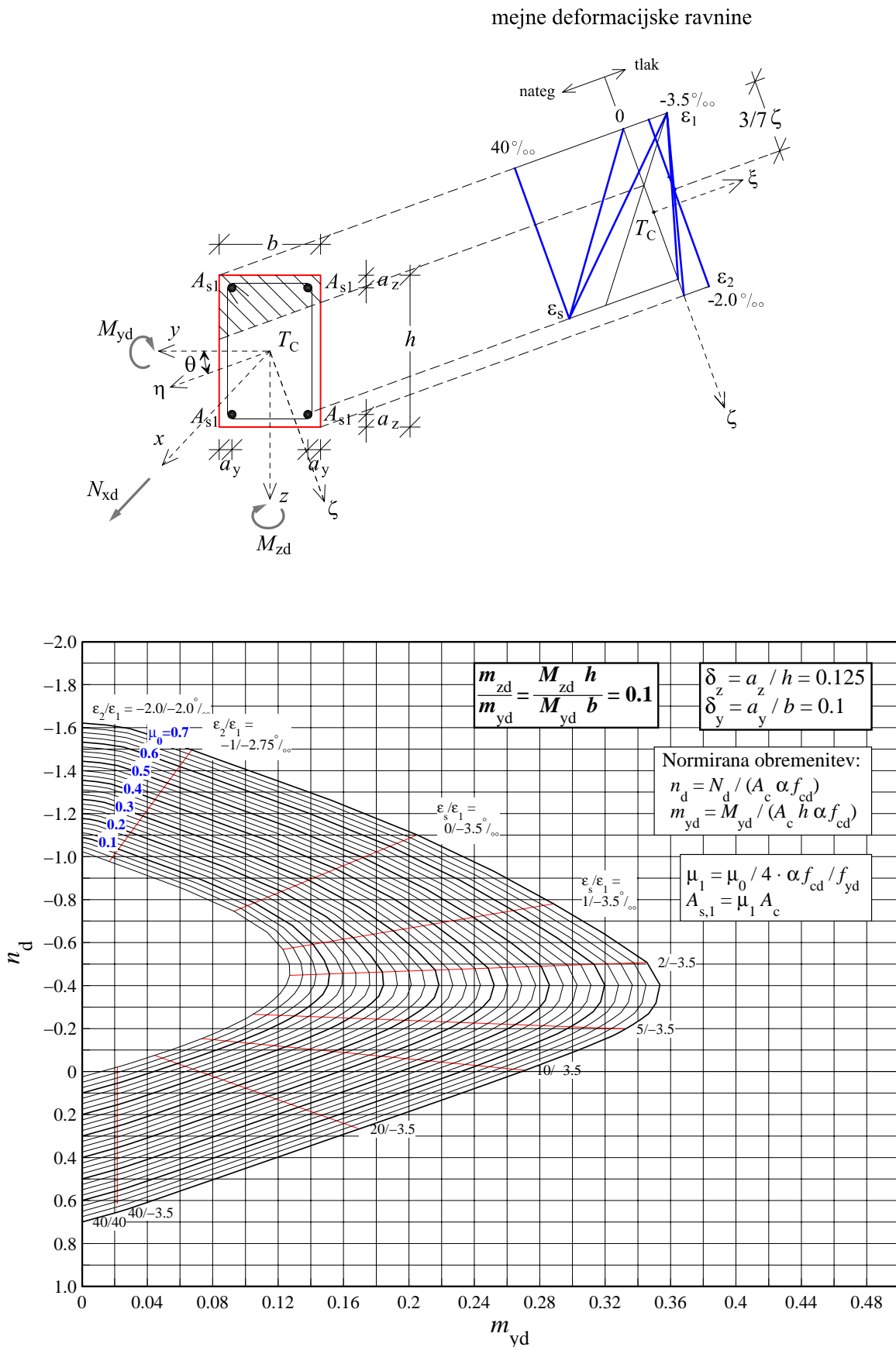


Slika 9: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.

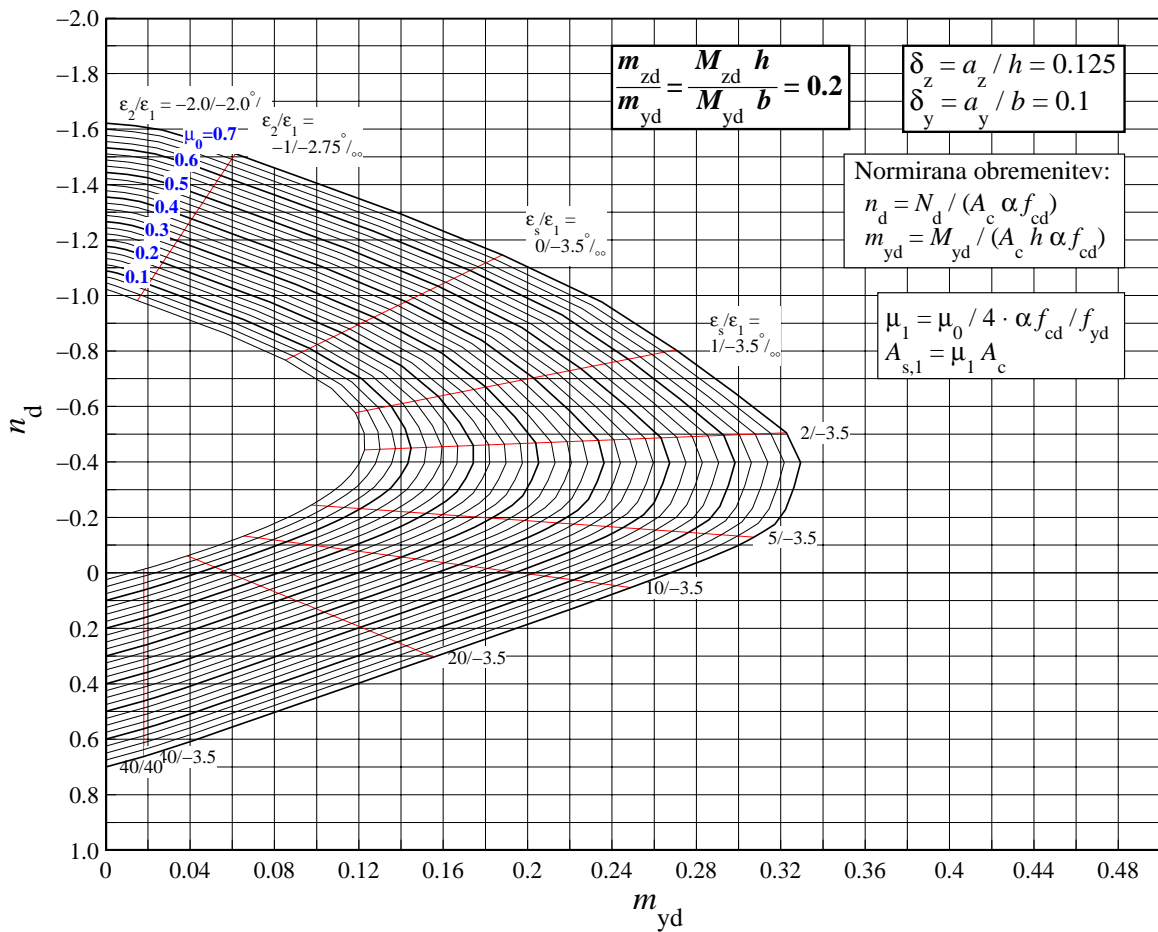


Slika 10: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 4 palice.

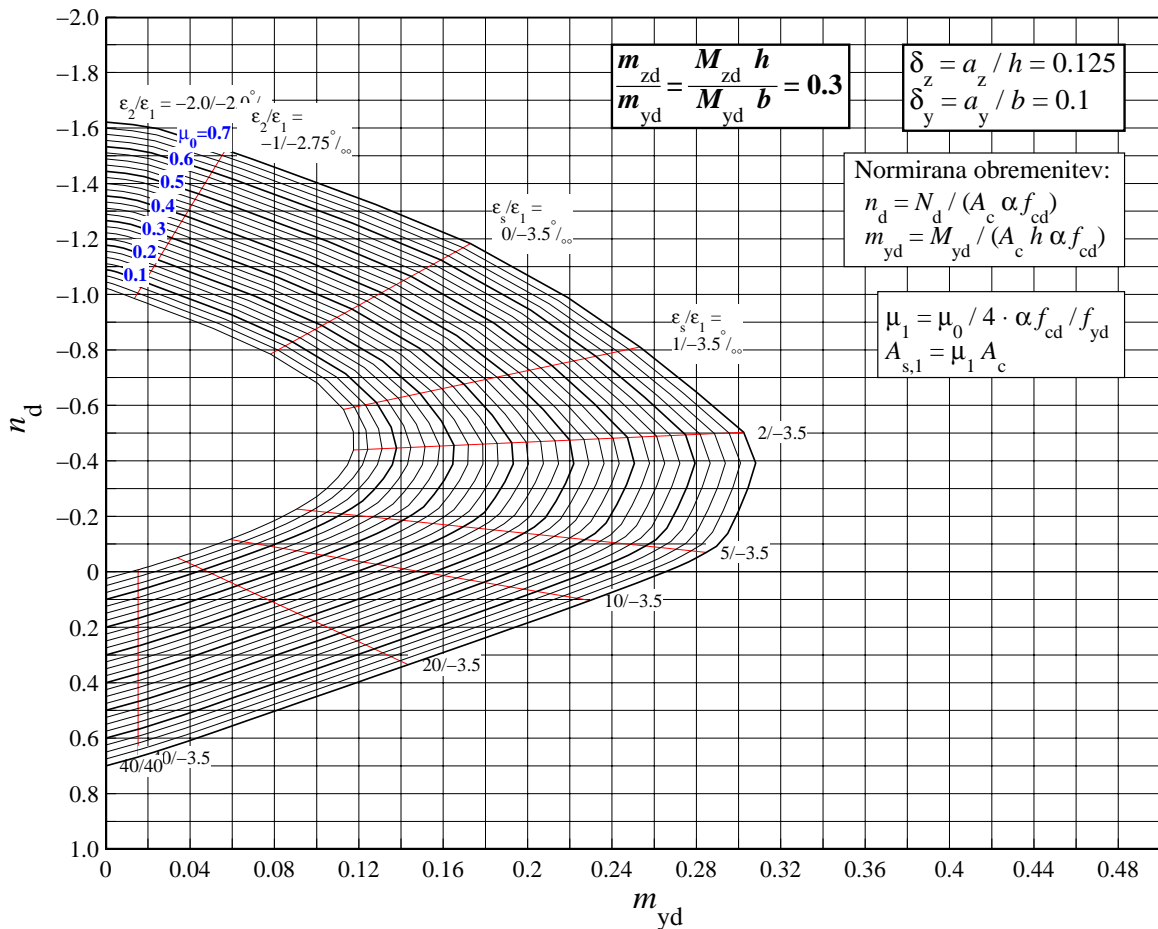
2.2 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.125, \delta_y = 0.1$), S500



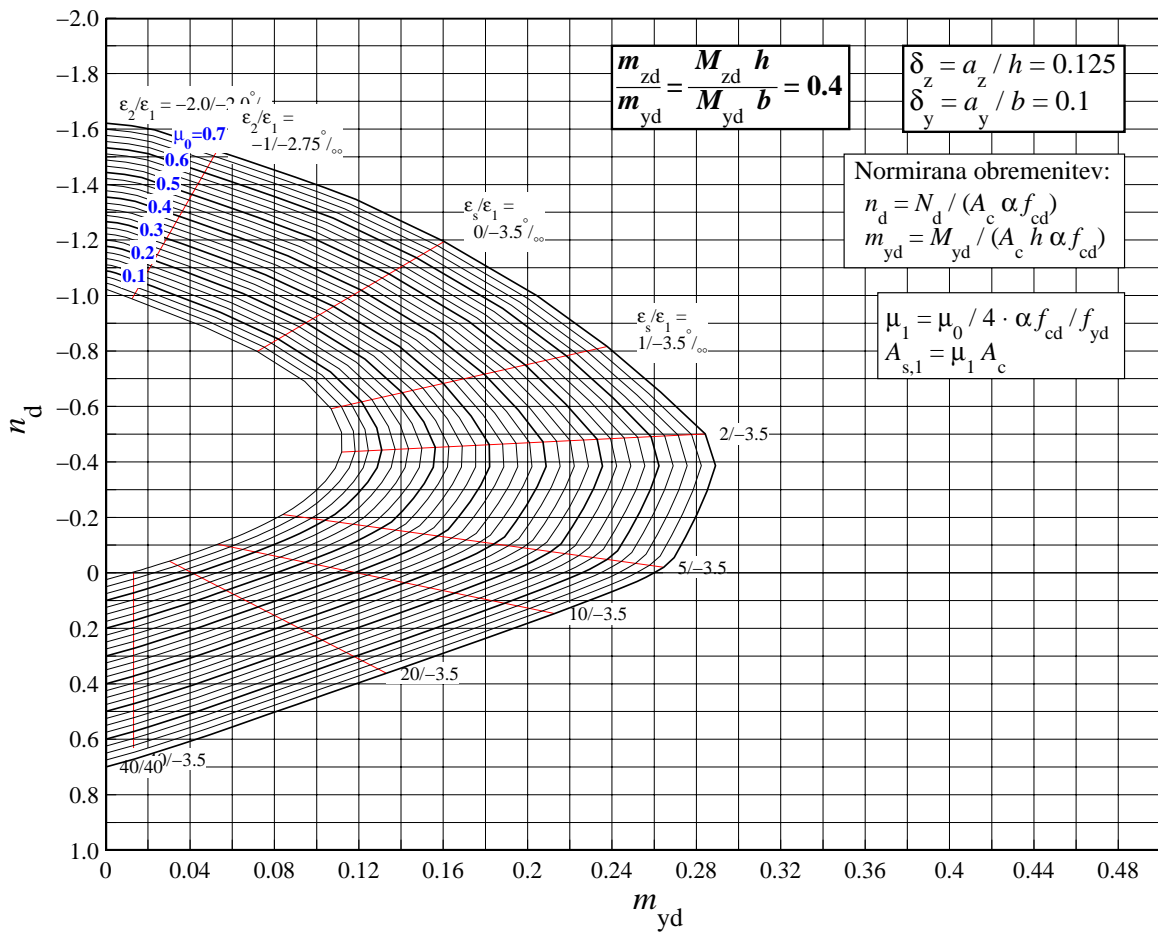
Slika 11: Pravokotni prerez: $\delta_z = 0.125, \delta_y = 0.1$, 4 palice.



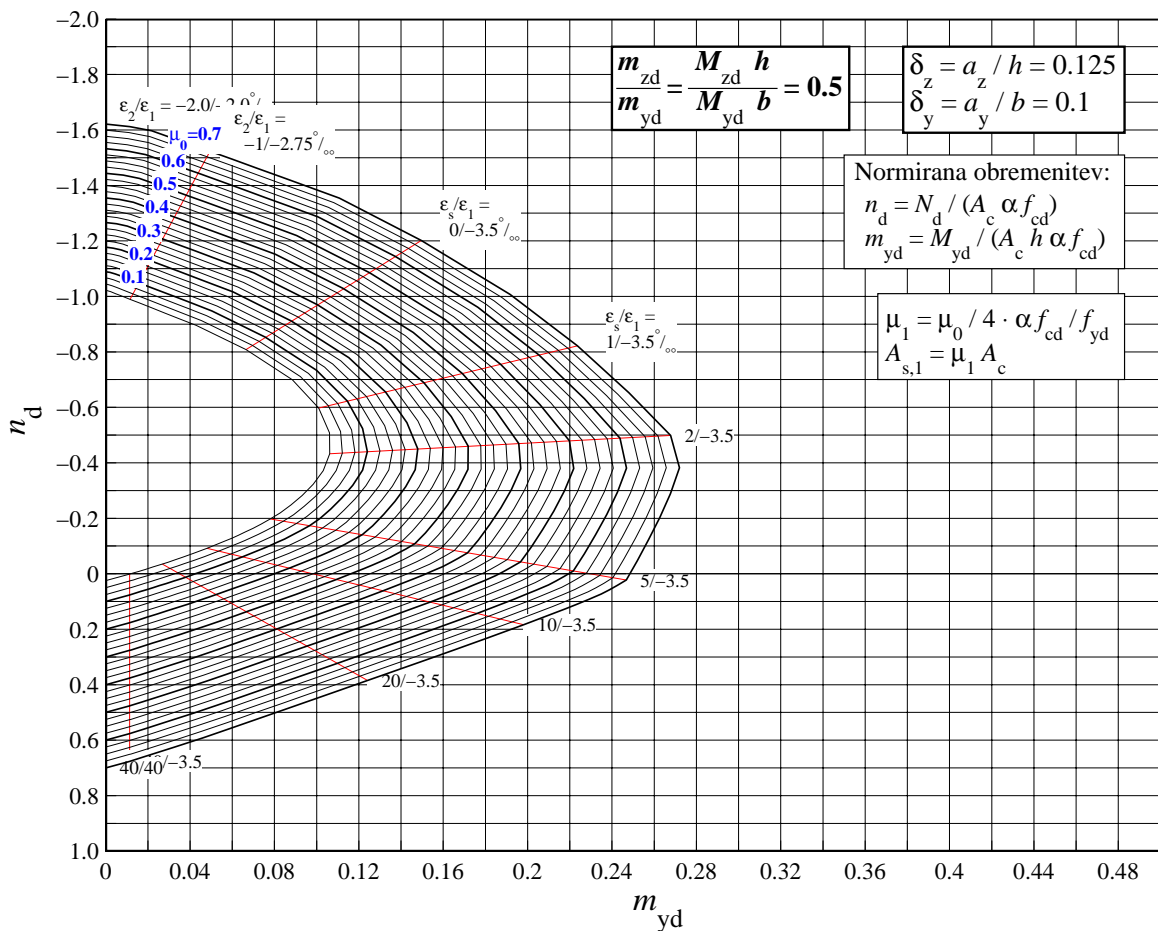
Slika 12: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



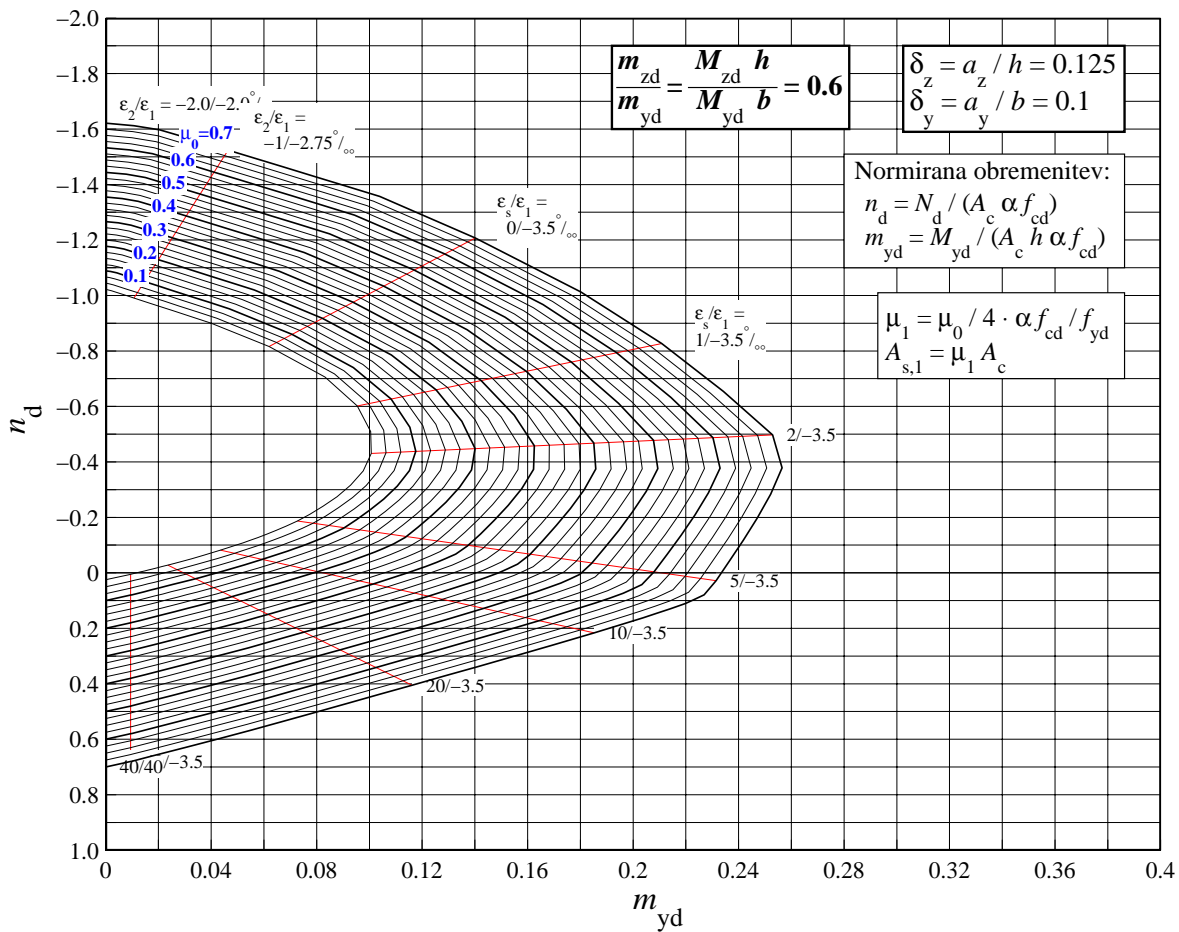
Slika 13: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



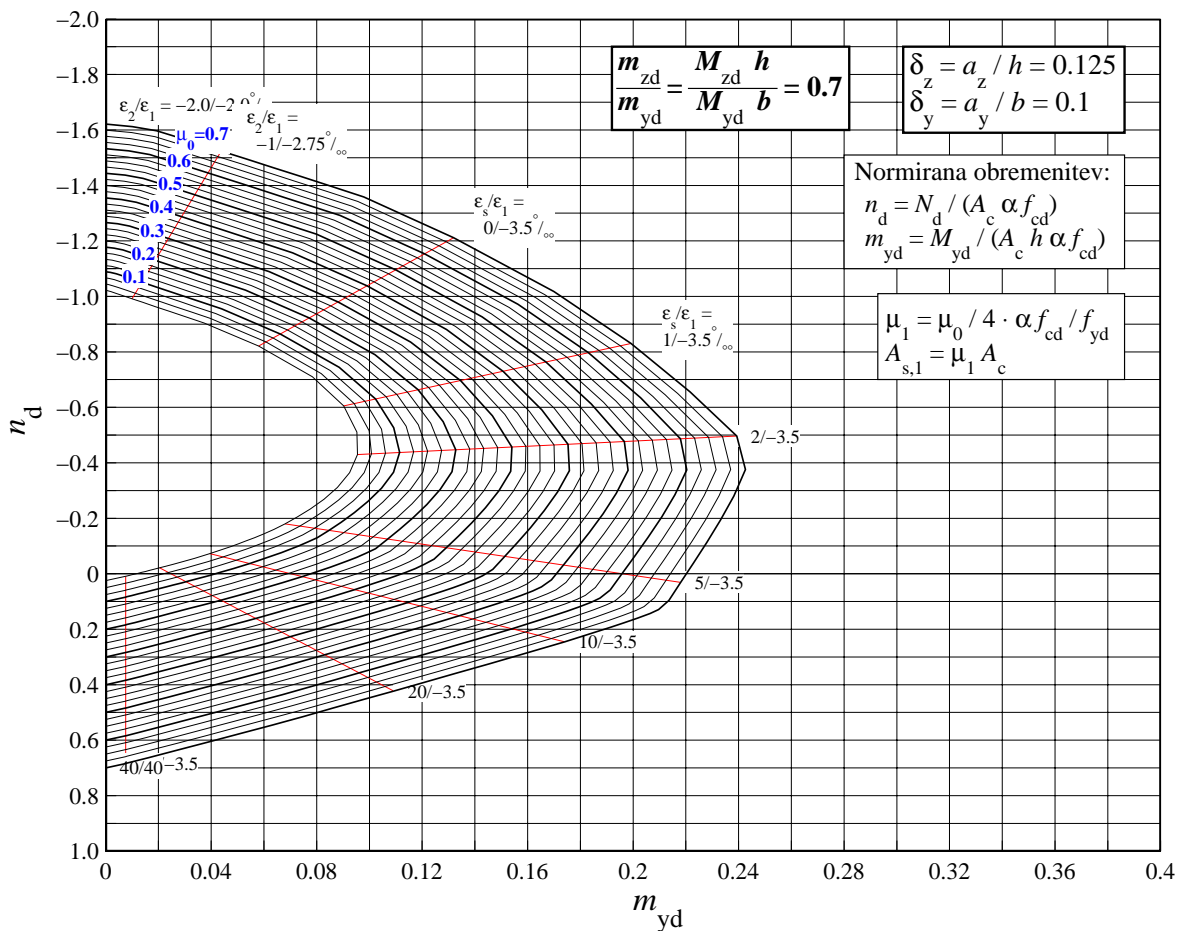
Slika 14: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



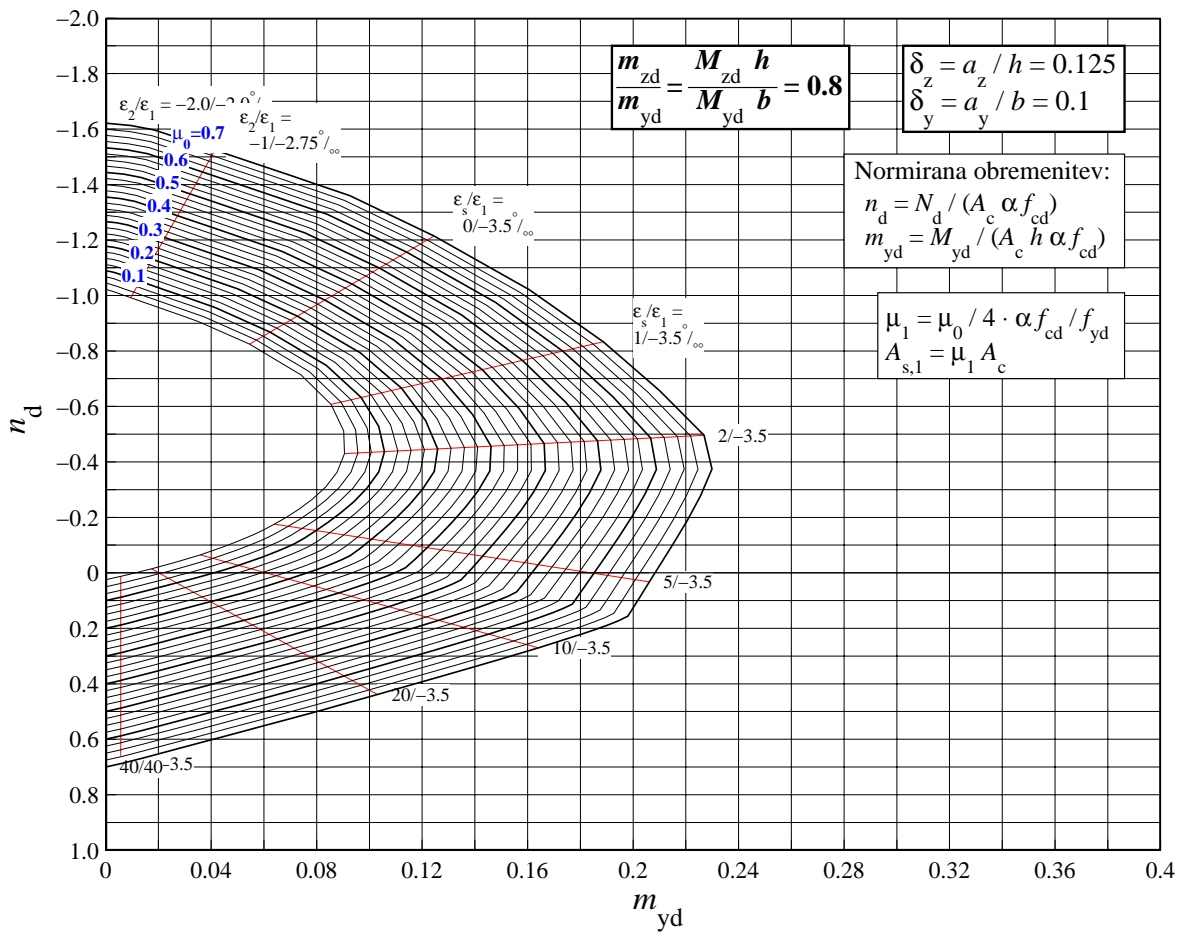
Slika 15: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



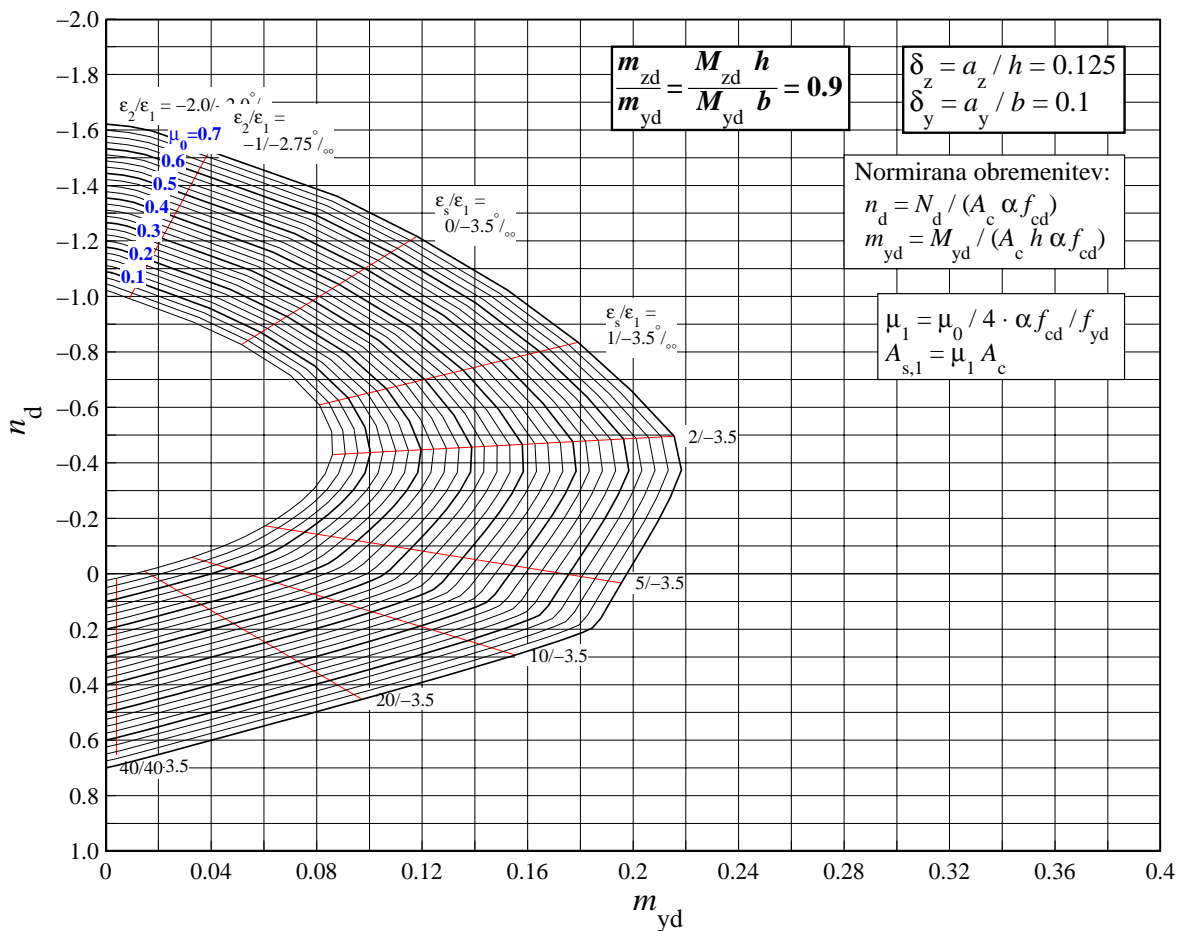
Slika 16: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



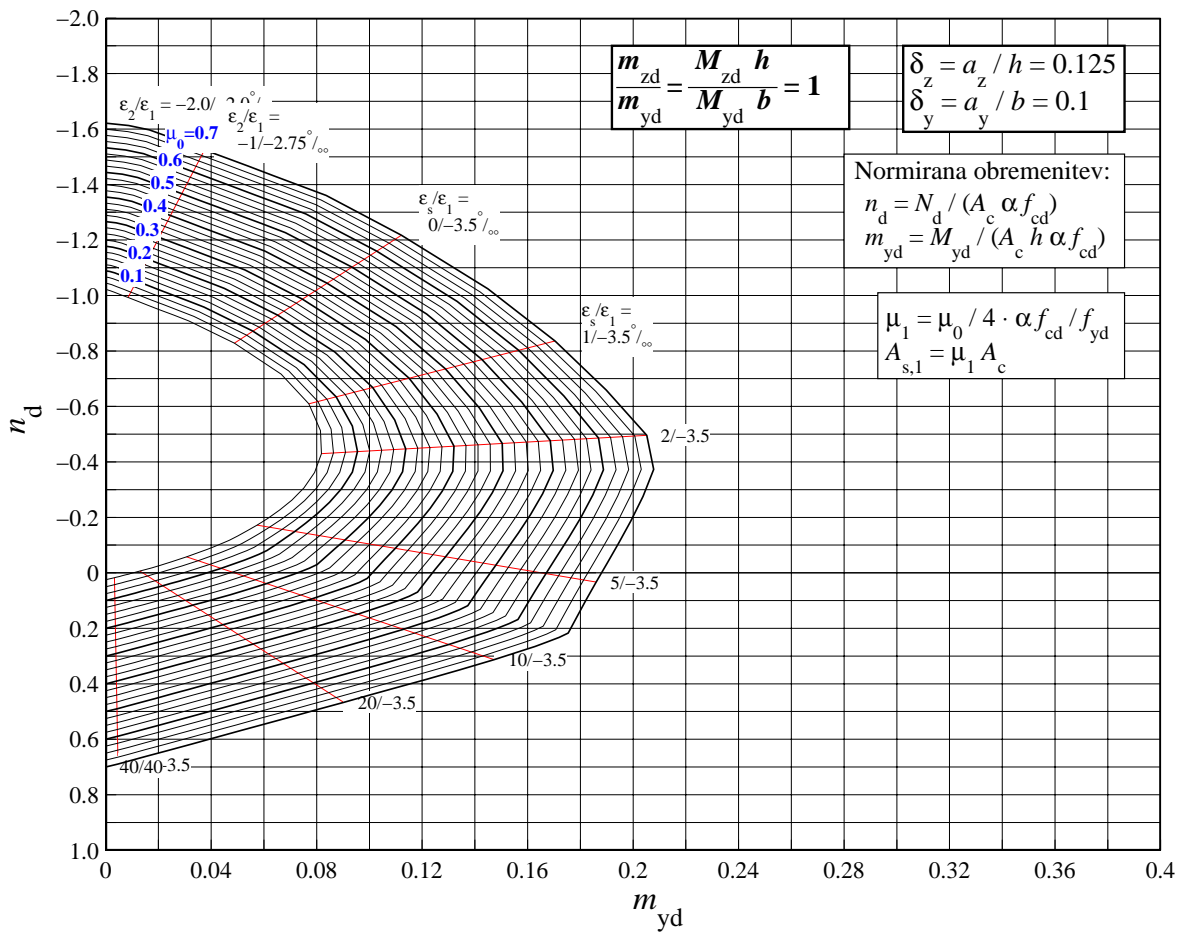
Slika 17: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.



Slika 18: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.

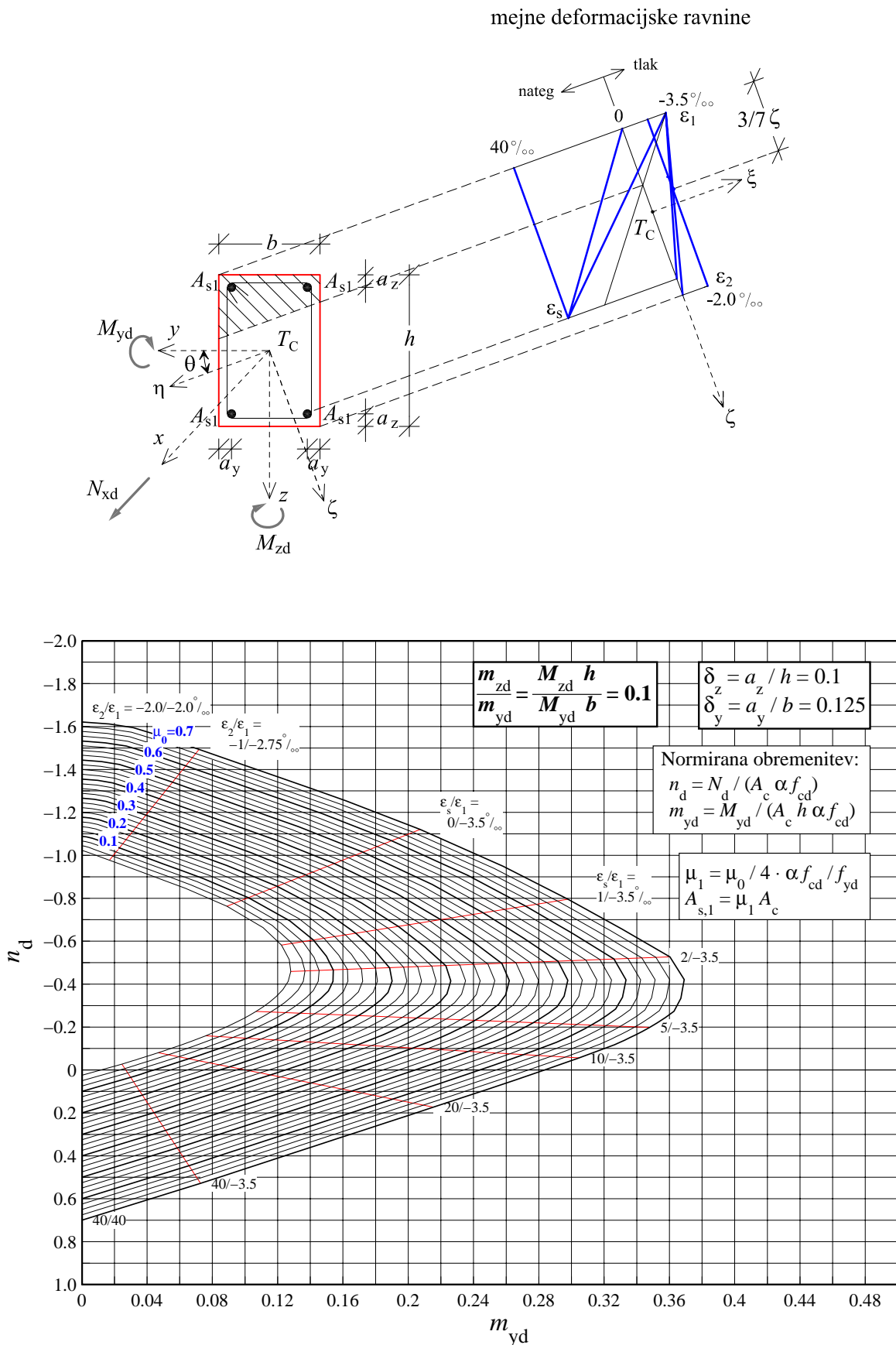


Slika 19: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.

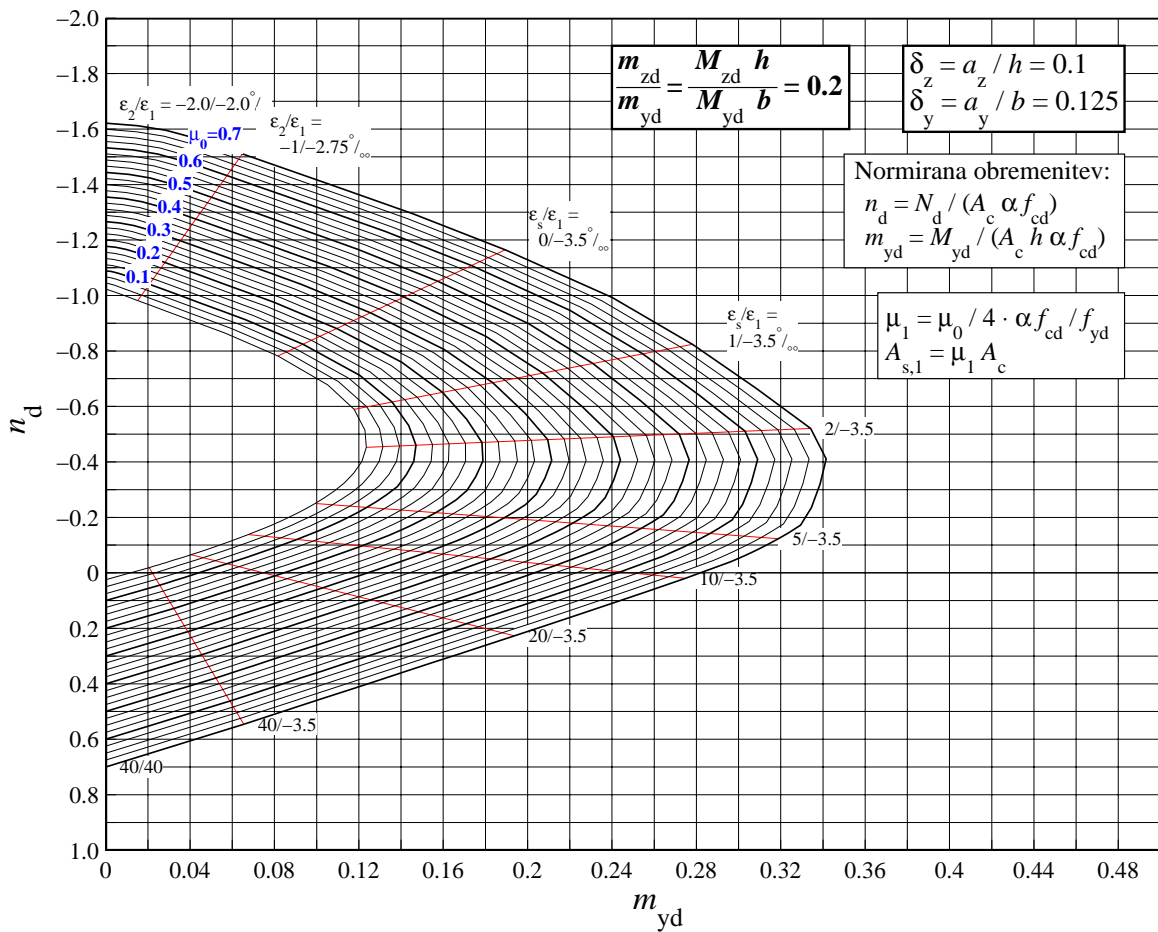


Slika 20: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 4 palice.

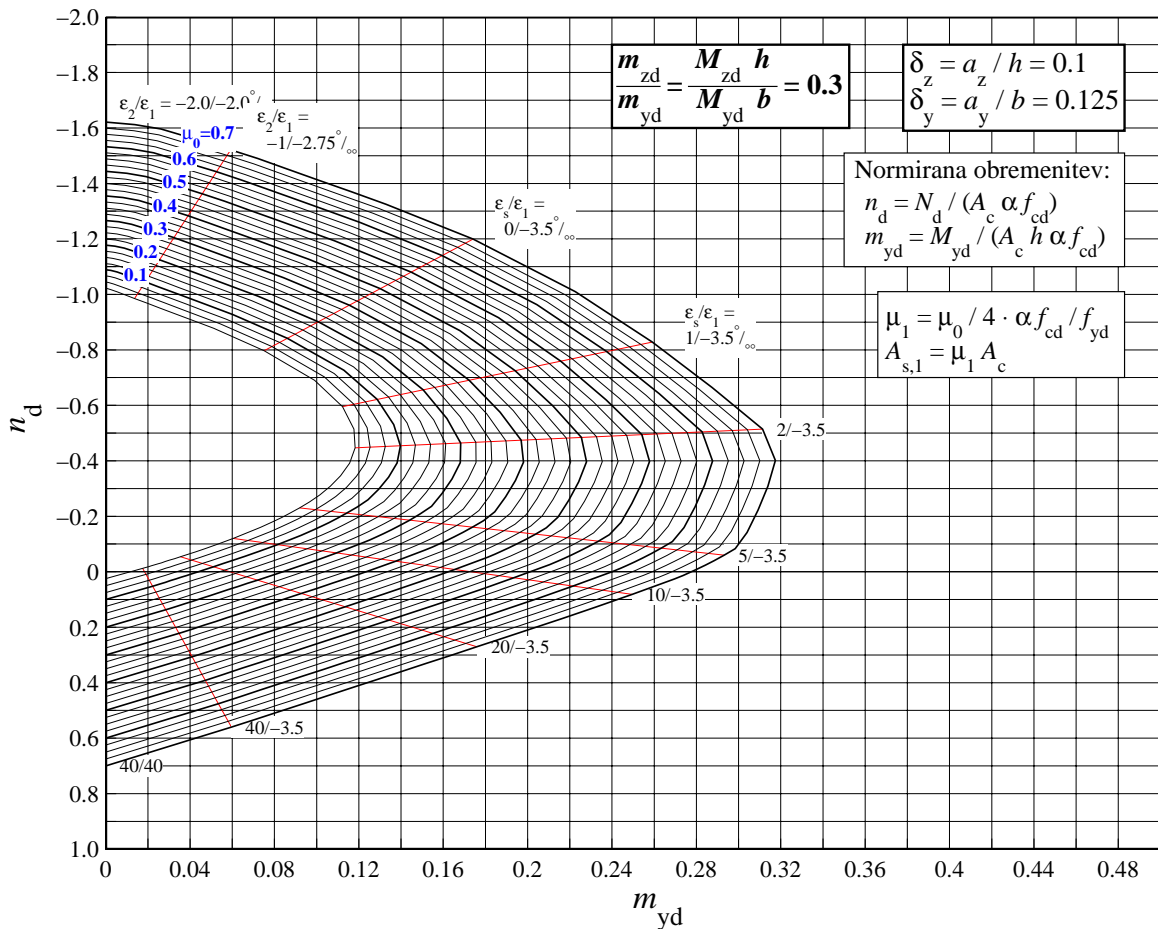
2.3 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.1, \delta_y = 0.125$), S500



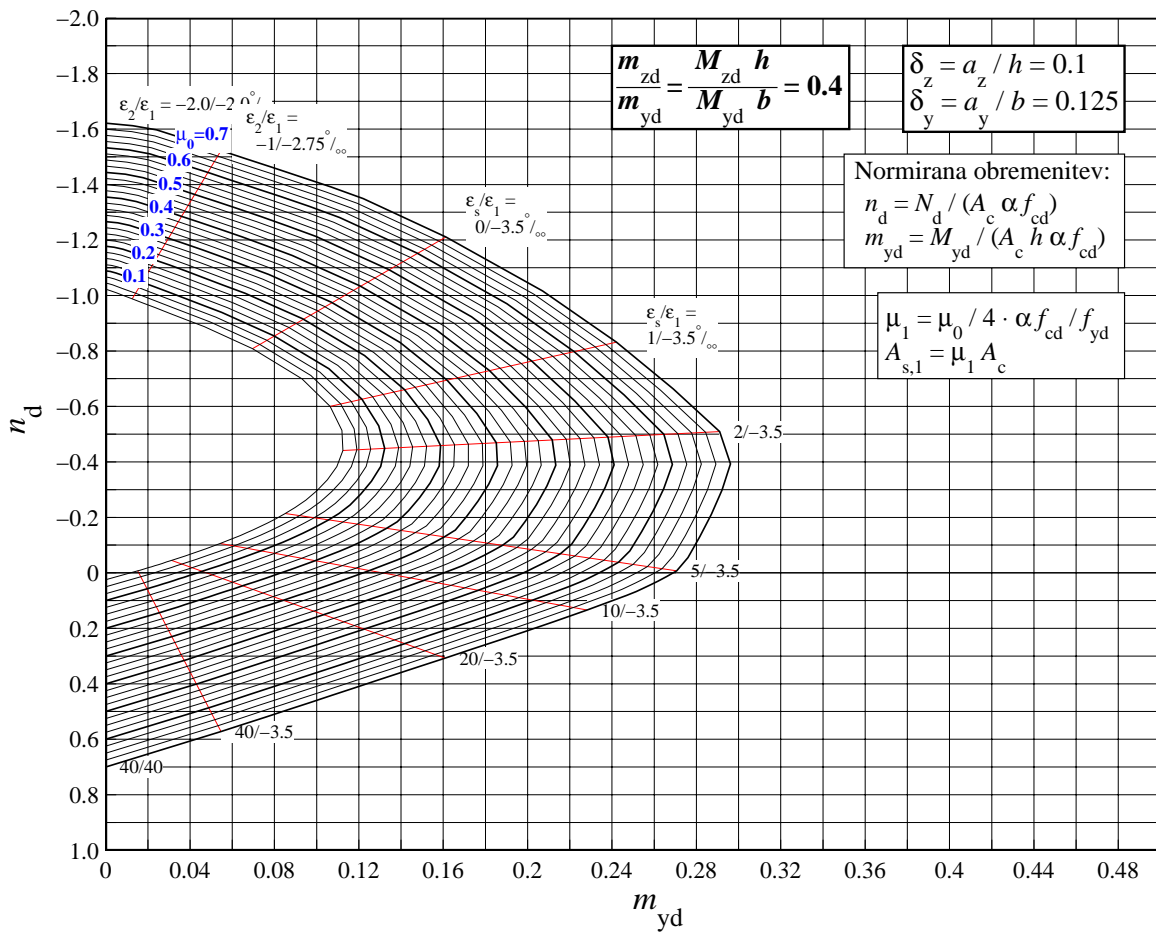
Slika 21: Pravokotni prerez: $\delta_z = 0.1, \delta_y = 0.125$, 4 palice.



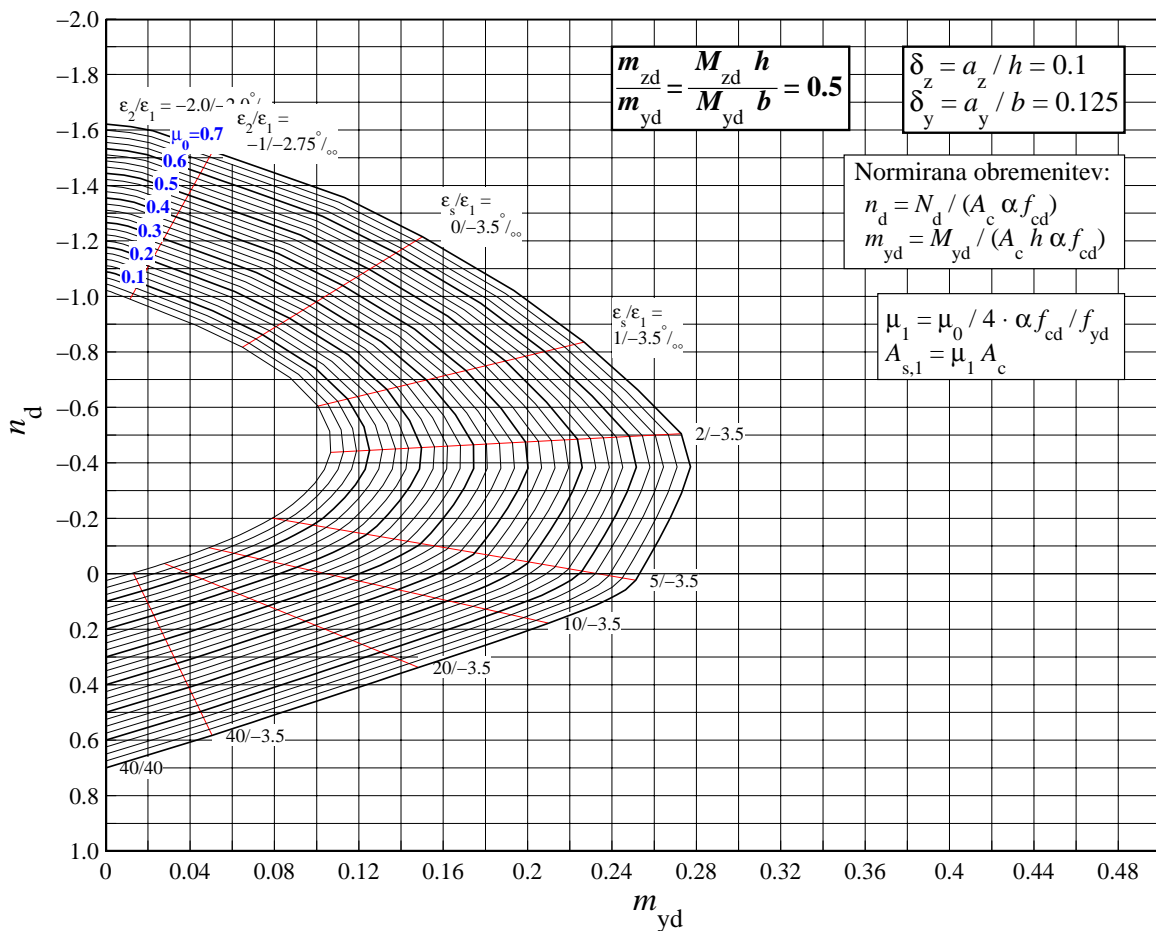
Slika 22: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



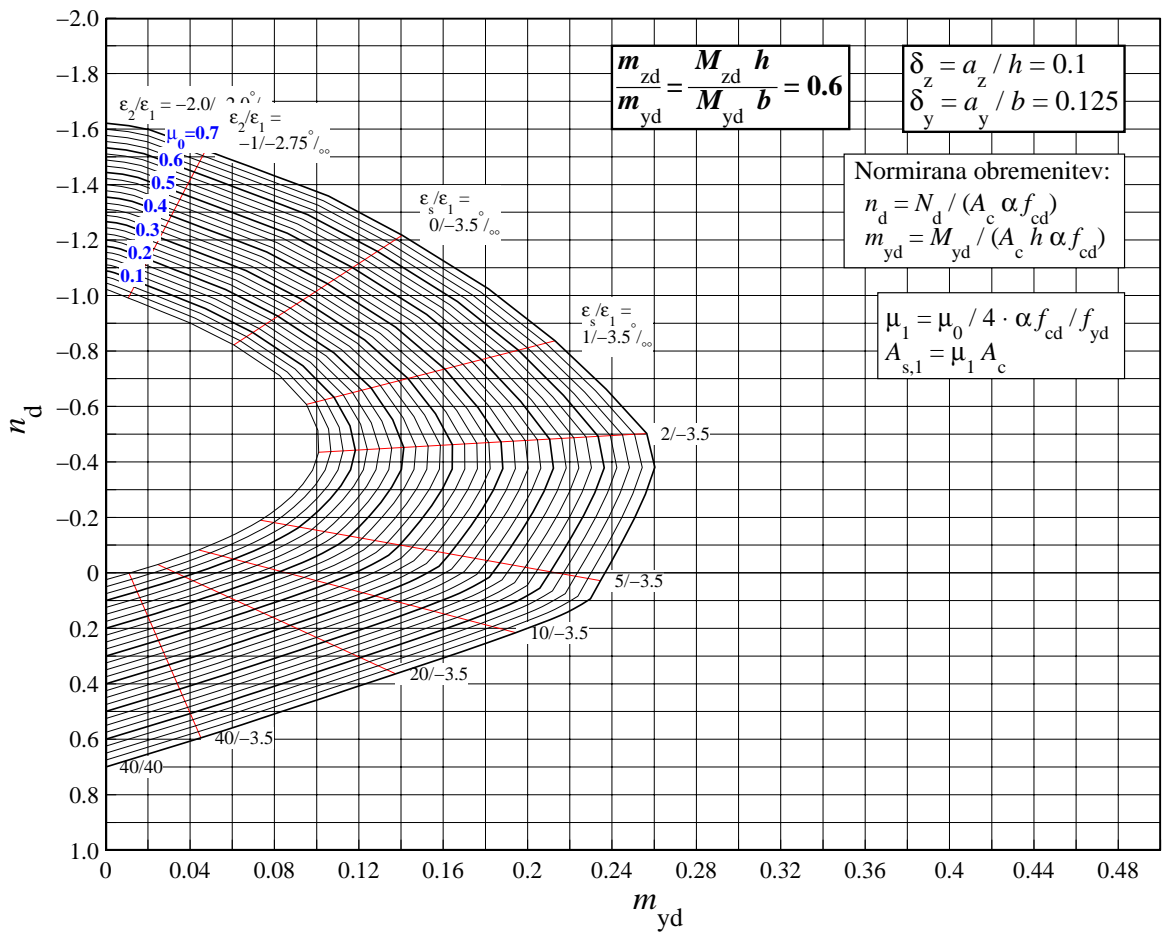
Slika 23: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



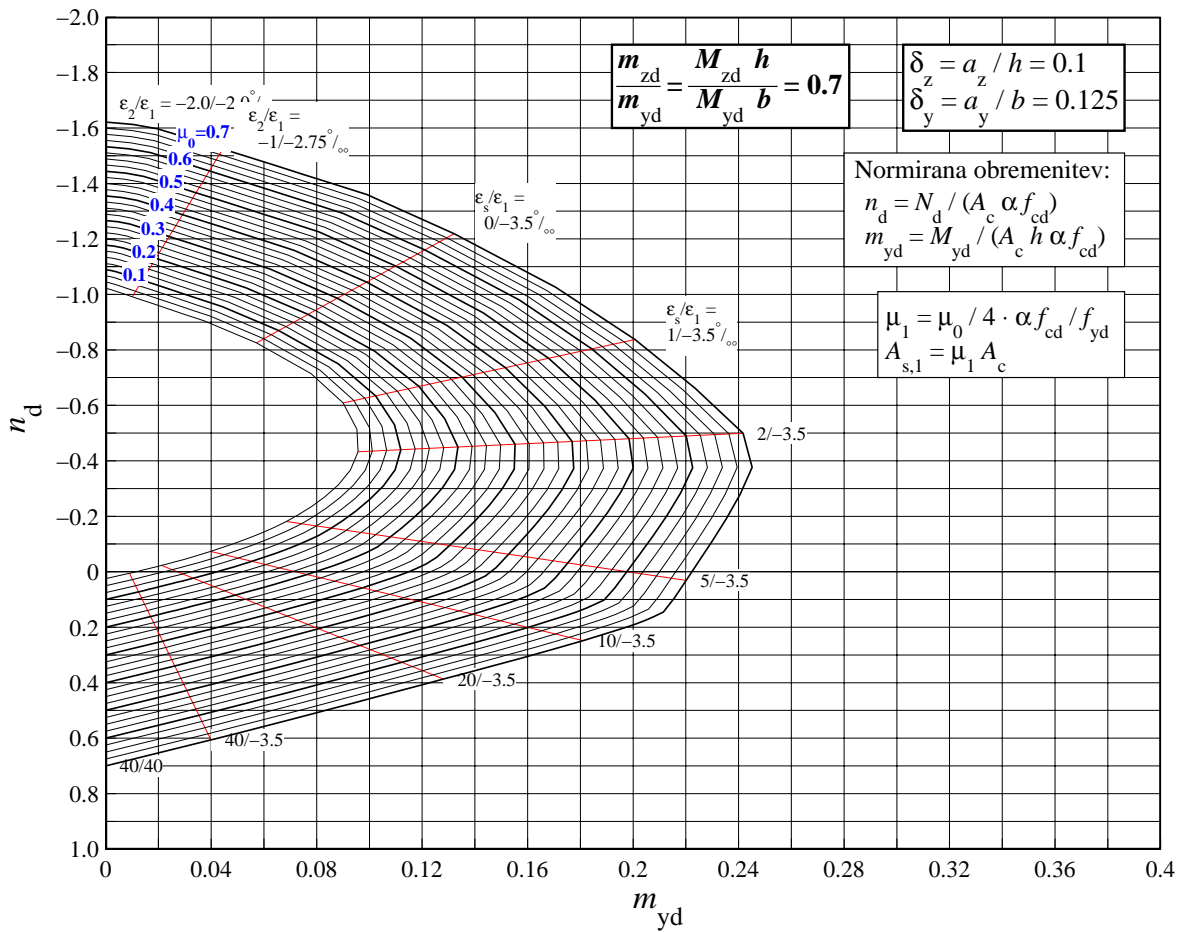
Slika 24: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



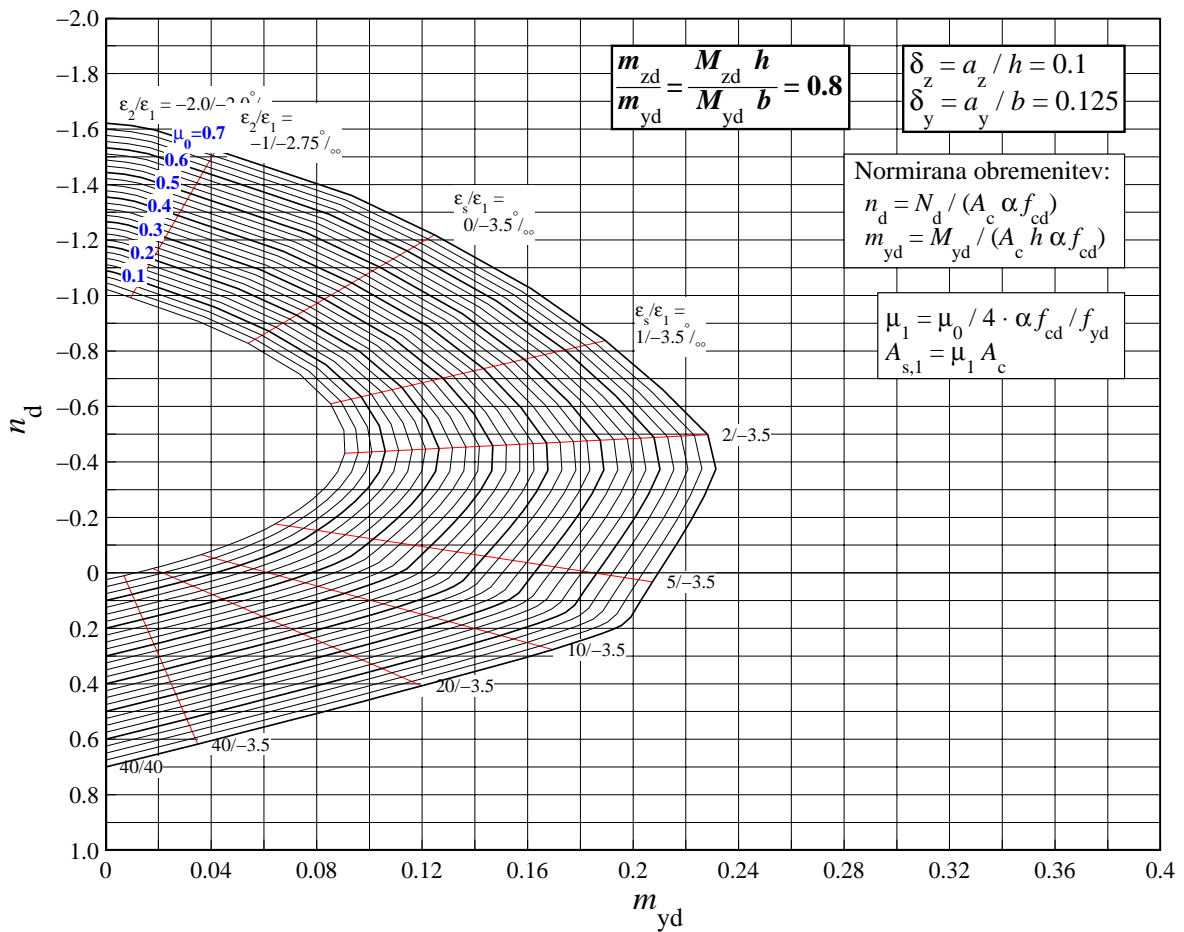
Slika 25: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



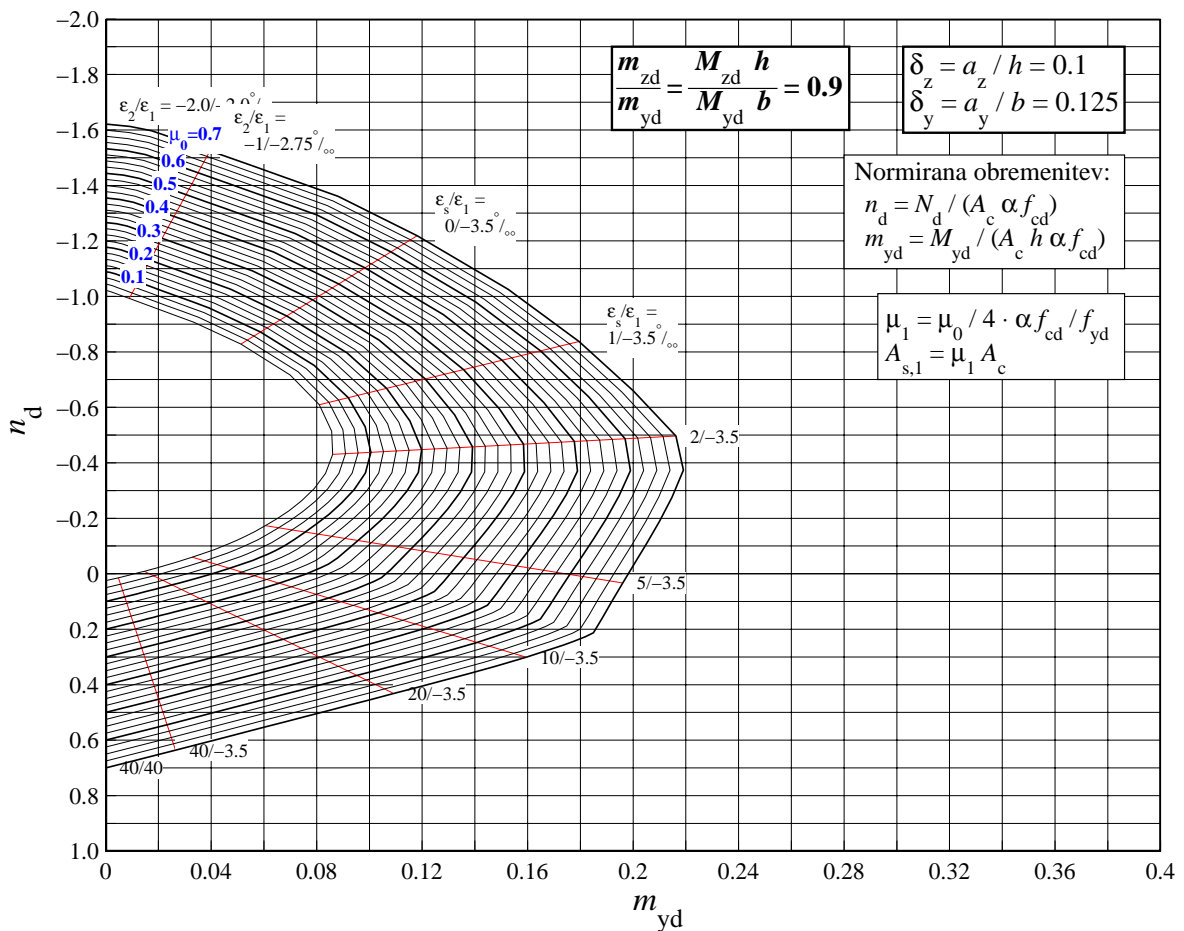
Slika 26: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



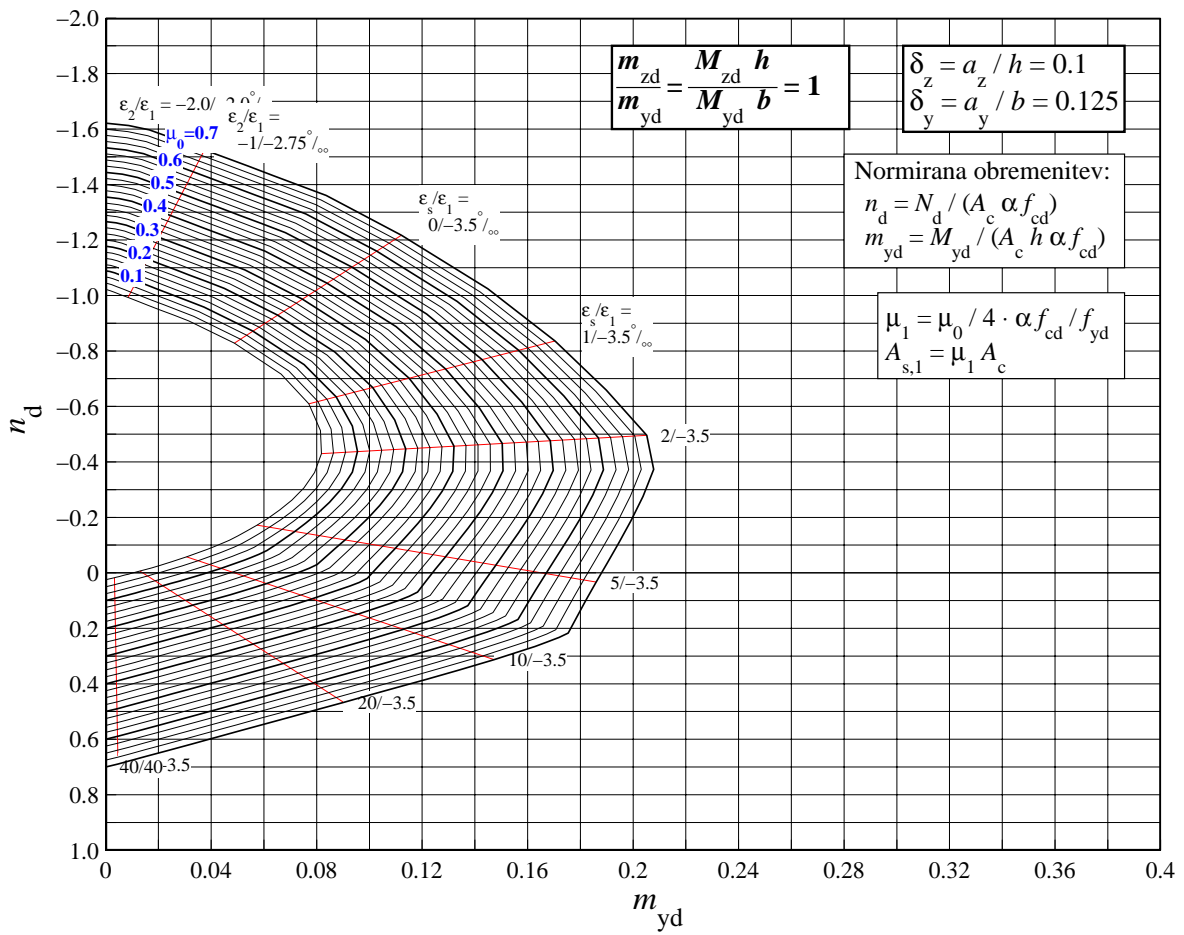
Slika 27: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.



Slika 28: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.

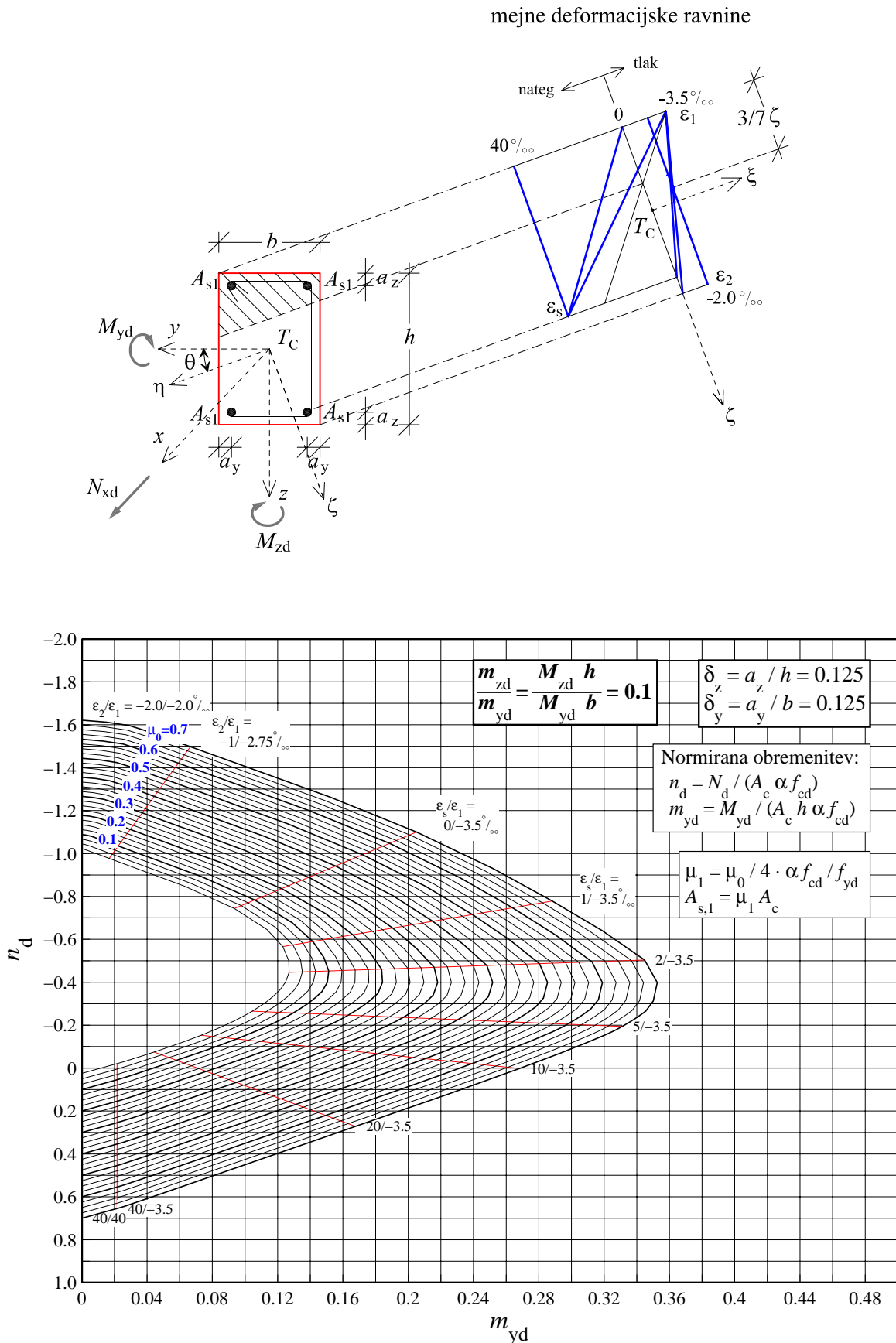


Slika 29: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.

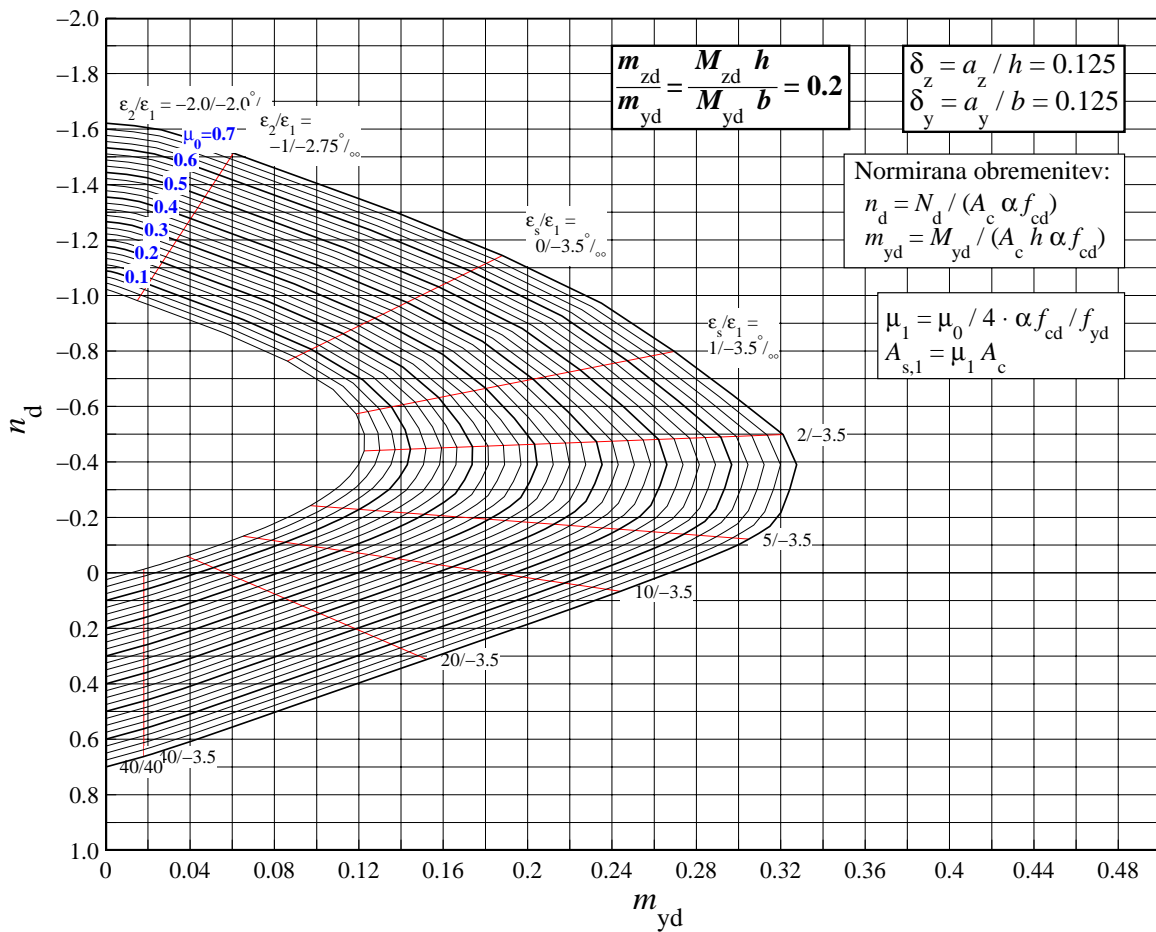


Slika 30: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 4 palice.

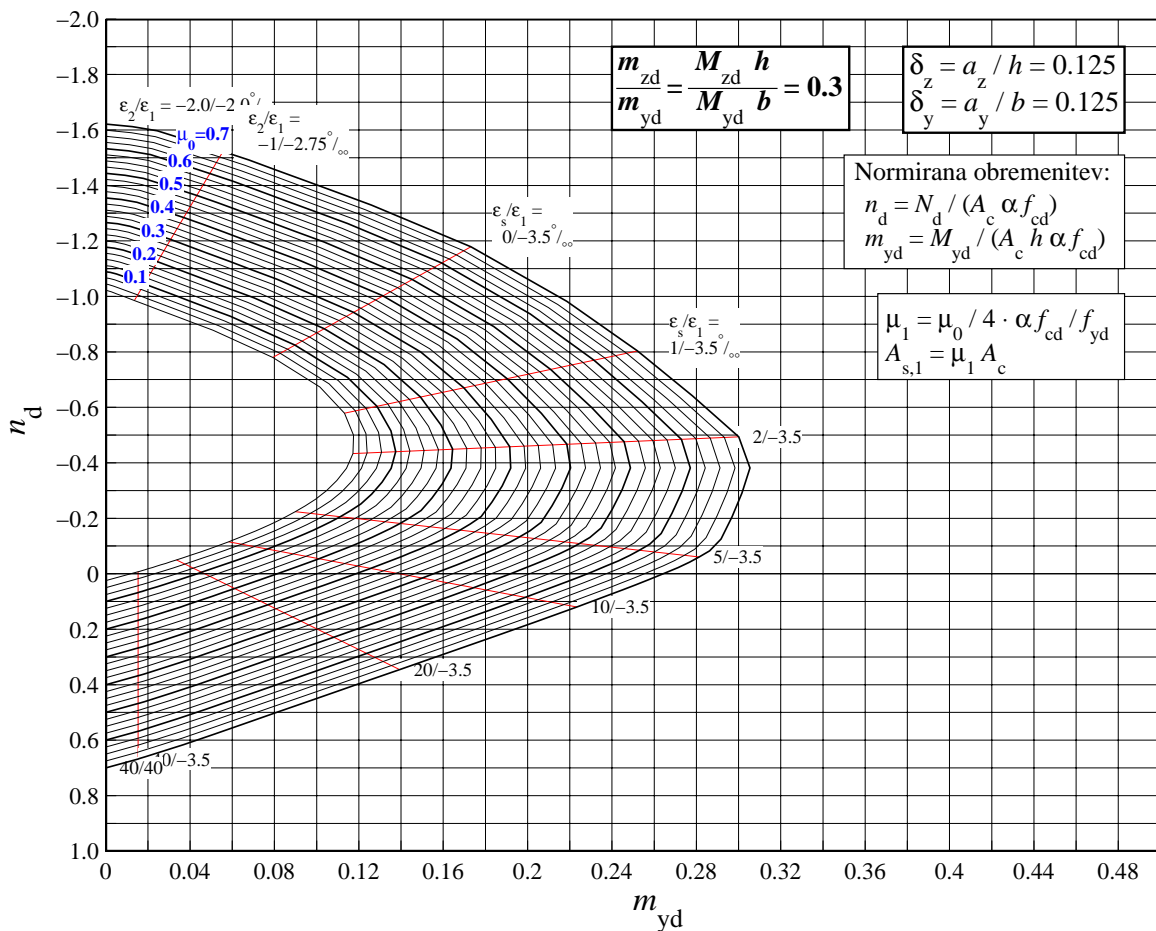
2.4 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.125, \delta_y = 0.125$), S500



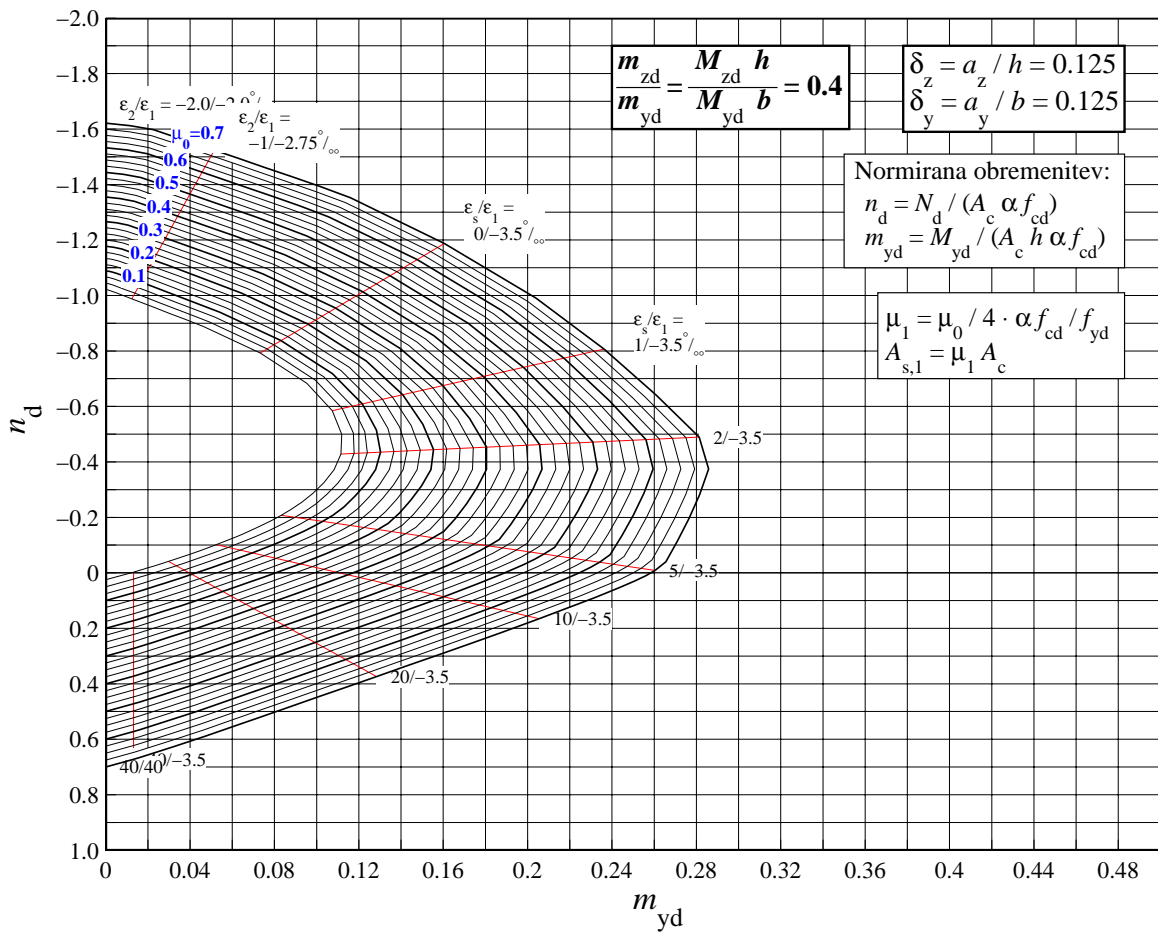
Slika 31: Pravokotni prerez: $\delta_z = 0.125, \delta_y = 0.125$, 4 palice.



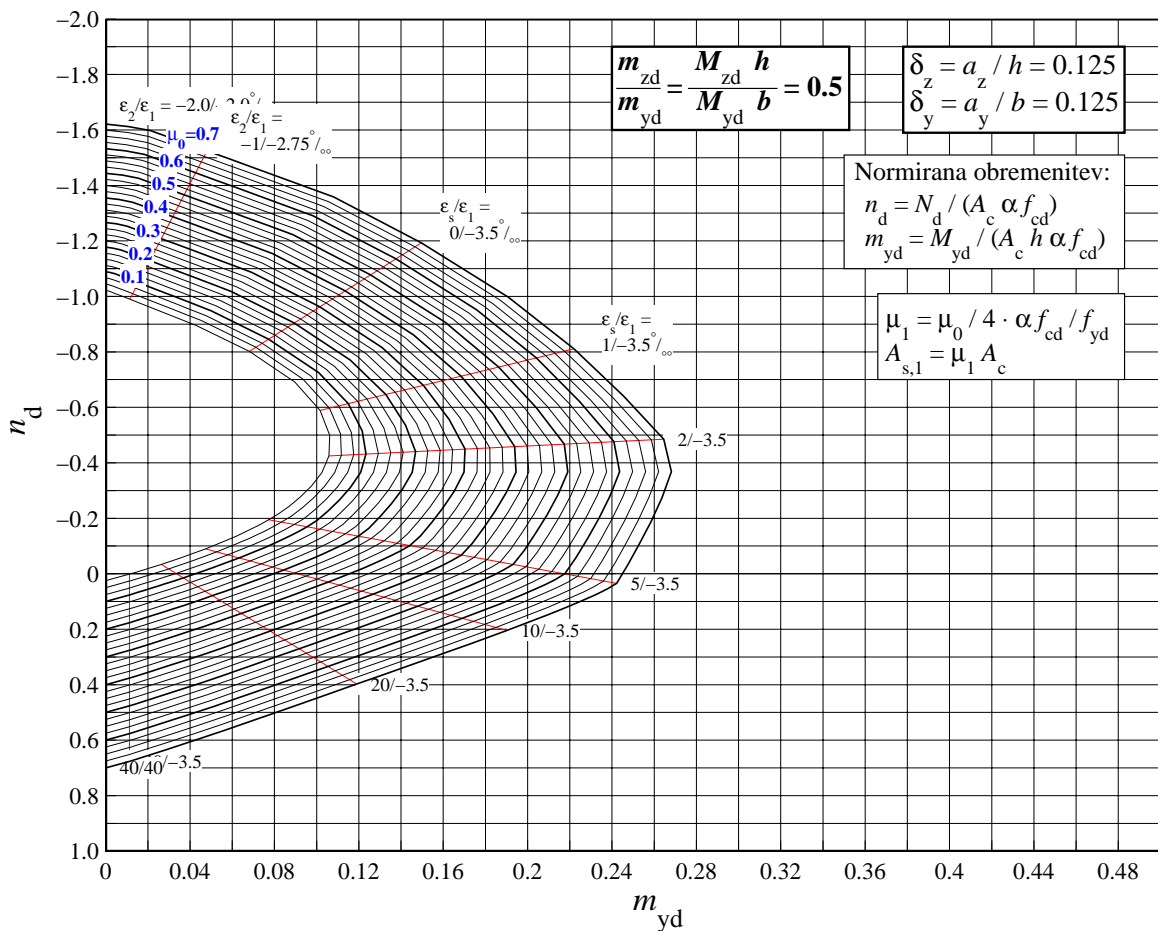
Slika 32: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



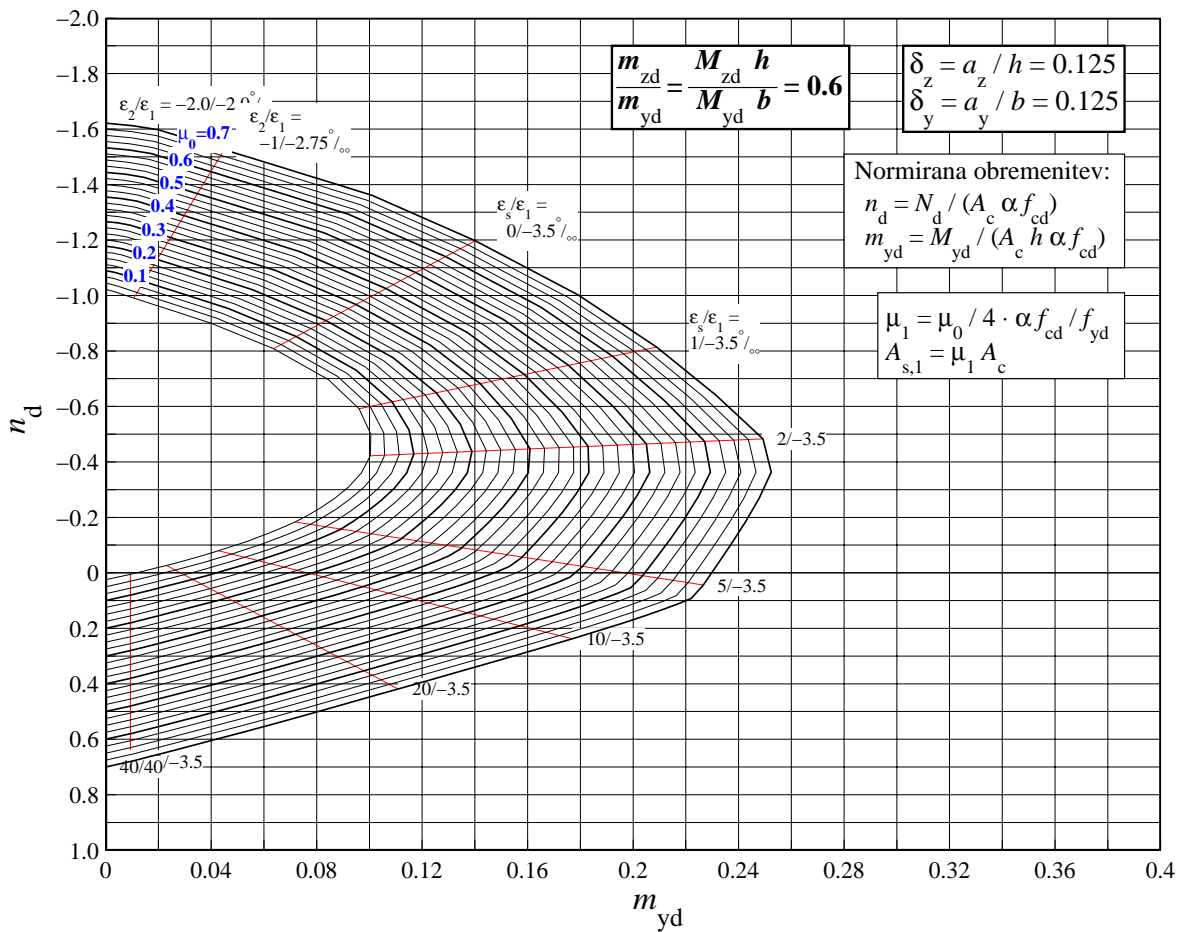
Slika 33: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



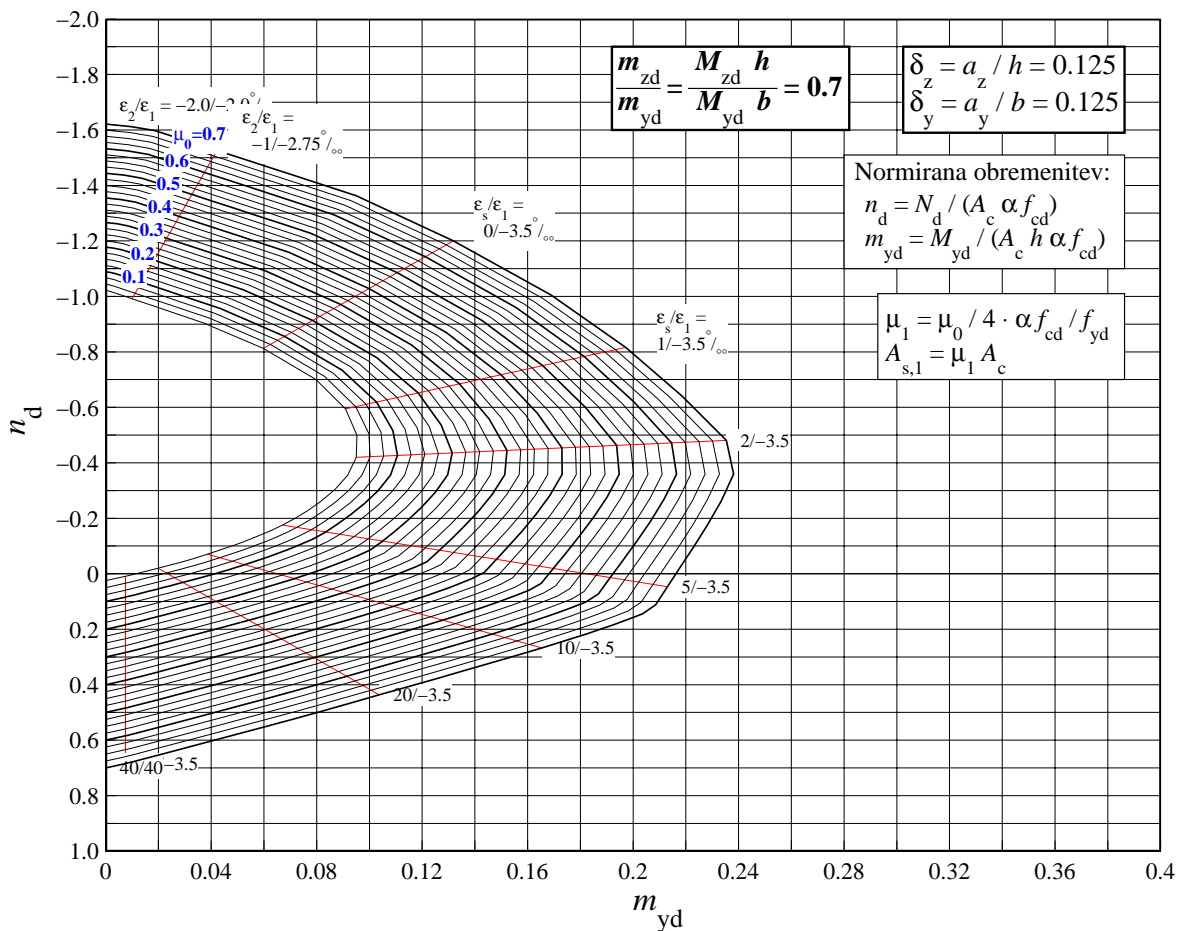
Slika 34: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



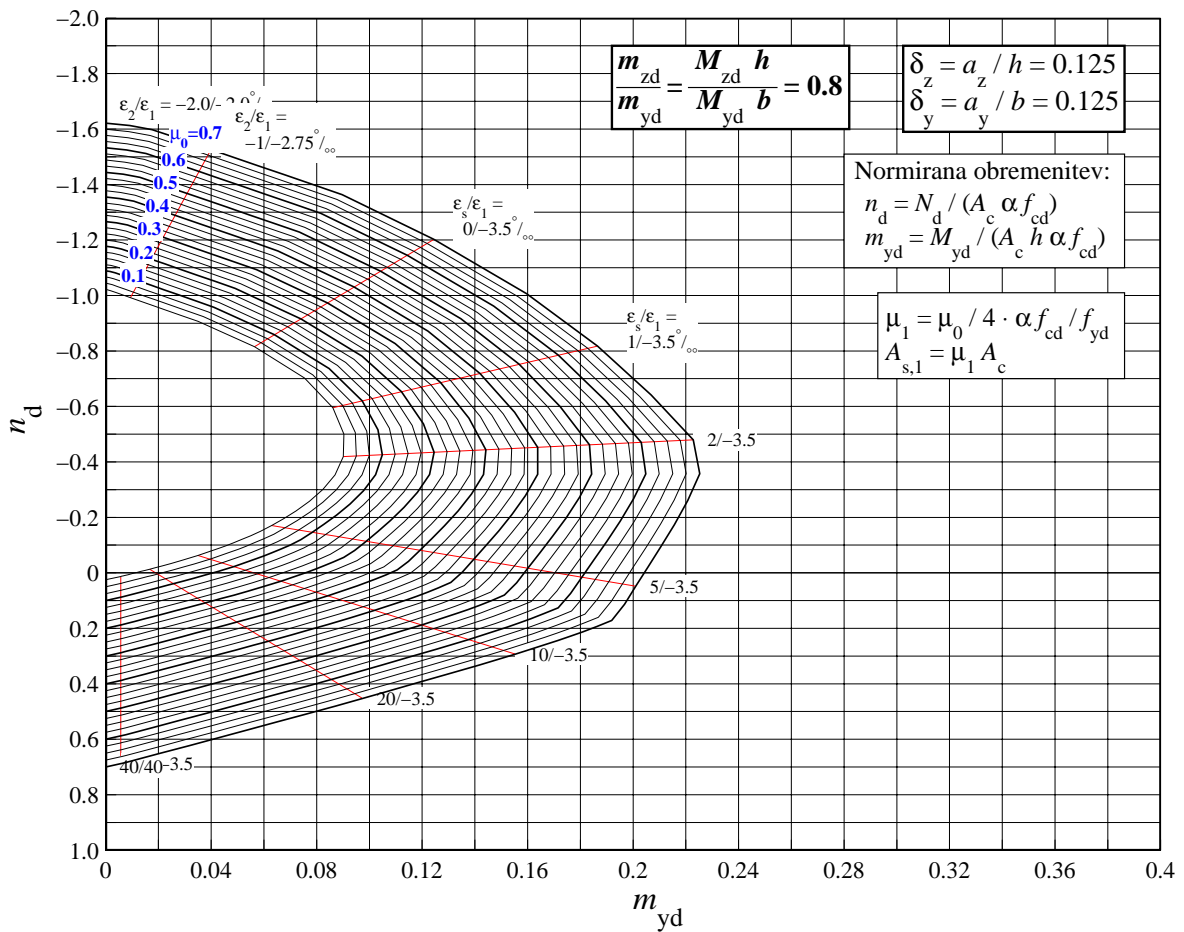
Slika 35: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



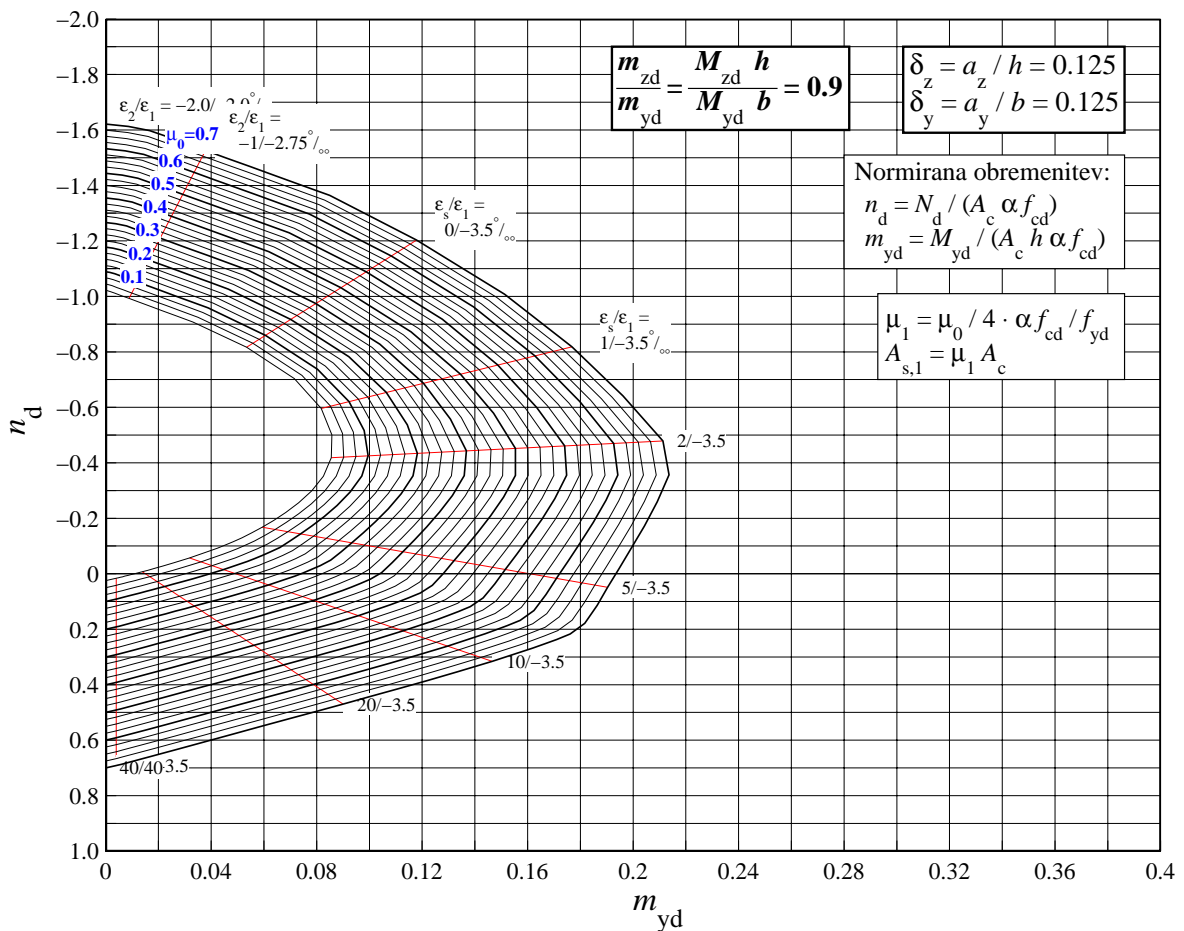
Slika 36: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



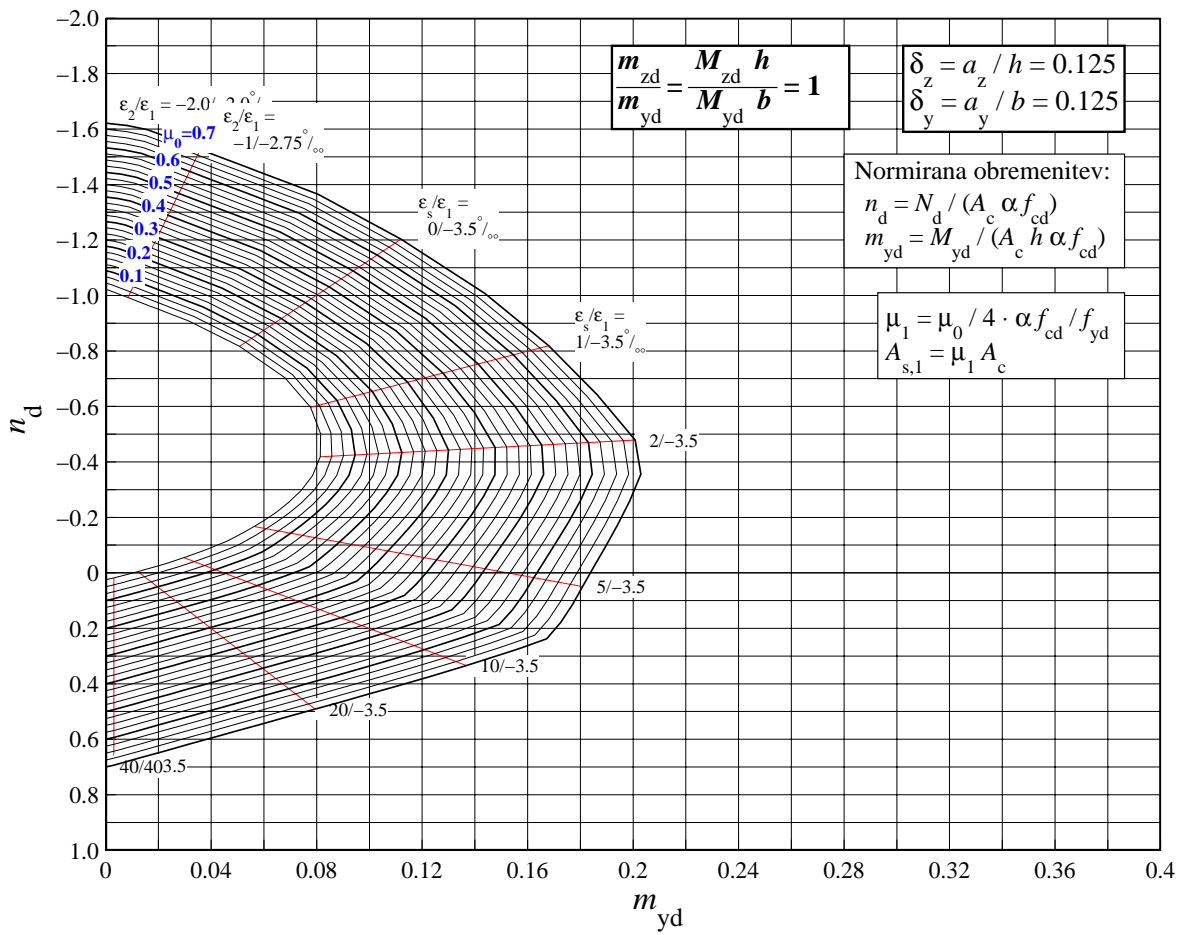
Slika 37: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.



Slika 38: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.

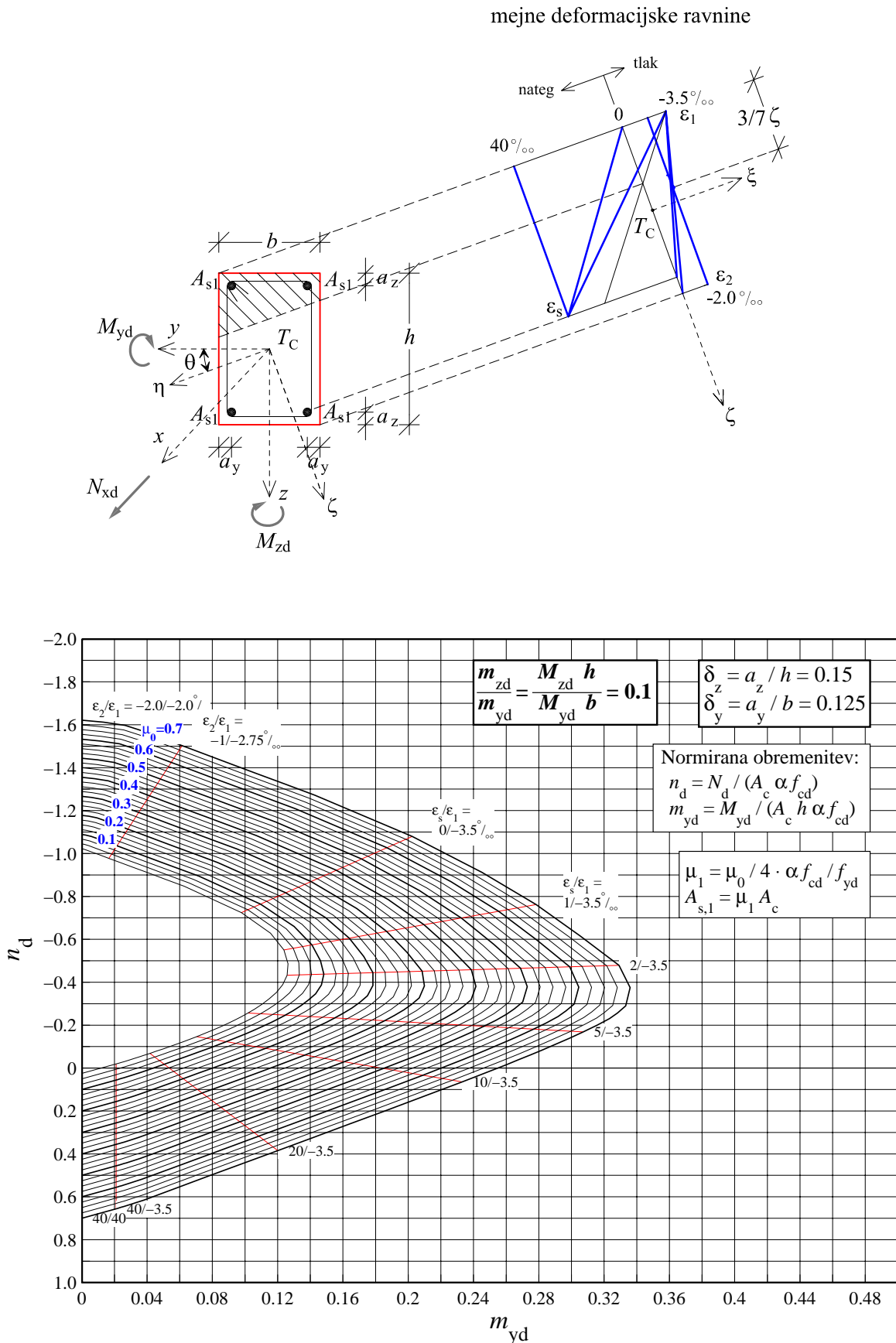


Slika 39: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.

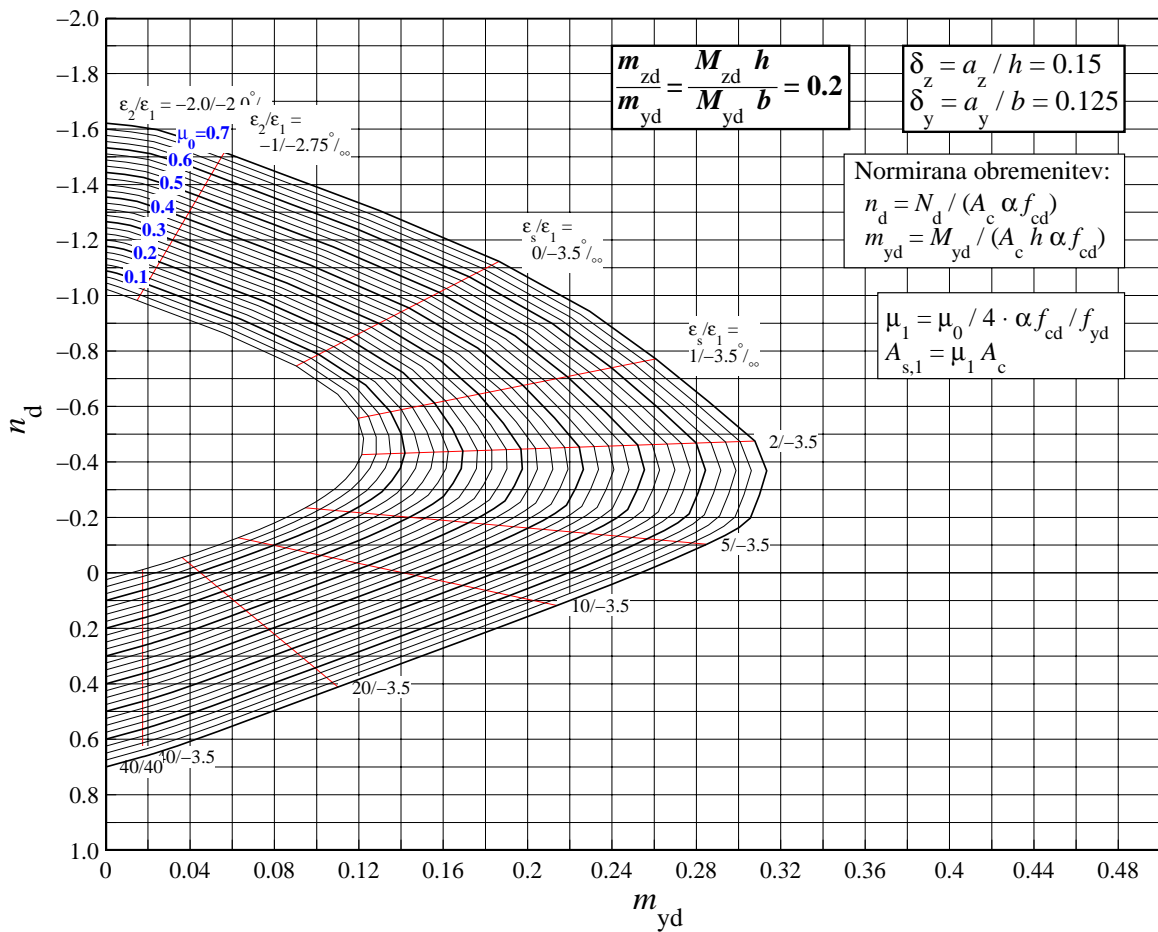


Slika 40: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 4 palice.

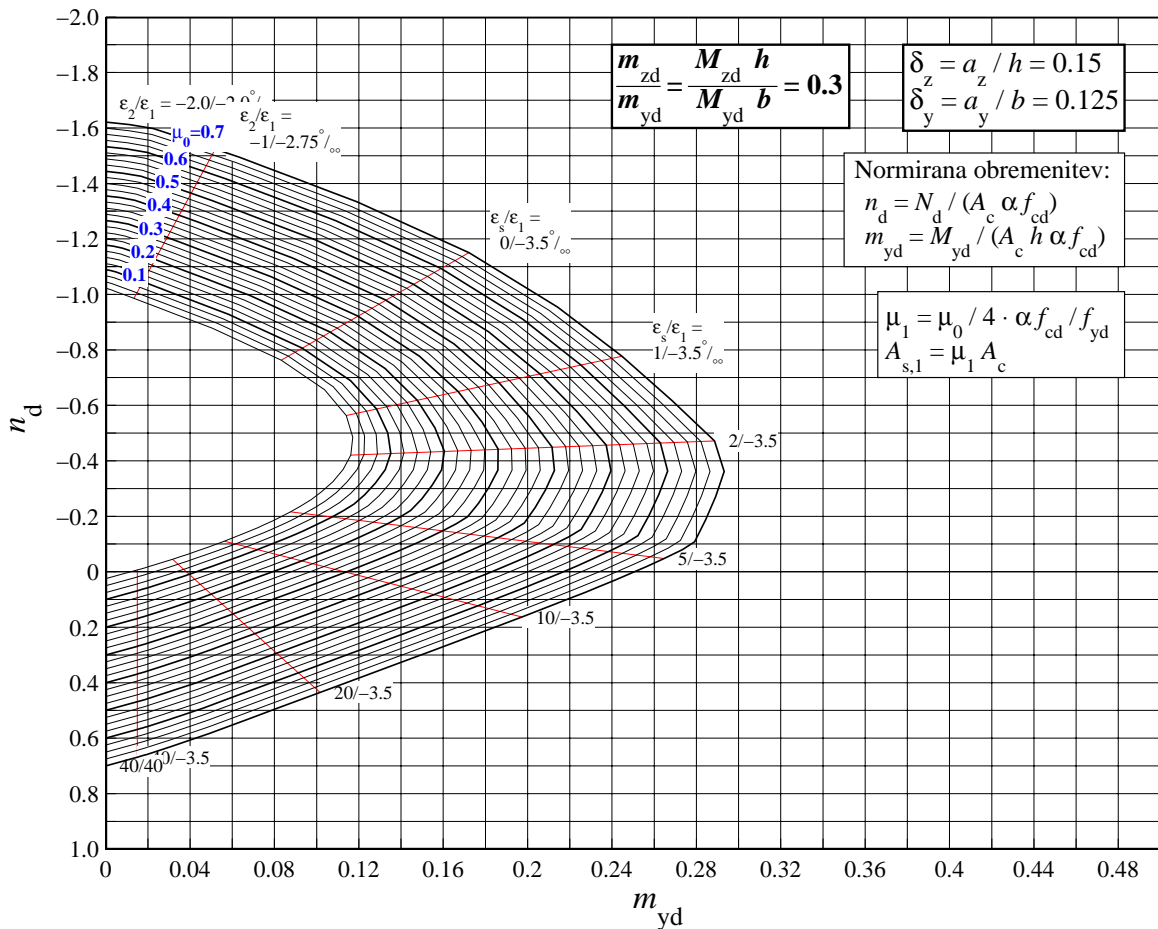
2.5 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.15, \delta_y = 0.125$), S500



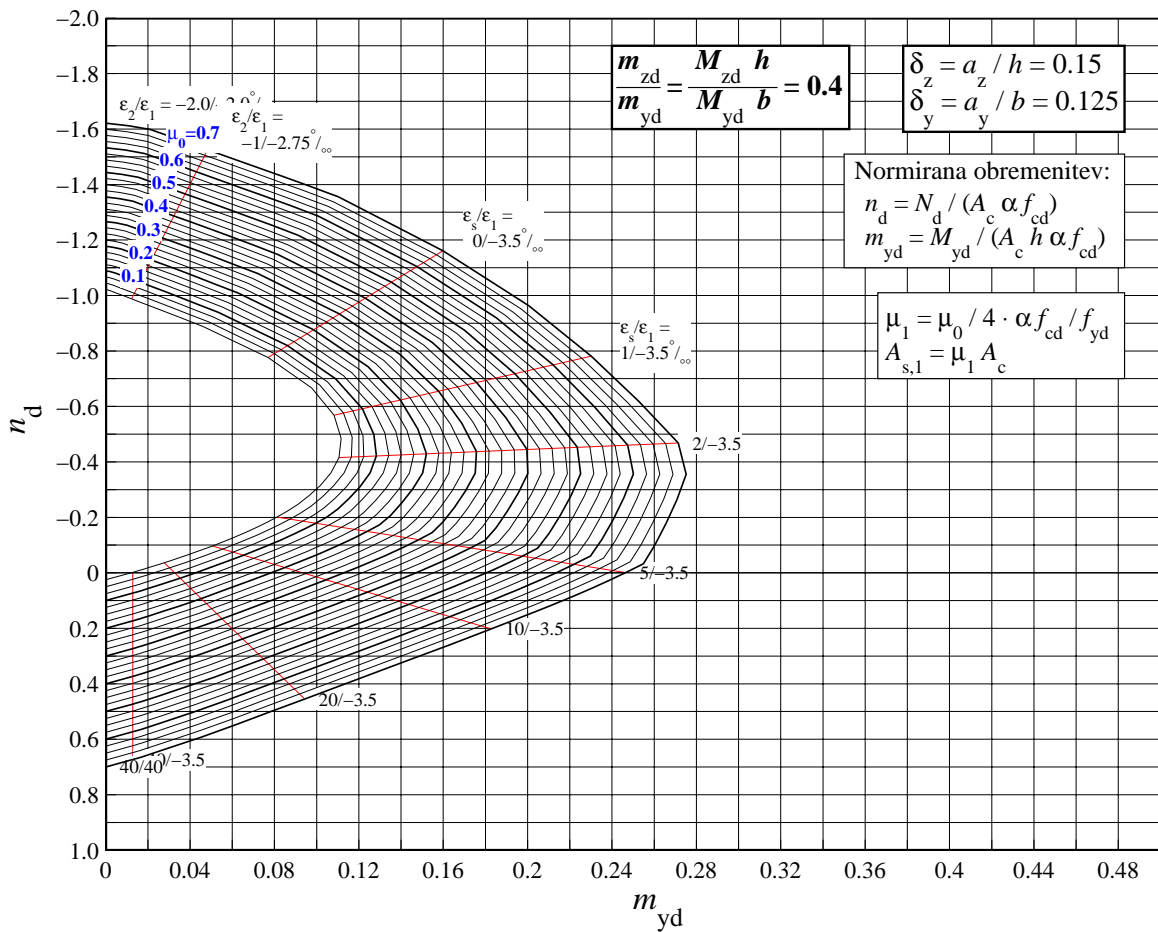
Slika 41: Pravokotni prerez: $\delta_z = 0.15, \delta_y = 0.125$, 4 palice.



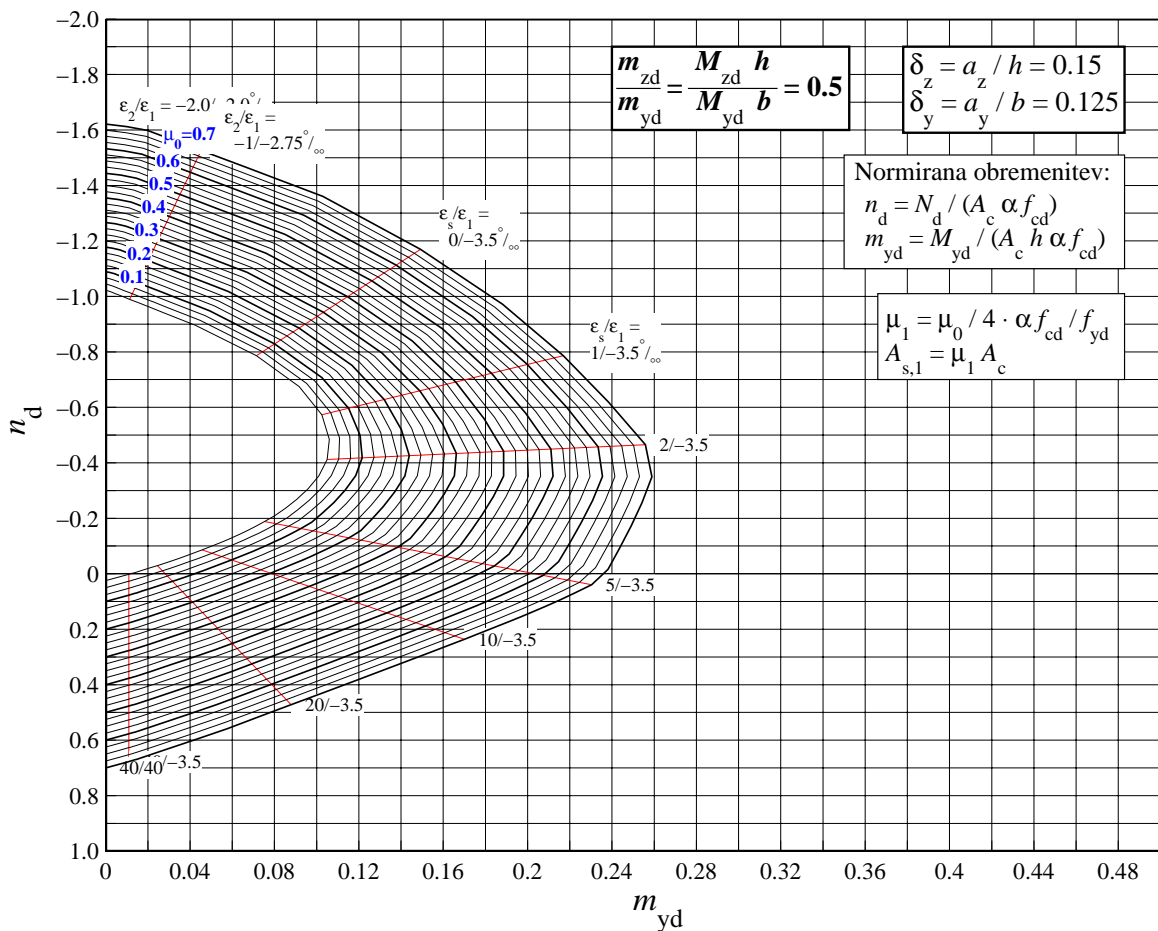
Slika 42: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



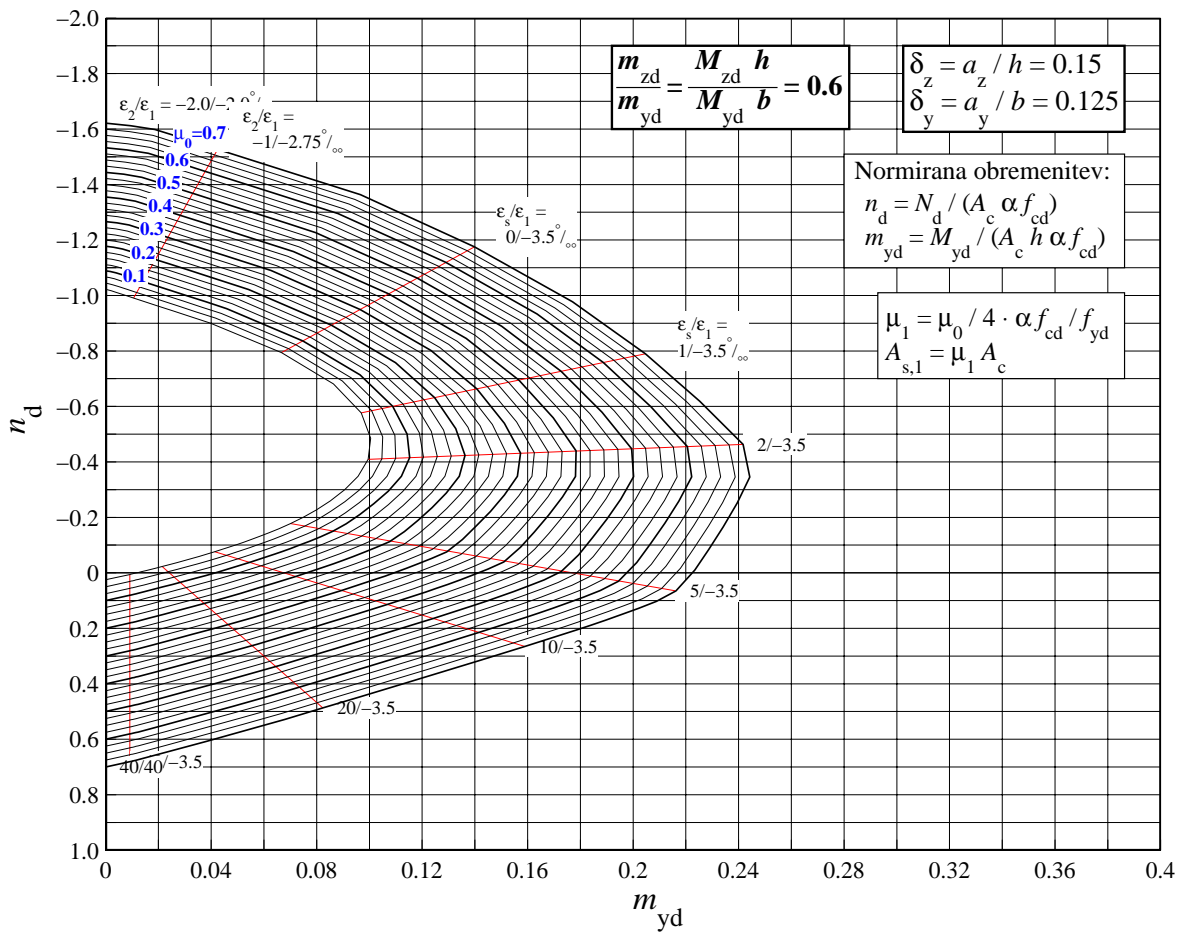
Slika 43: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



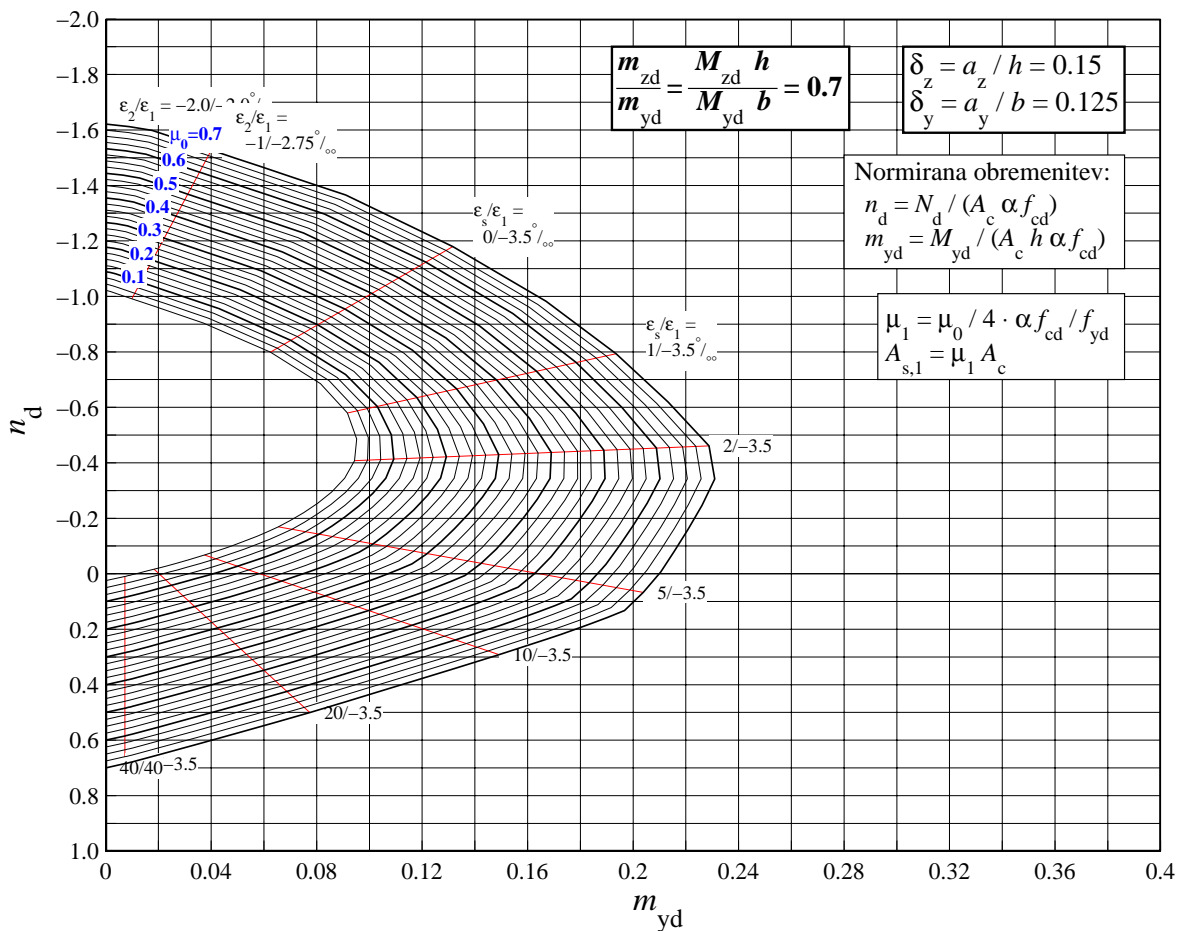
Slika 44: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



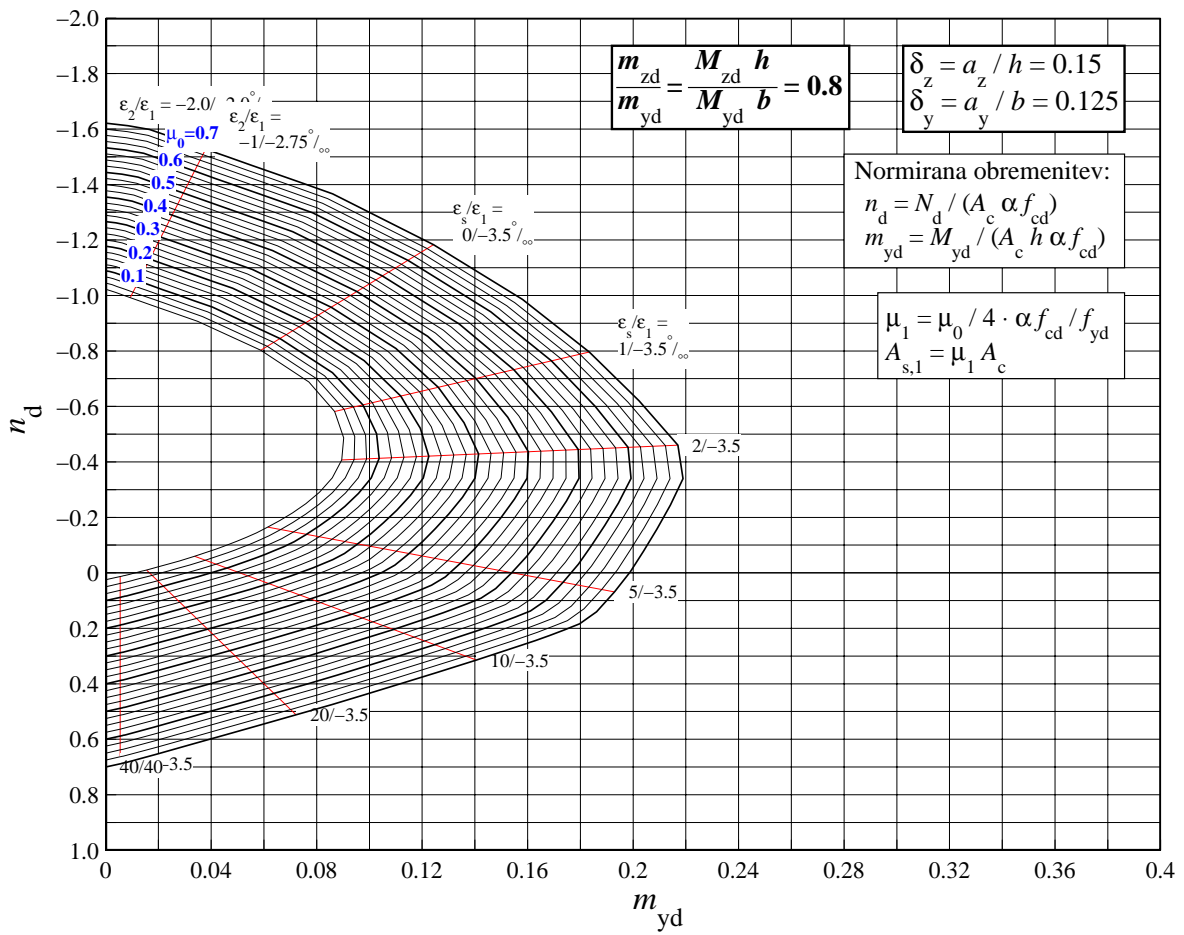
Slika 45: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



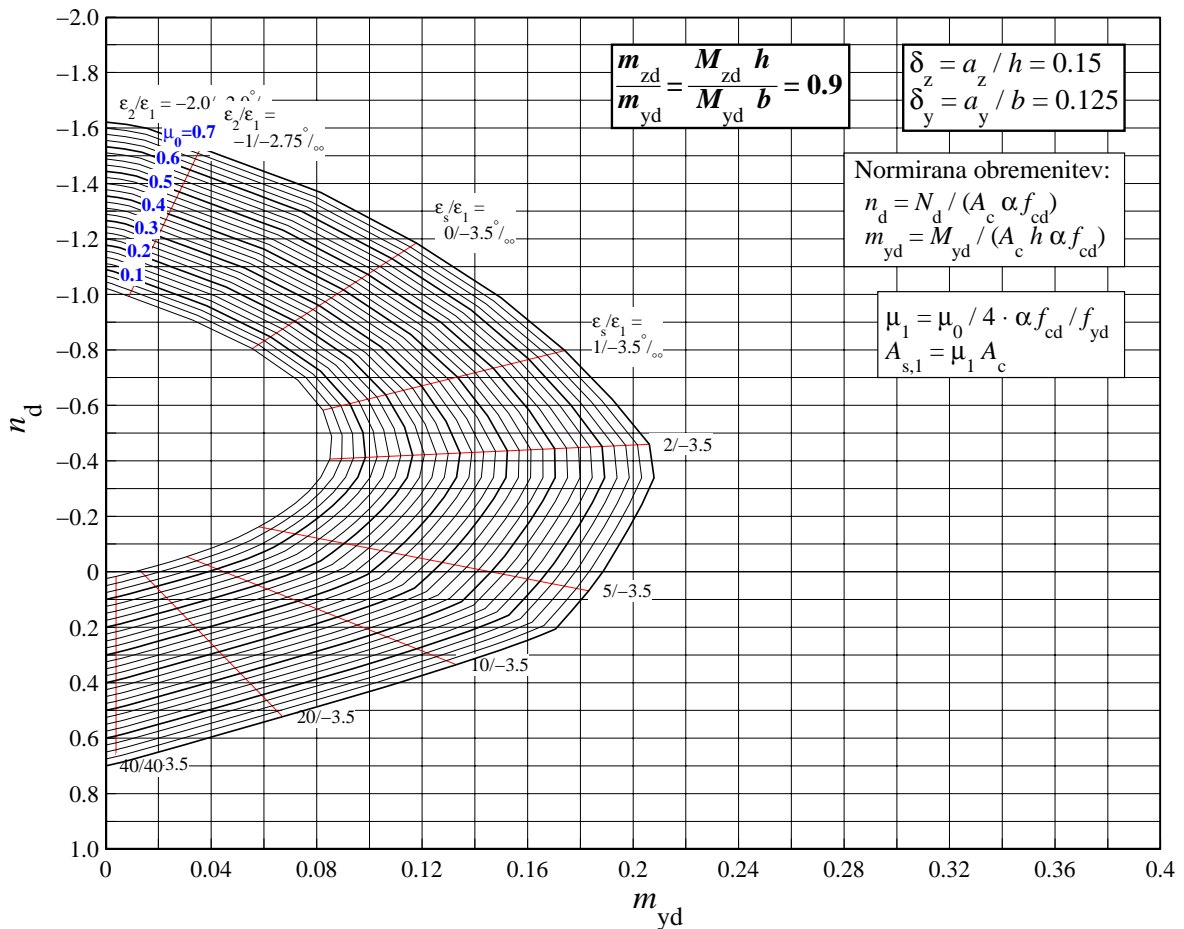
Slika 46: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



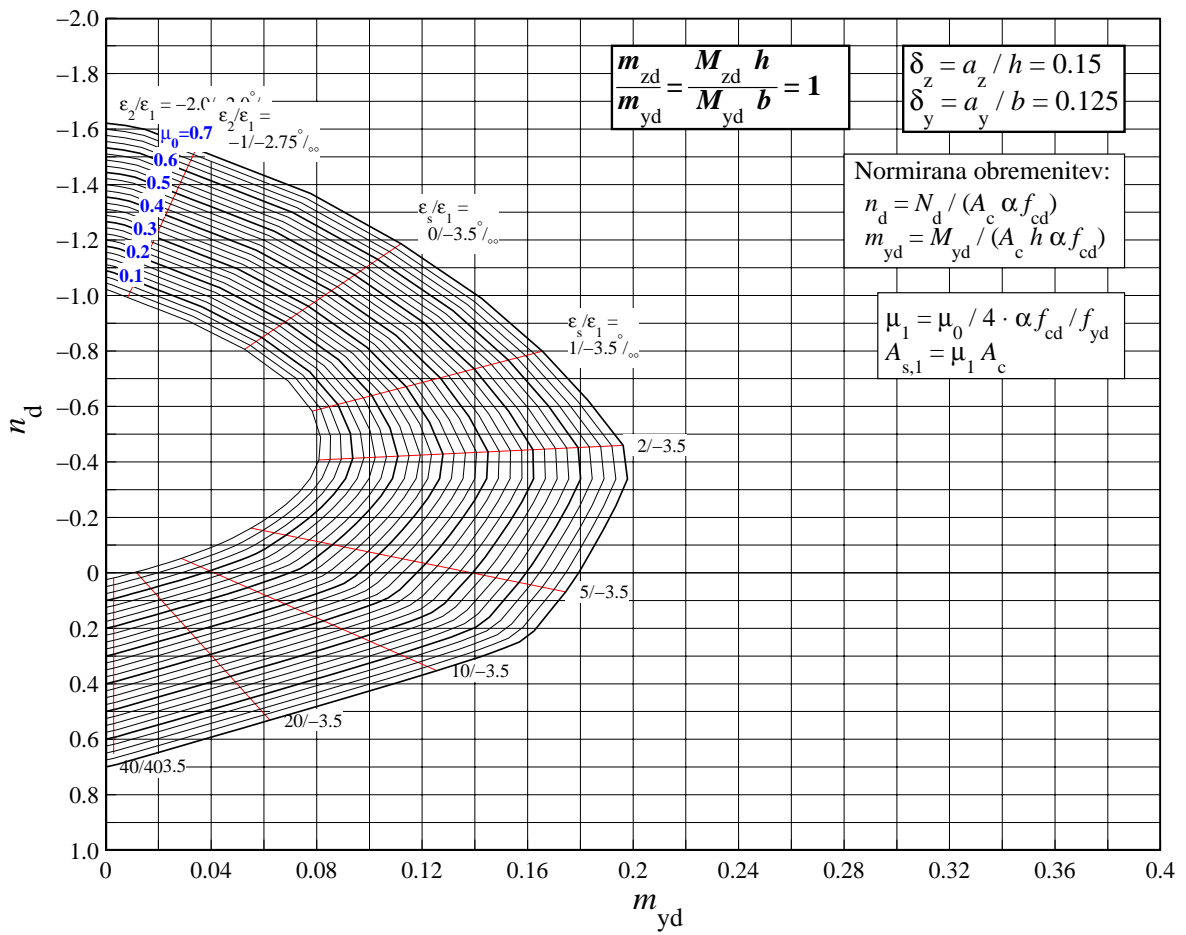
Slika 47: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.



Slika 48: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.

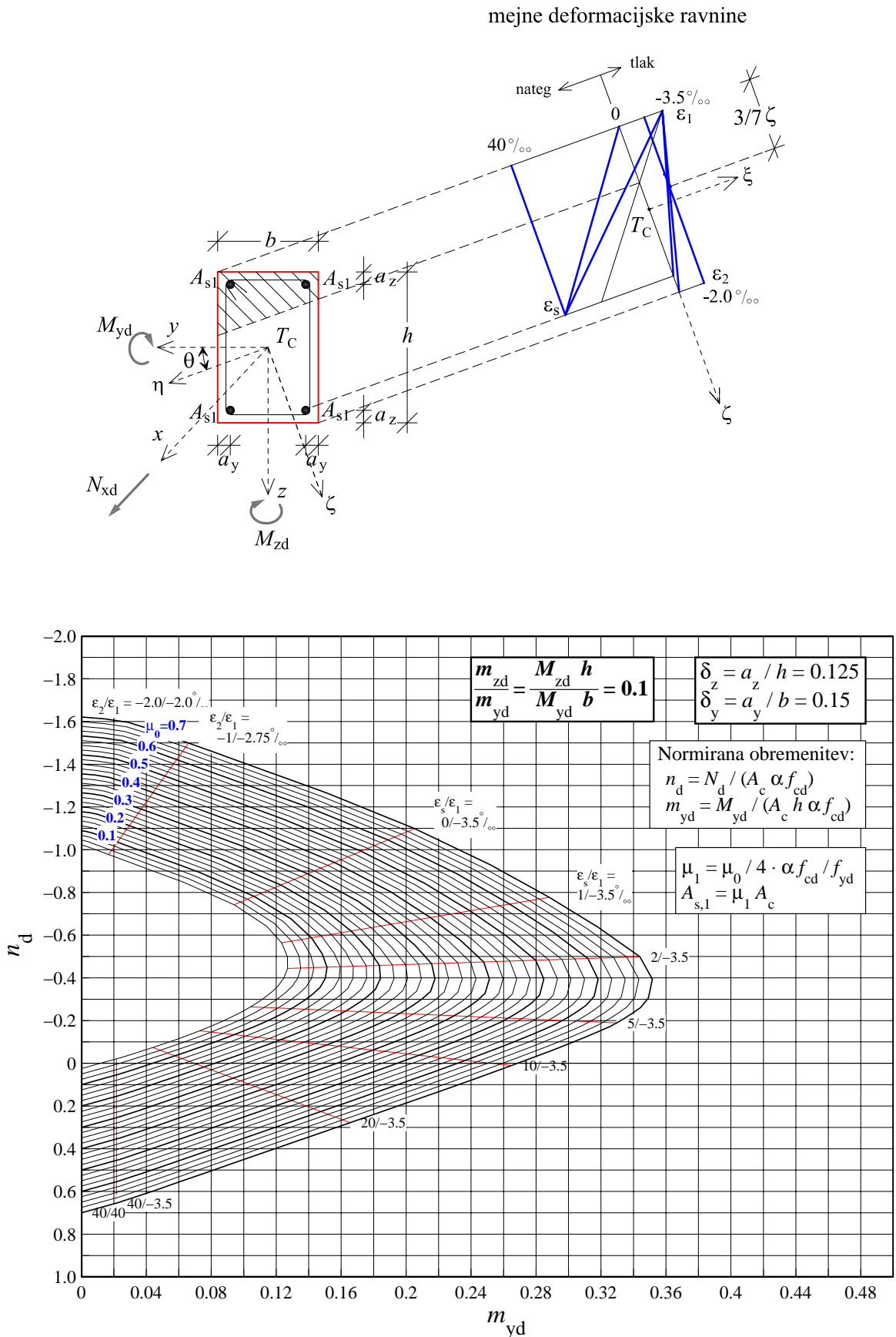


Slika 49: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.

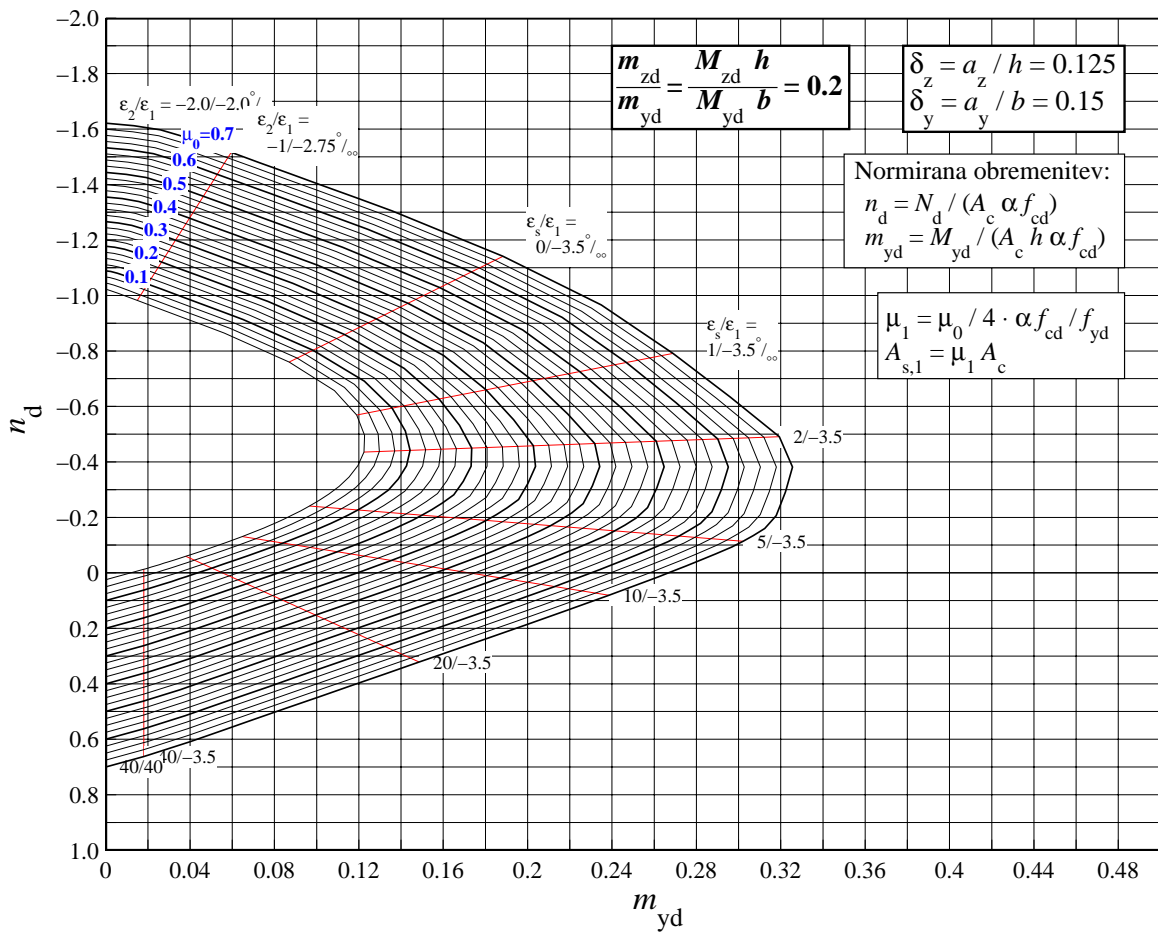


Slika 50: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.125$, 4 palice.

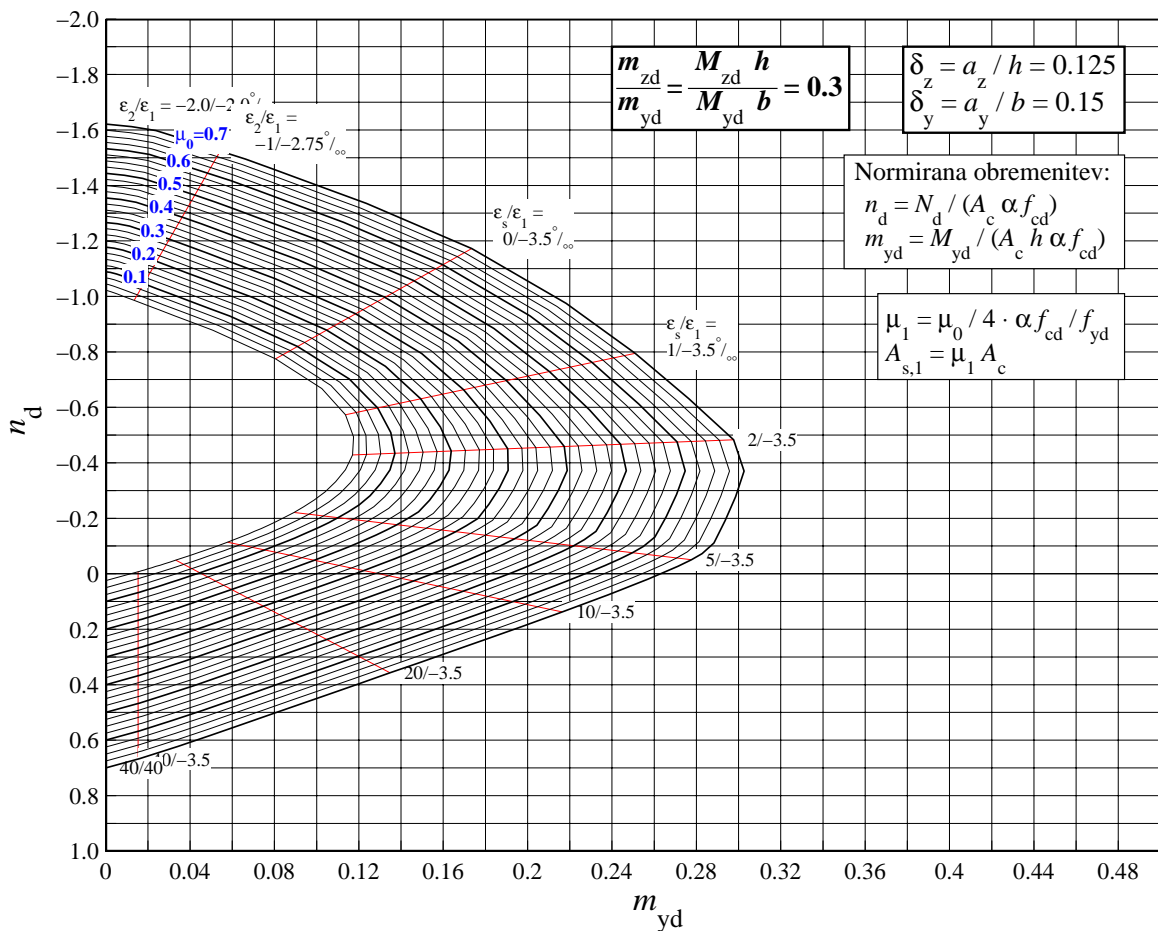
2.6 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.125, \delta_y = 0.15$), S500



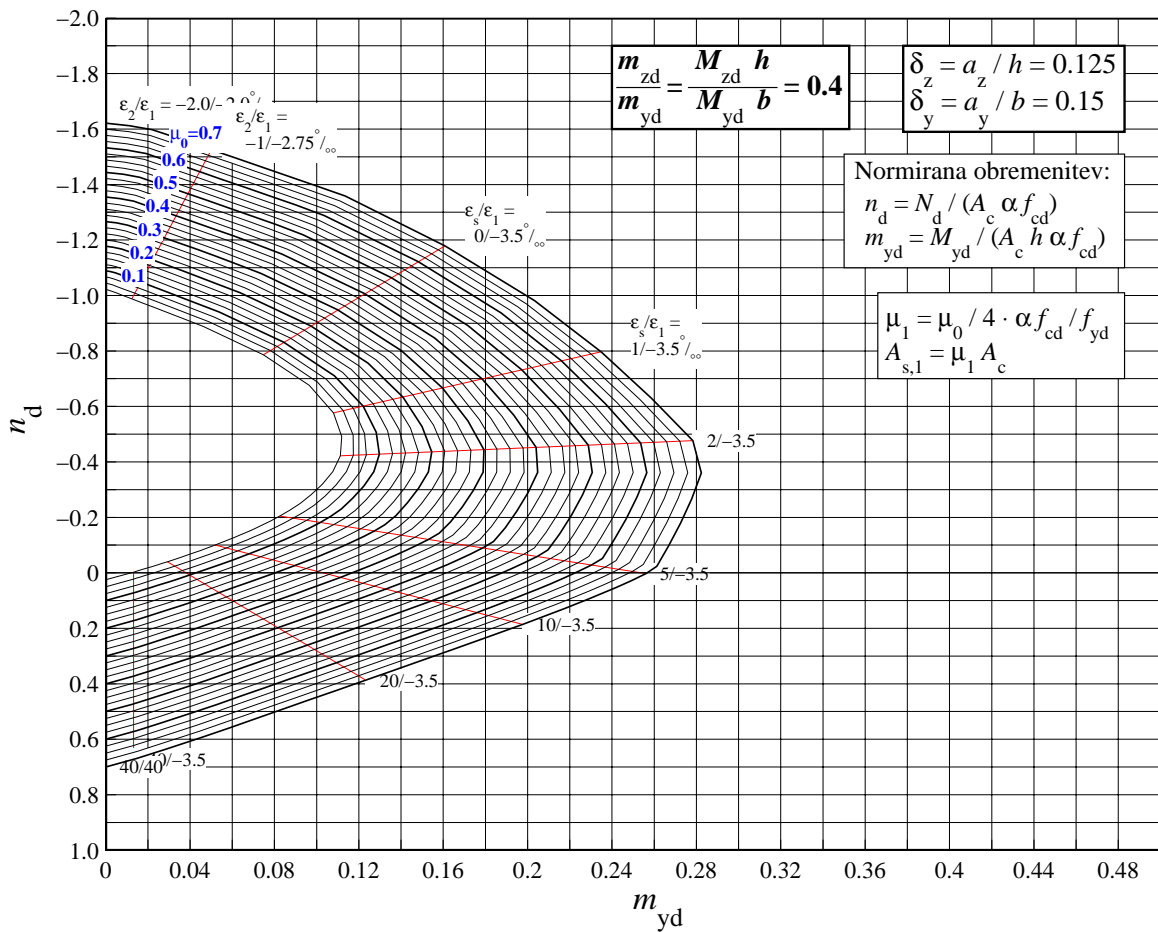
Slika 51: Pravokotni prerez: $\delta_z = 0.125, \delta_y = 0.15$, 4 palice.



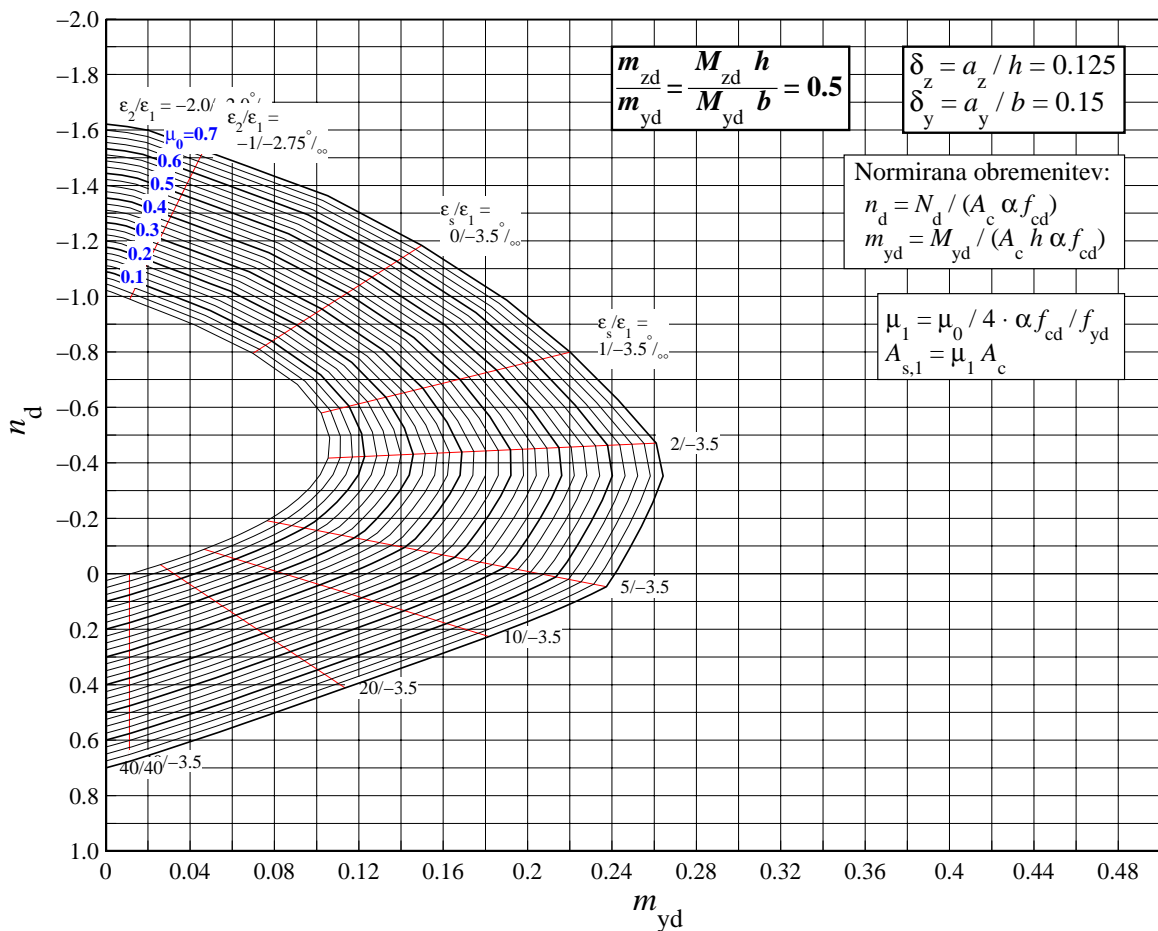
Slika 52: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



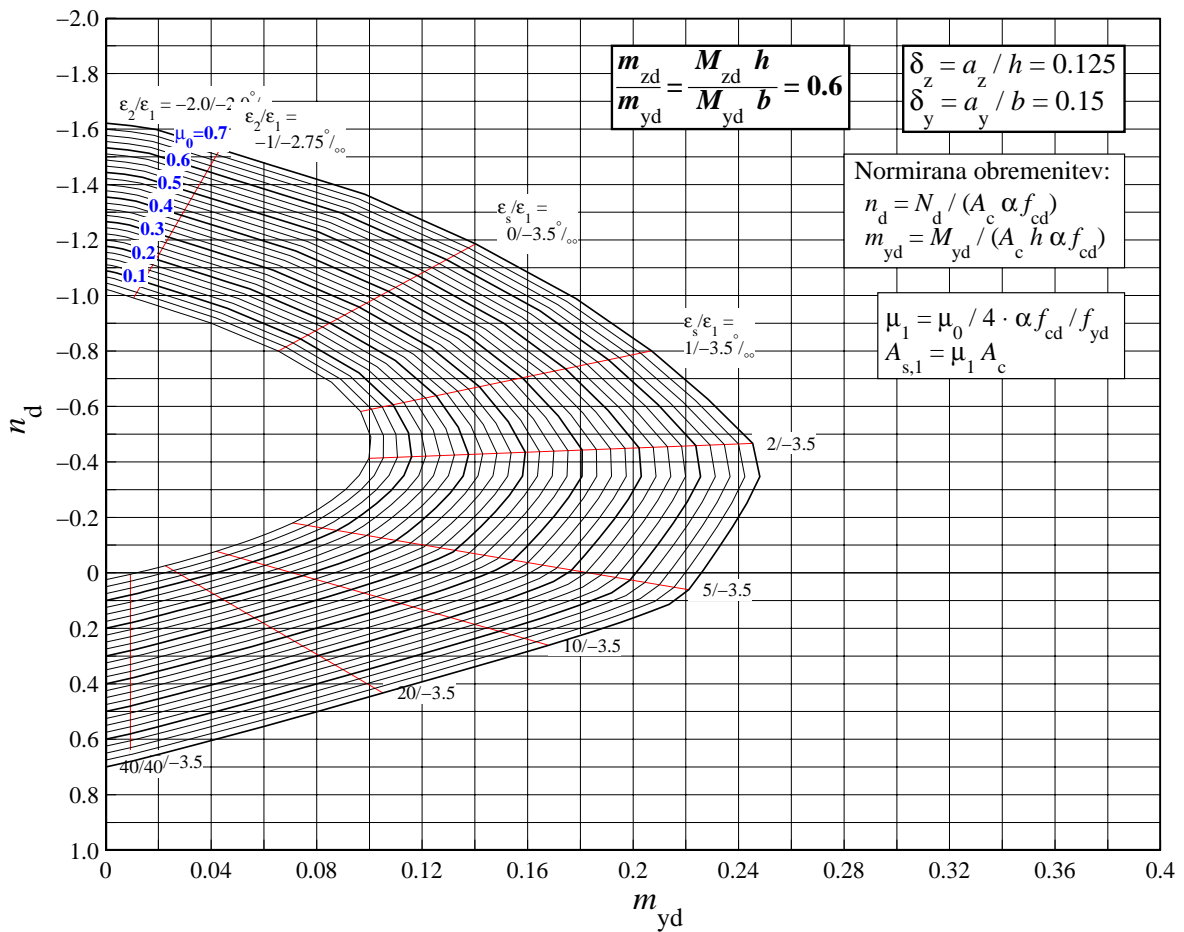
Slika 53: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



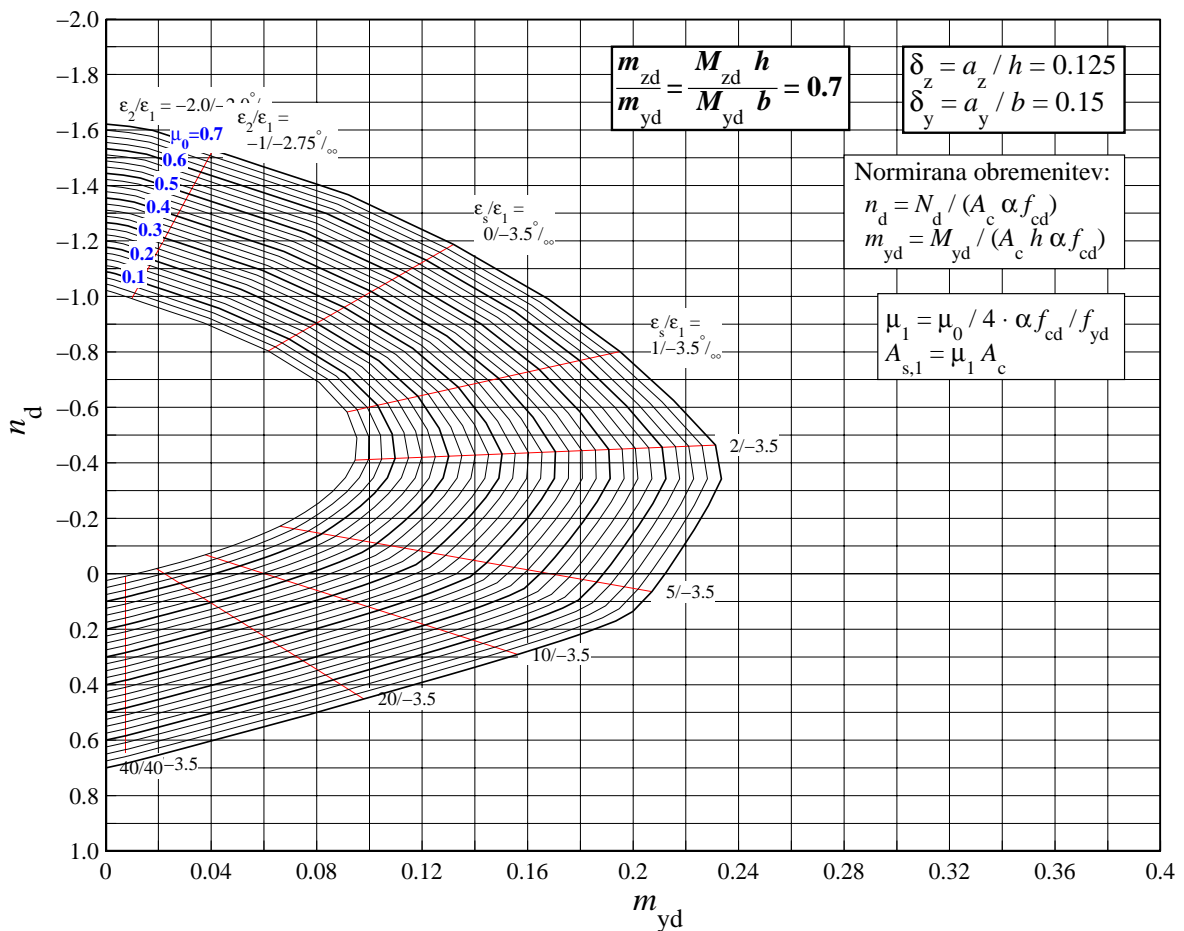
Slika 54: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



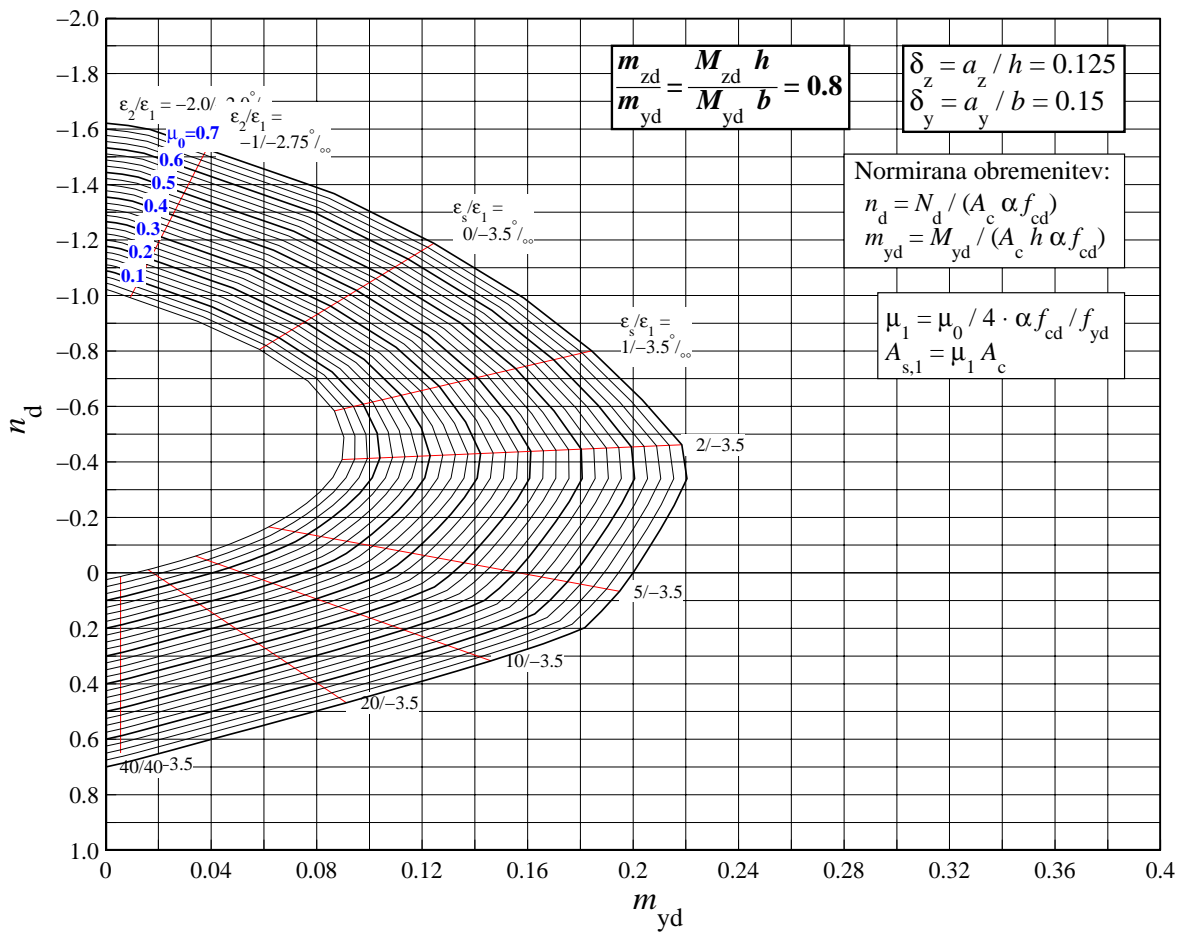
Slika 55: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



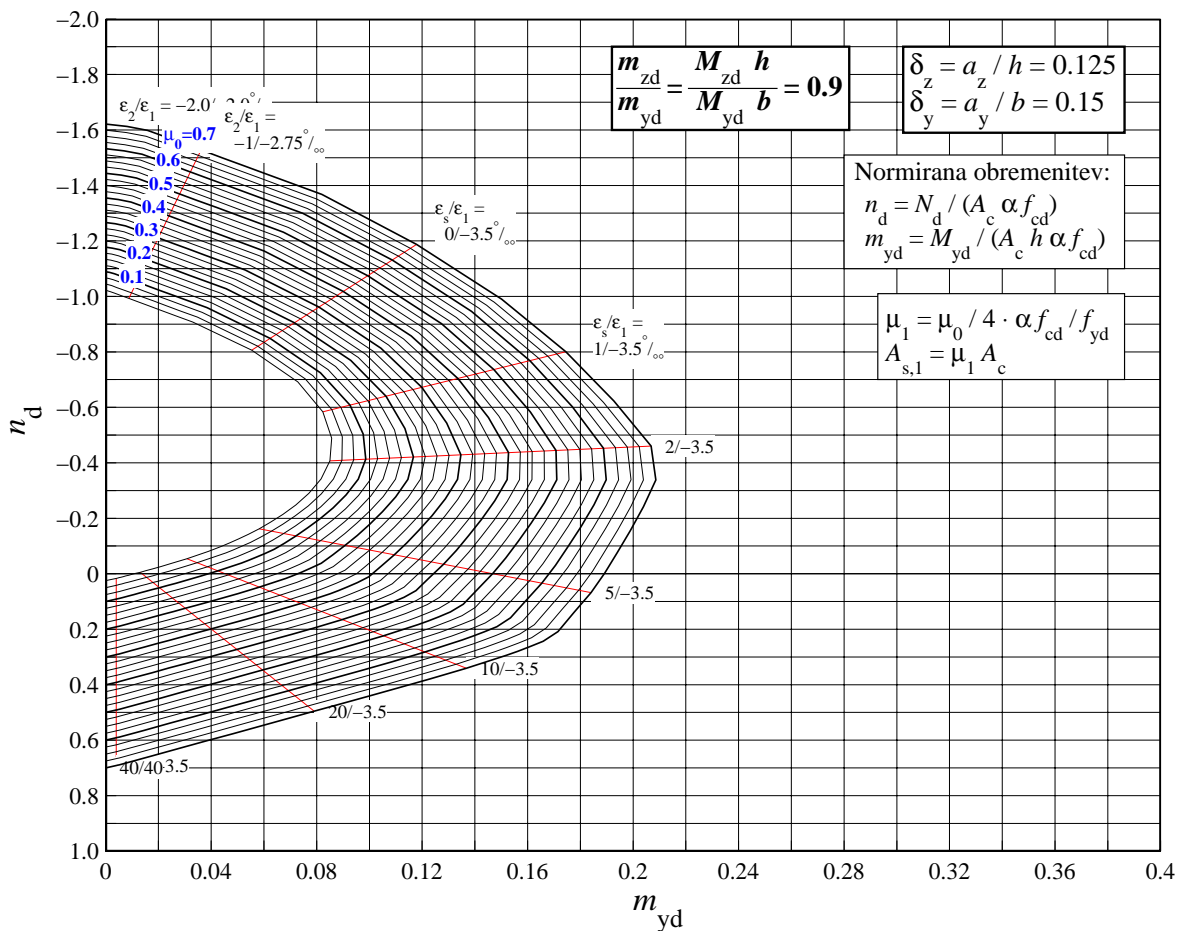
Slika 56: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



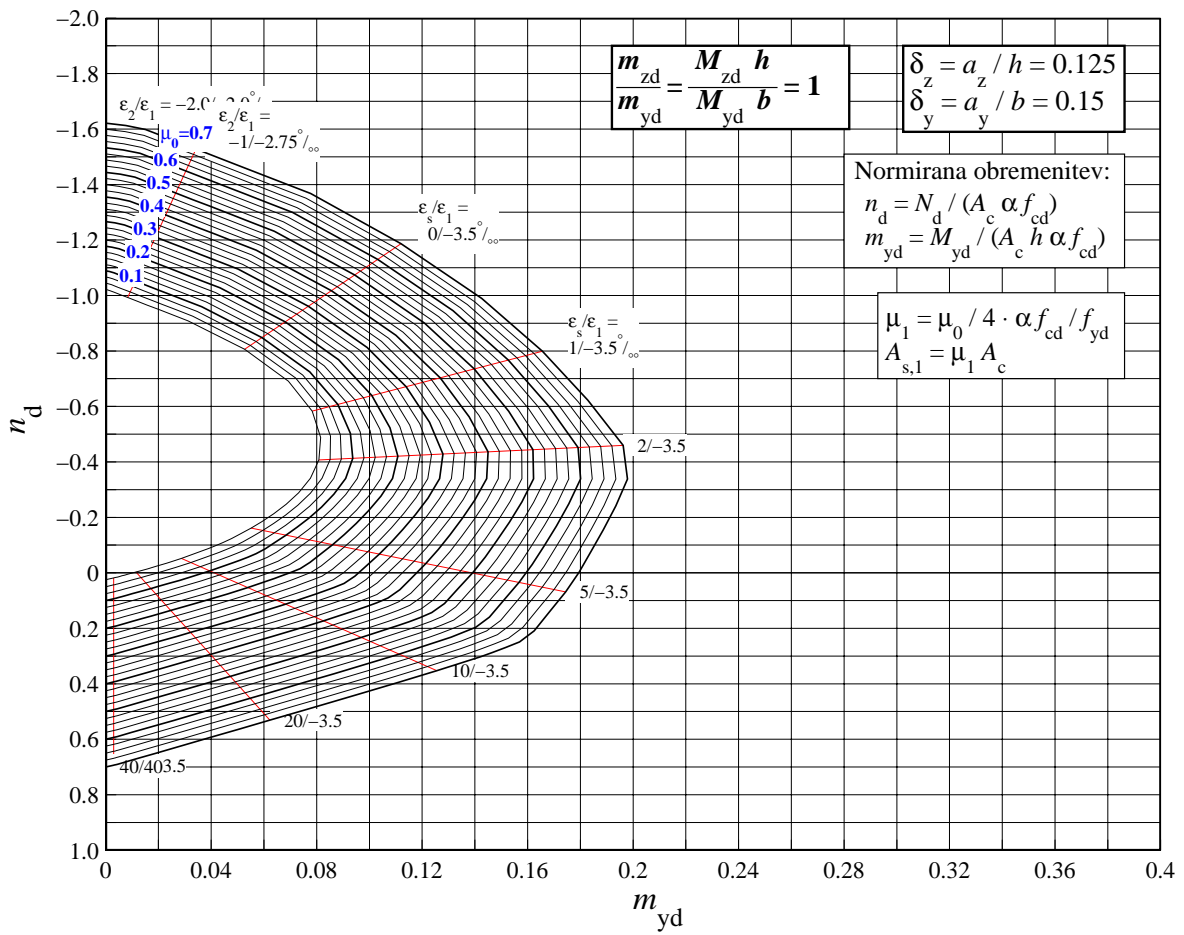
Slika 57: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.



Slika 58: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.

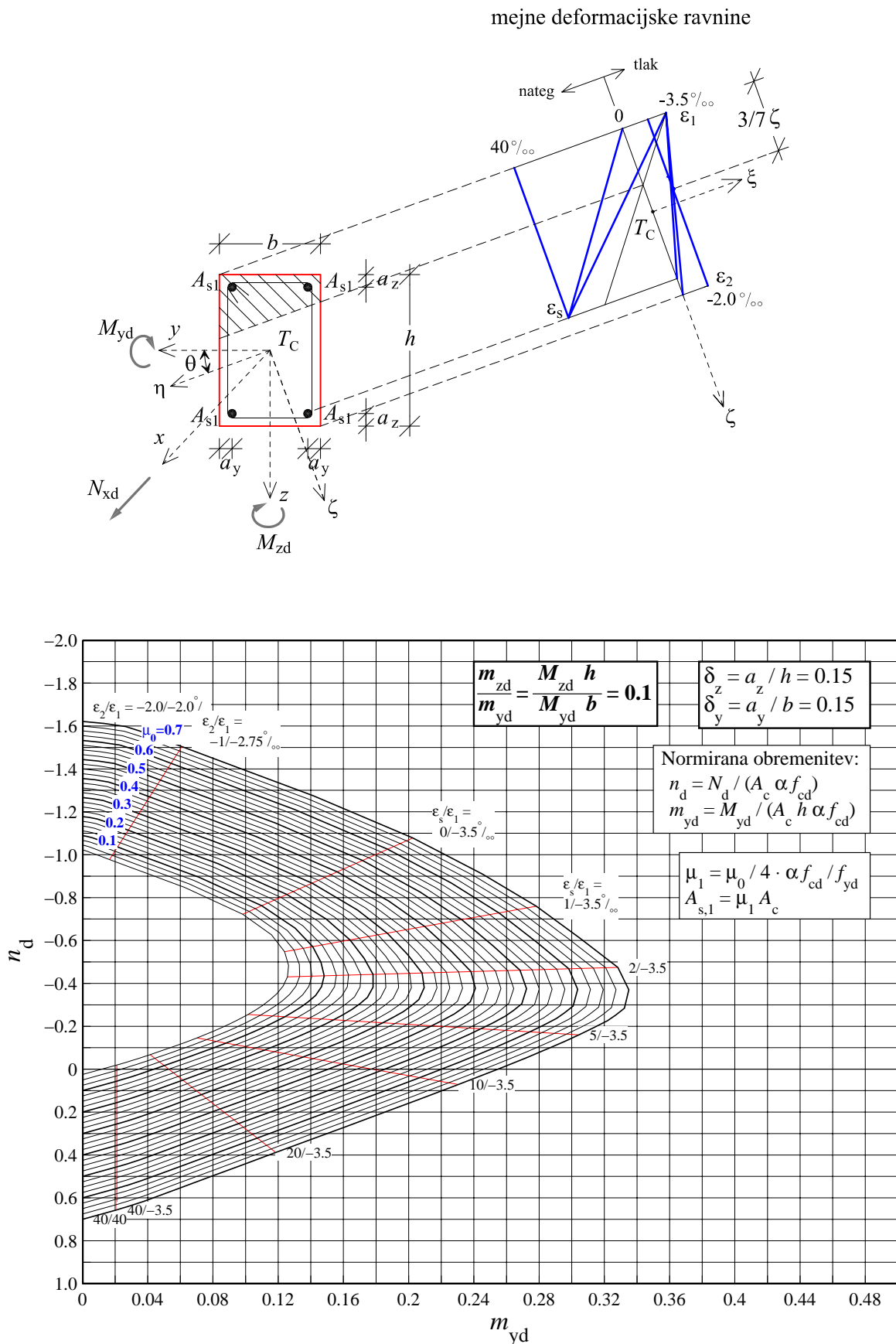


Slika 59: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.

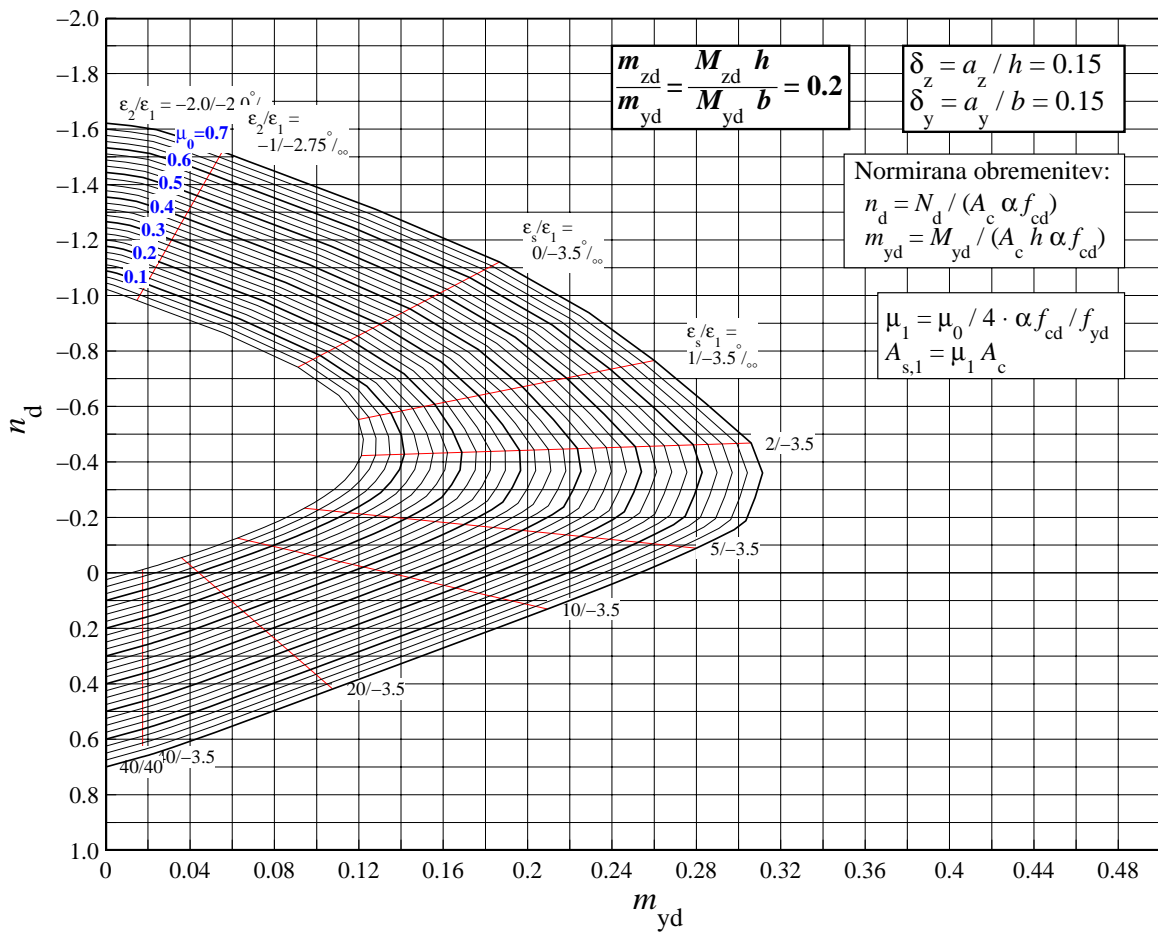


Slika 60: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.15$, 4 palice.

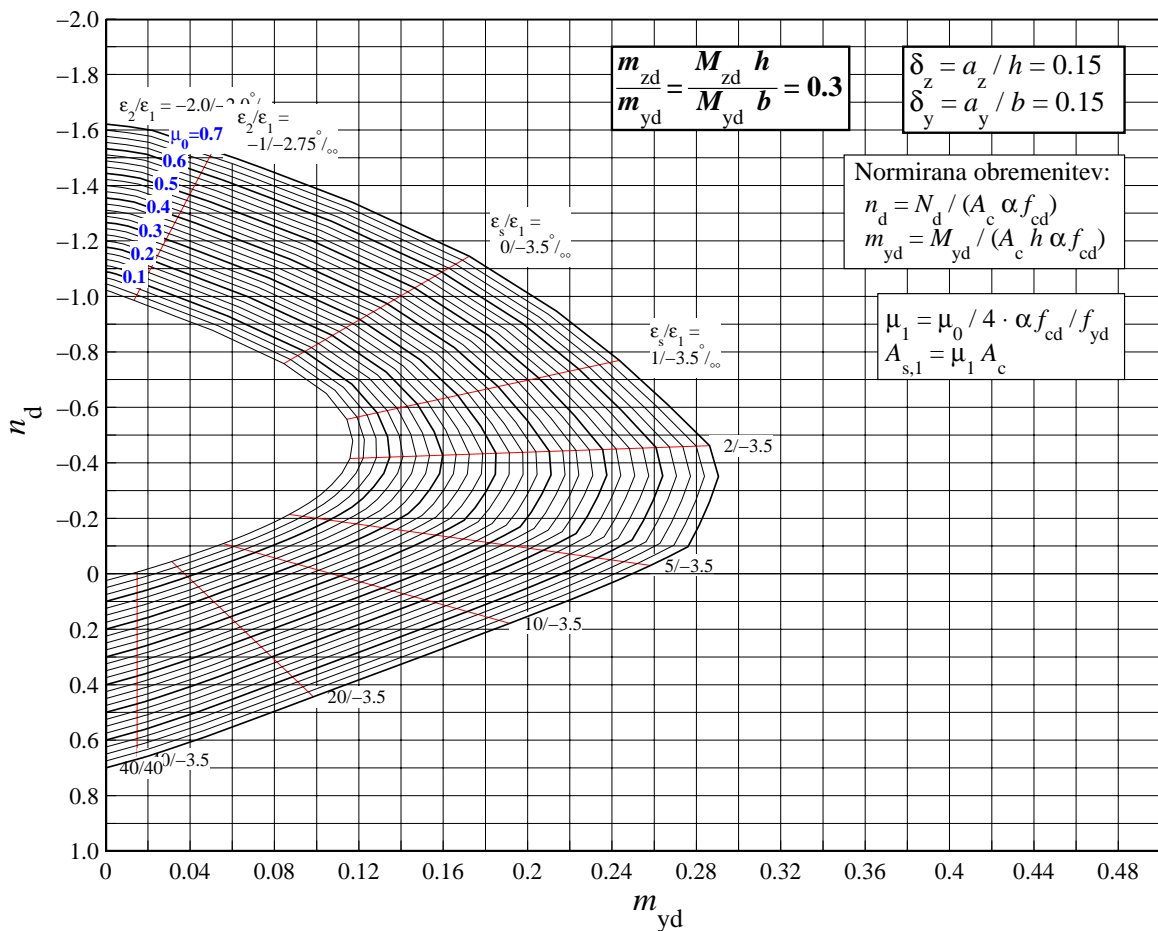
2.7 PRAVOKOTNI PREREZ, 4 palice ($\delta_z = 0.15, \delta_y = 0.15$), S500



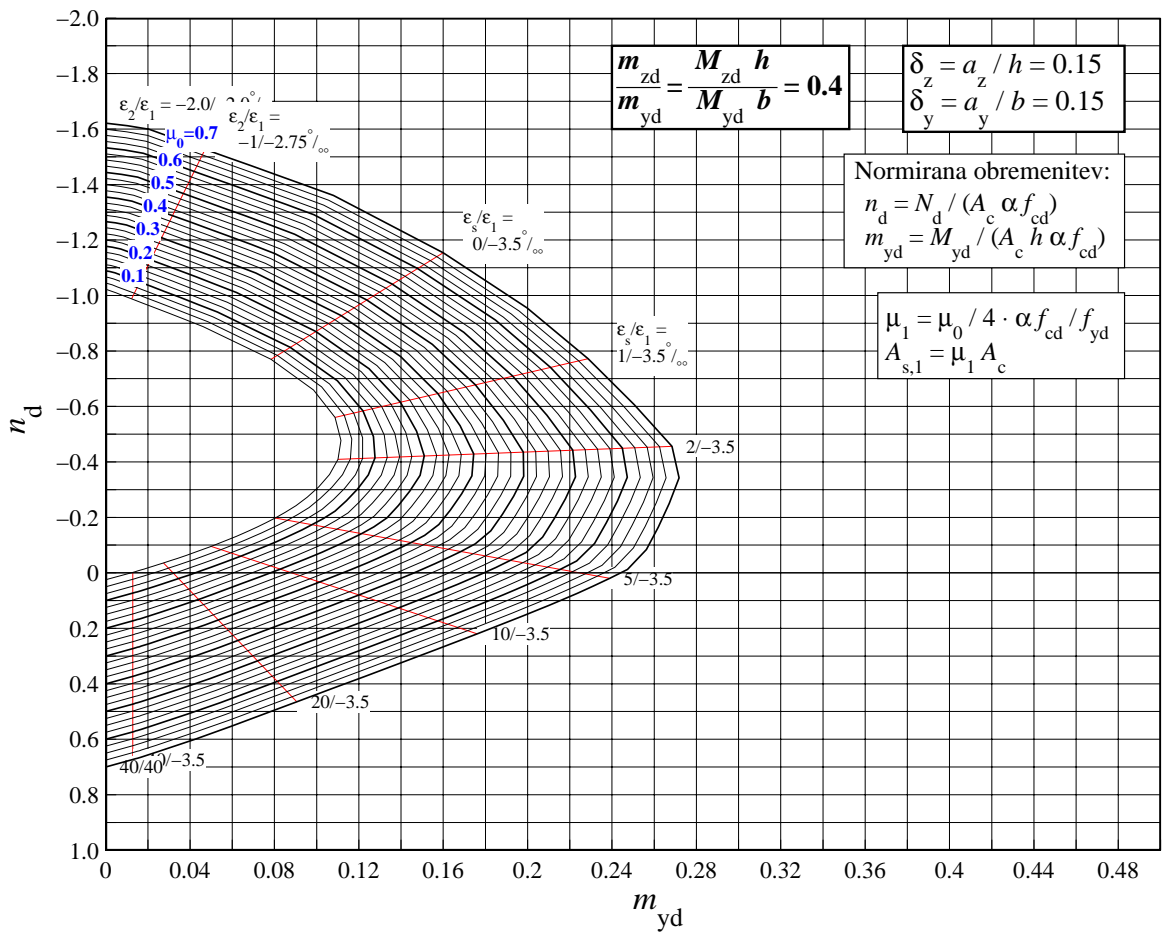
Slika 61: Pravokotni prerez: $\delta_z = 0.15, \delta_y = 0.15$, 4 palice.



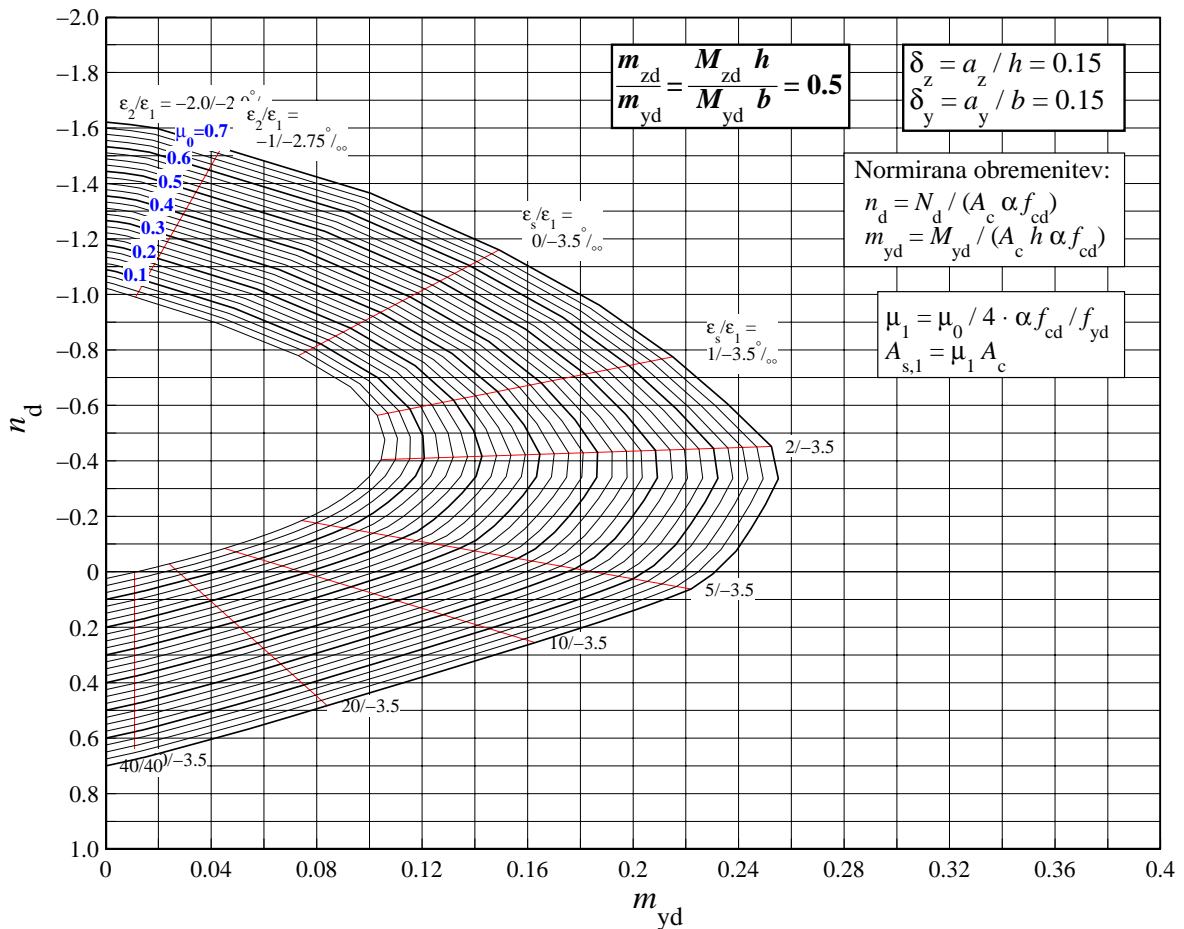
Slika 62: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



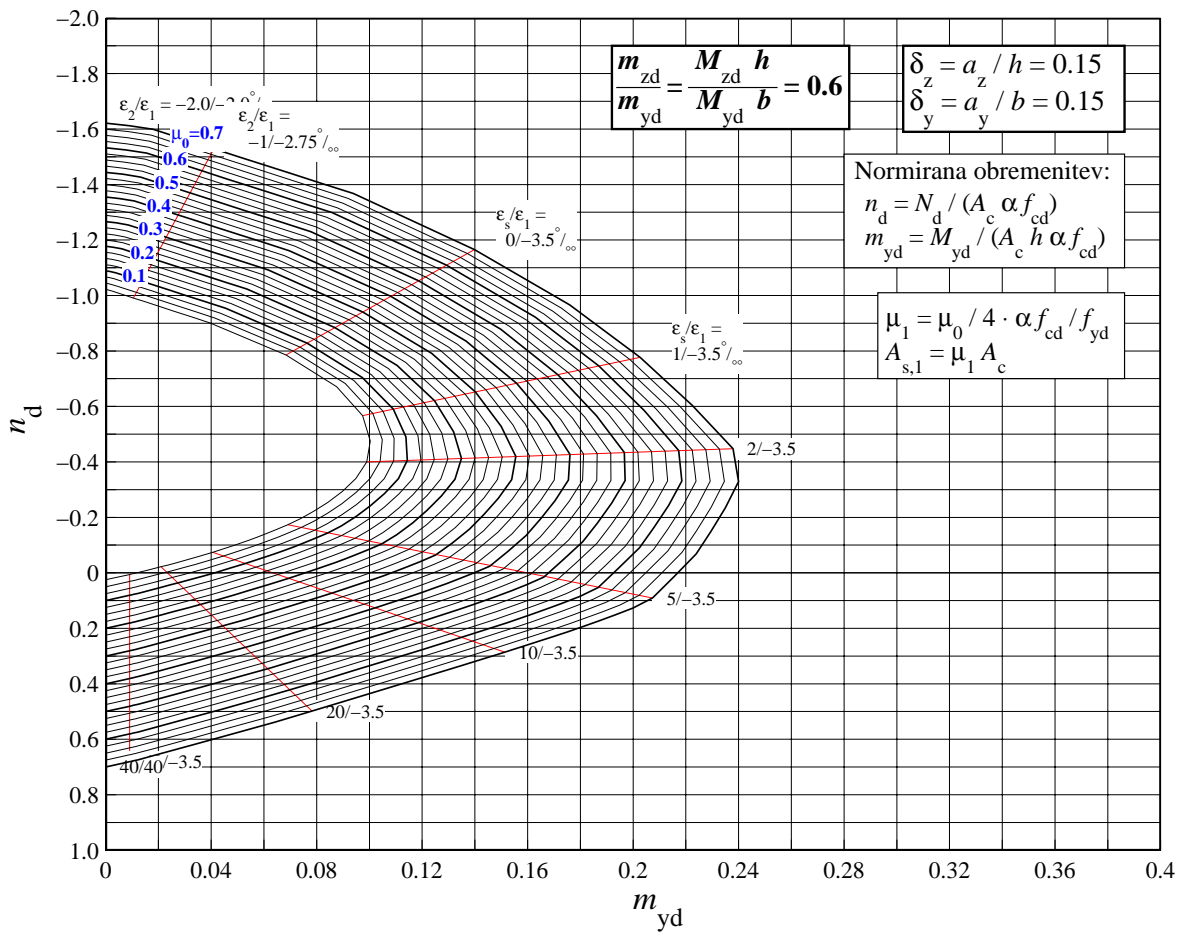
Slika 63: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



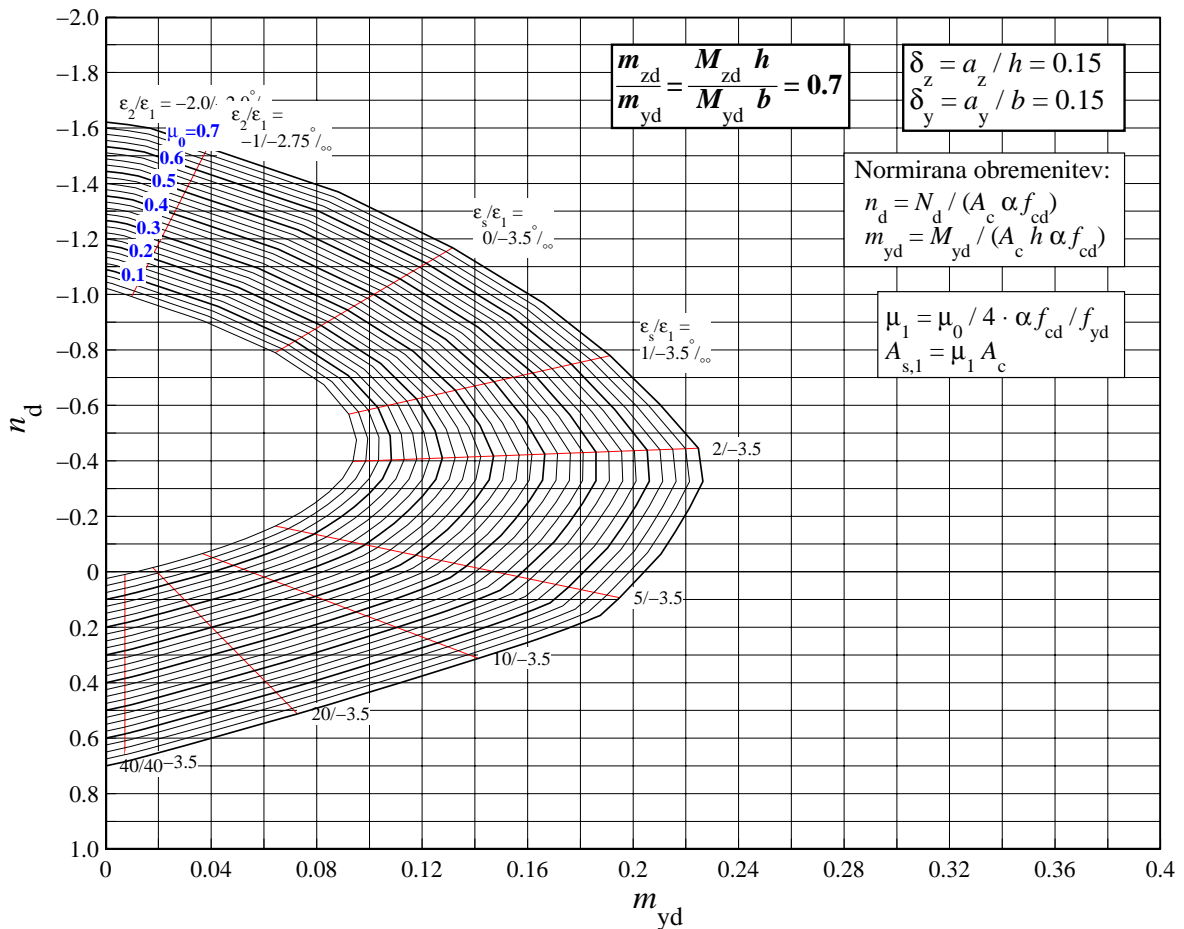
Slika 64: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



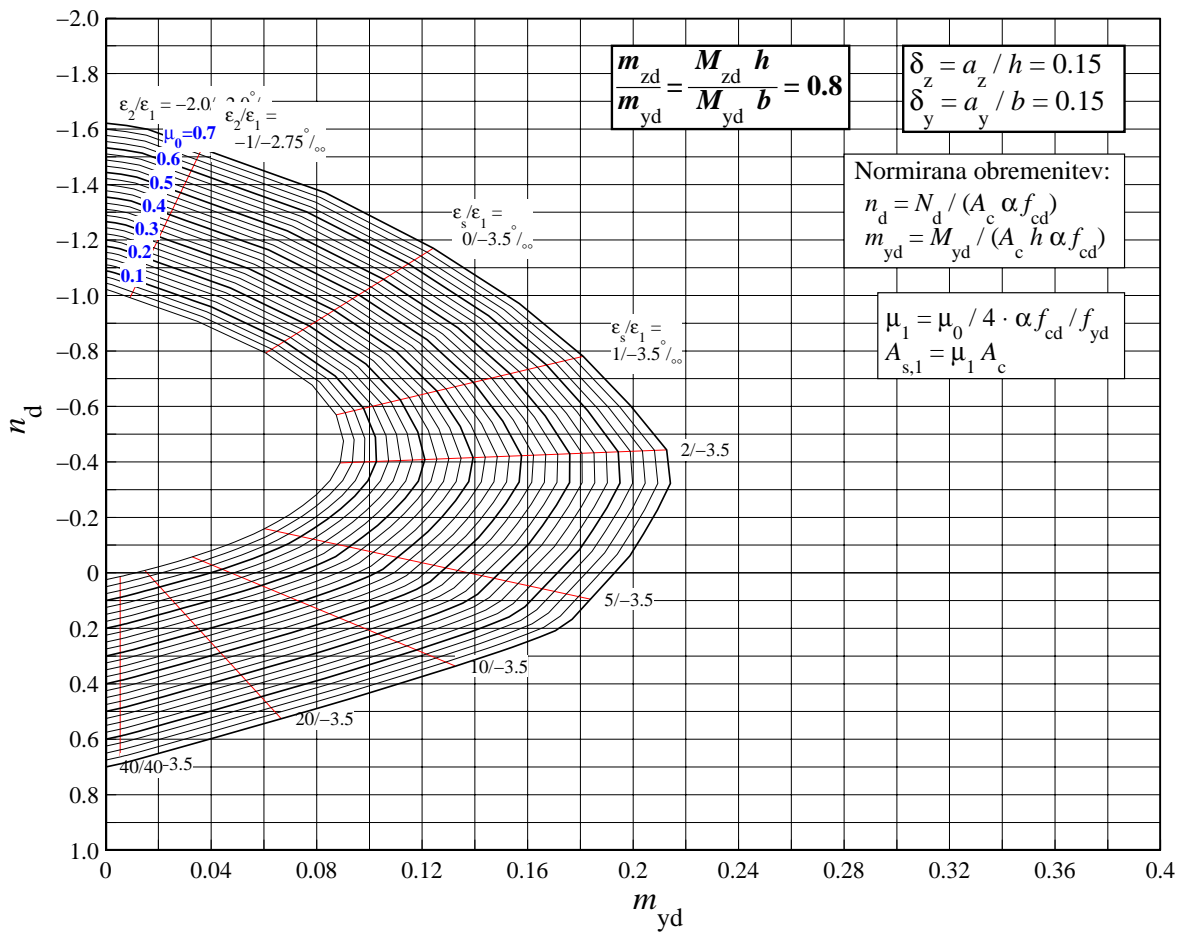
Slika 65: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



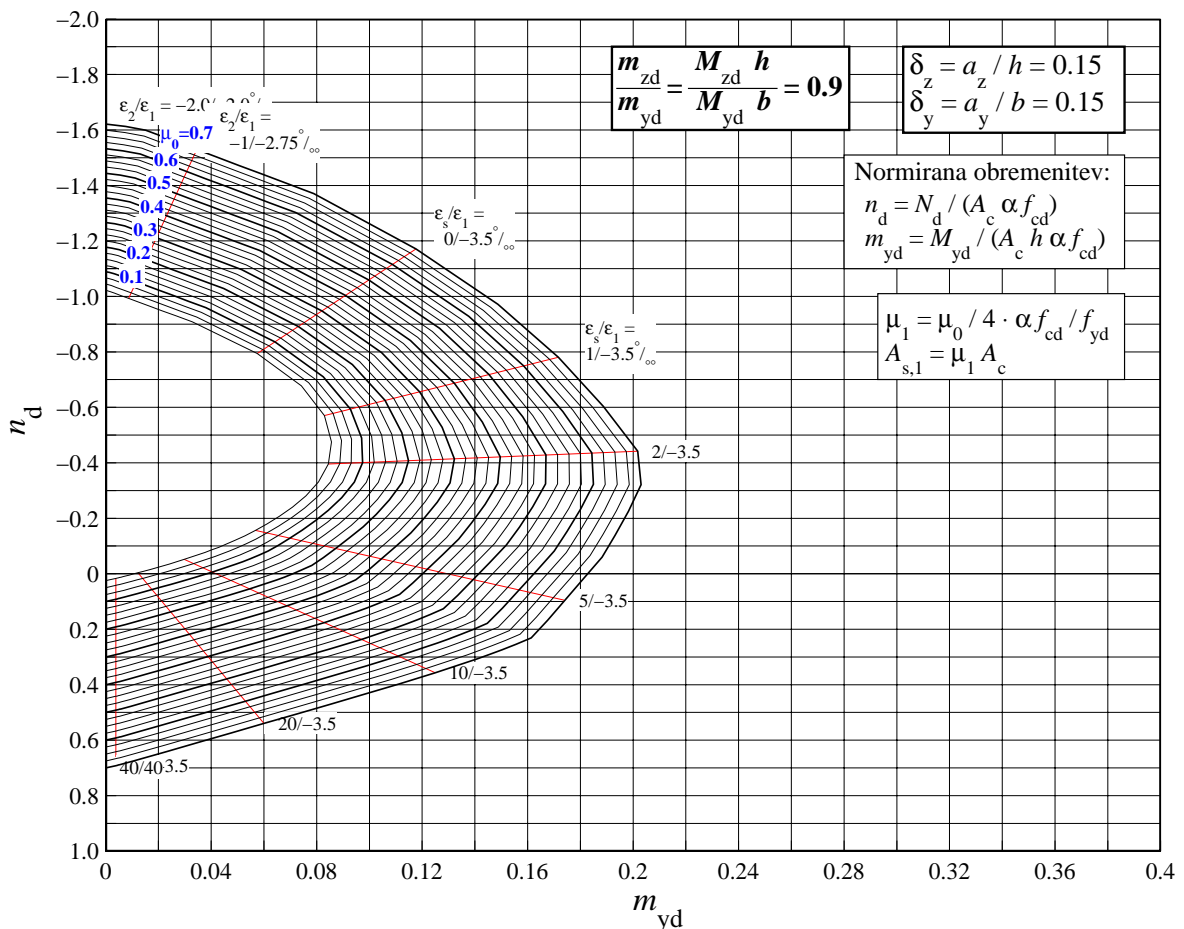
Slika 66: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



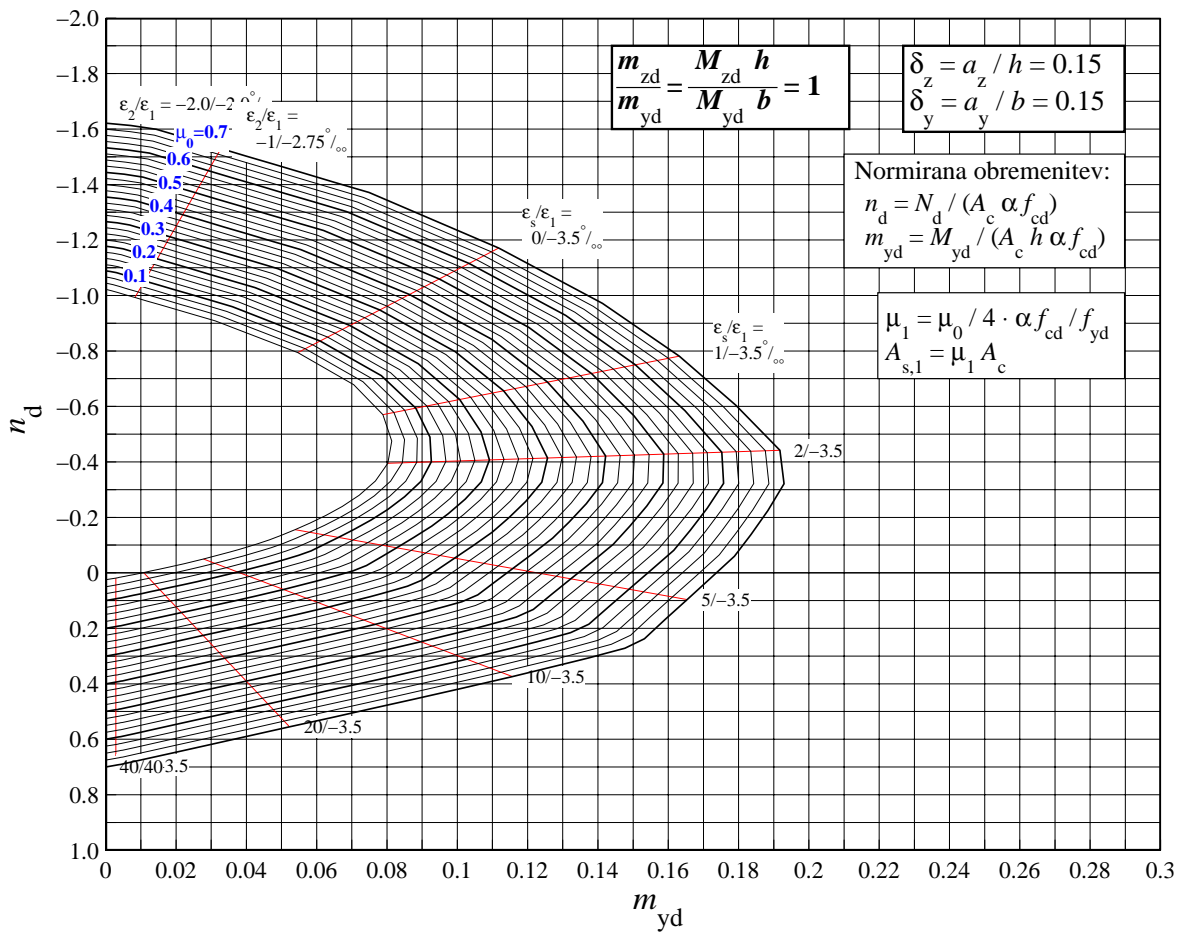
Slika 67: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



Slika 68: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.

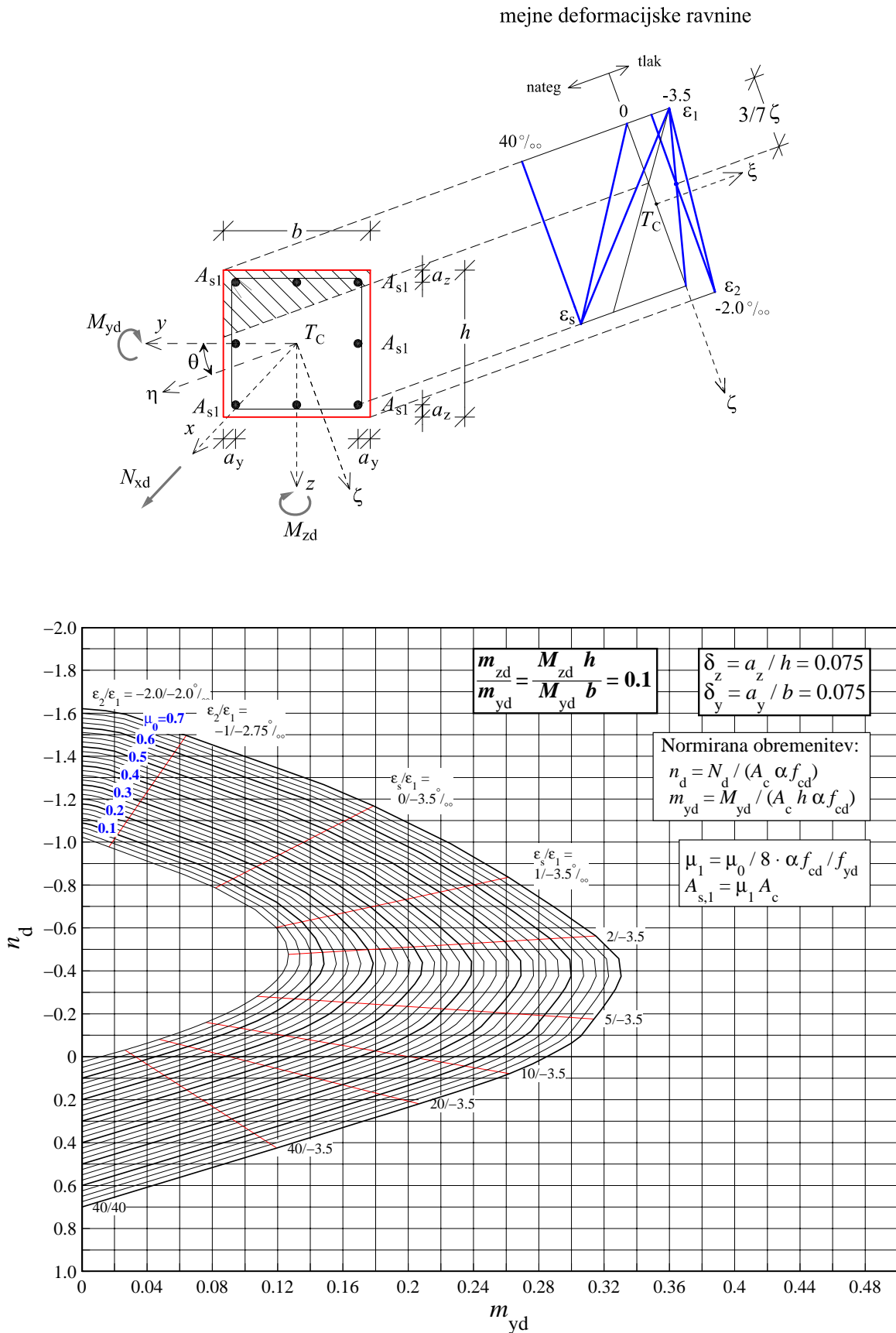


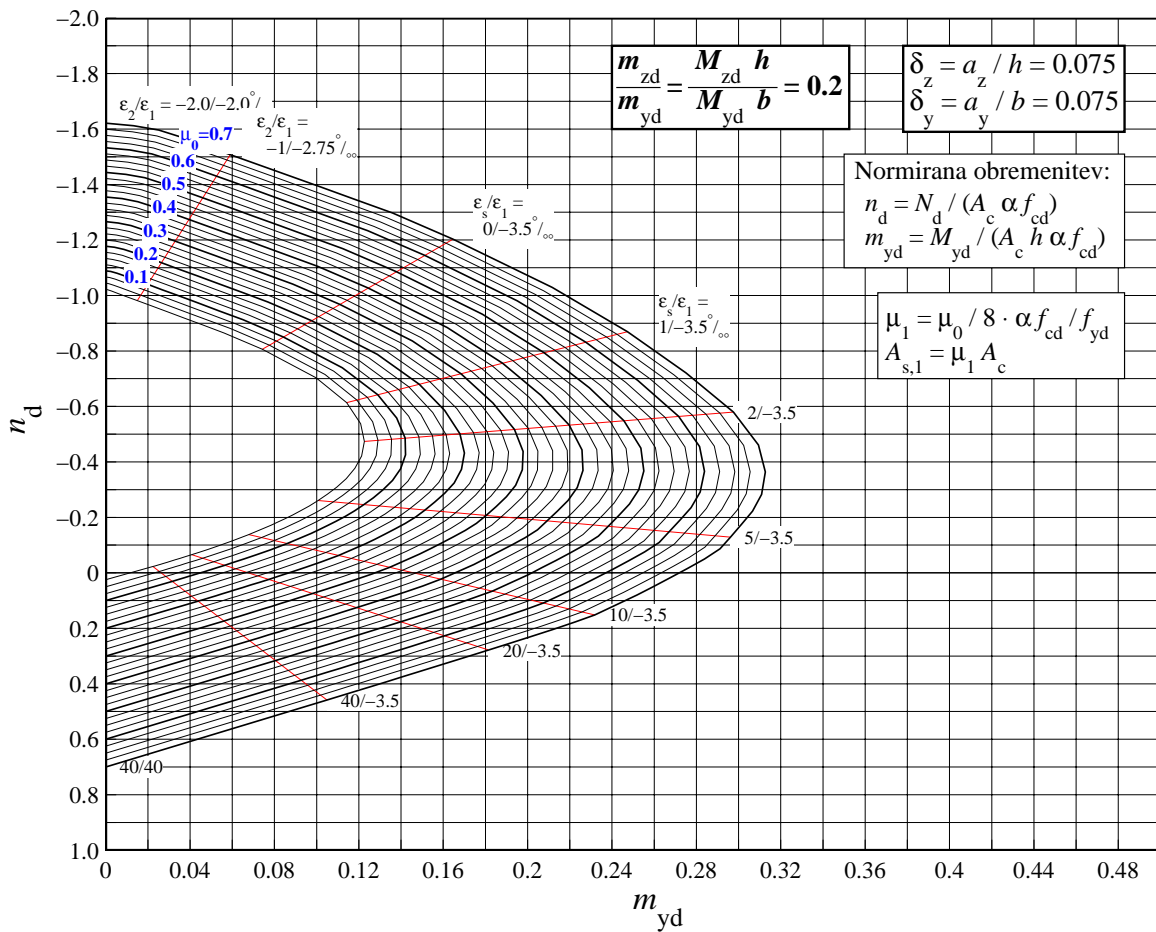
Slika 69: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.



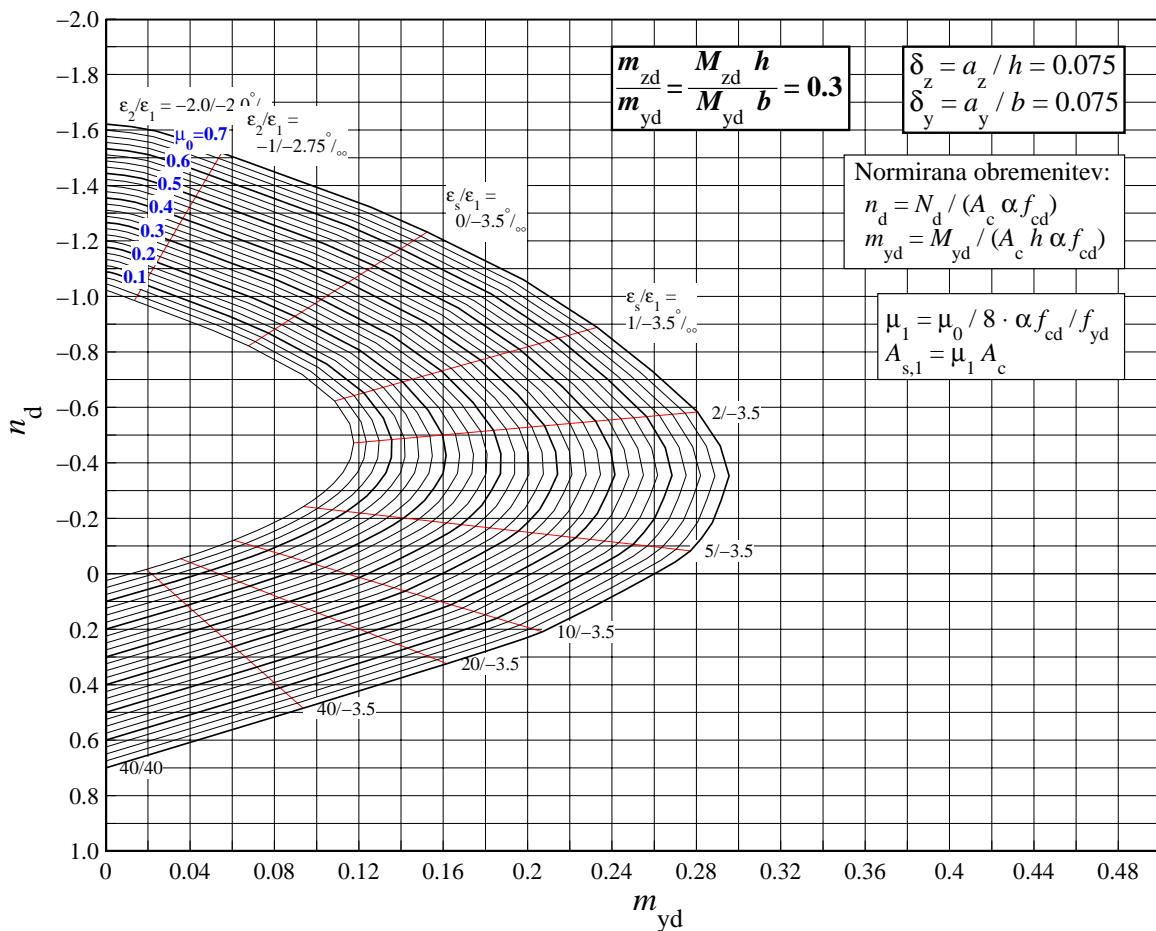
Slika 70: Pravokotni prerez: $\delta_z = 0.15$, $\delta_y = 0.15$, 4 palice.

2.8 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.075, \delta_y = 0.075$), S500

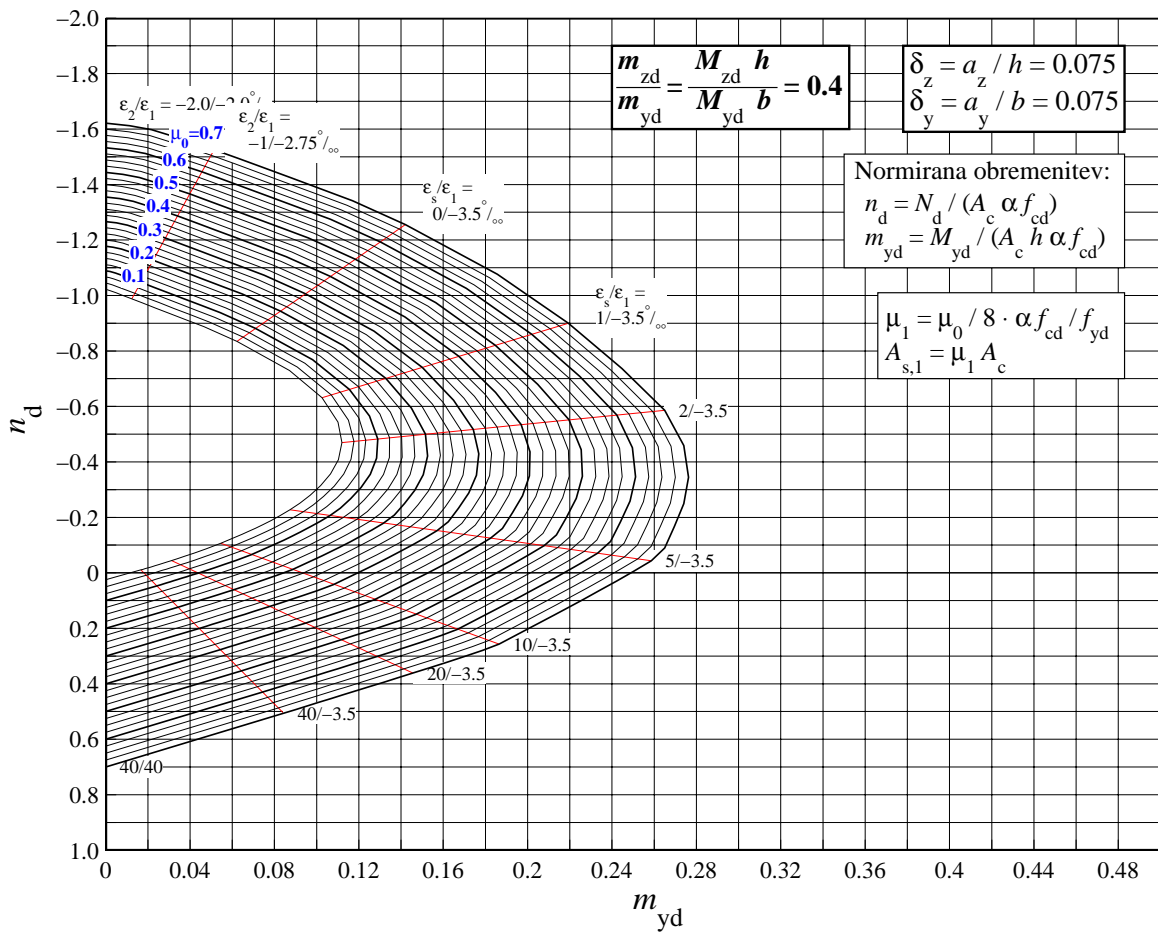




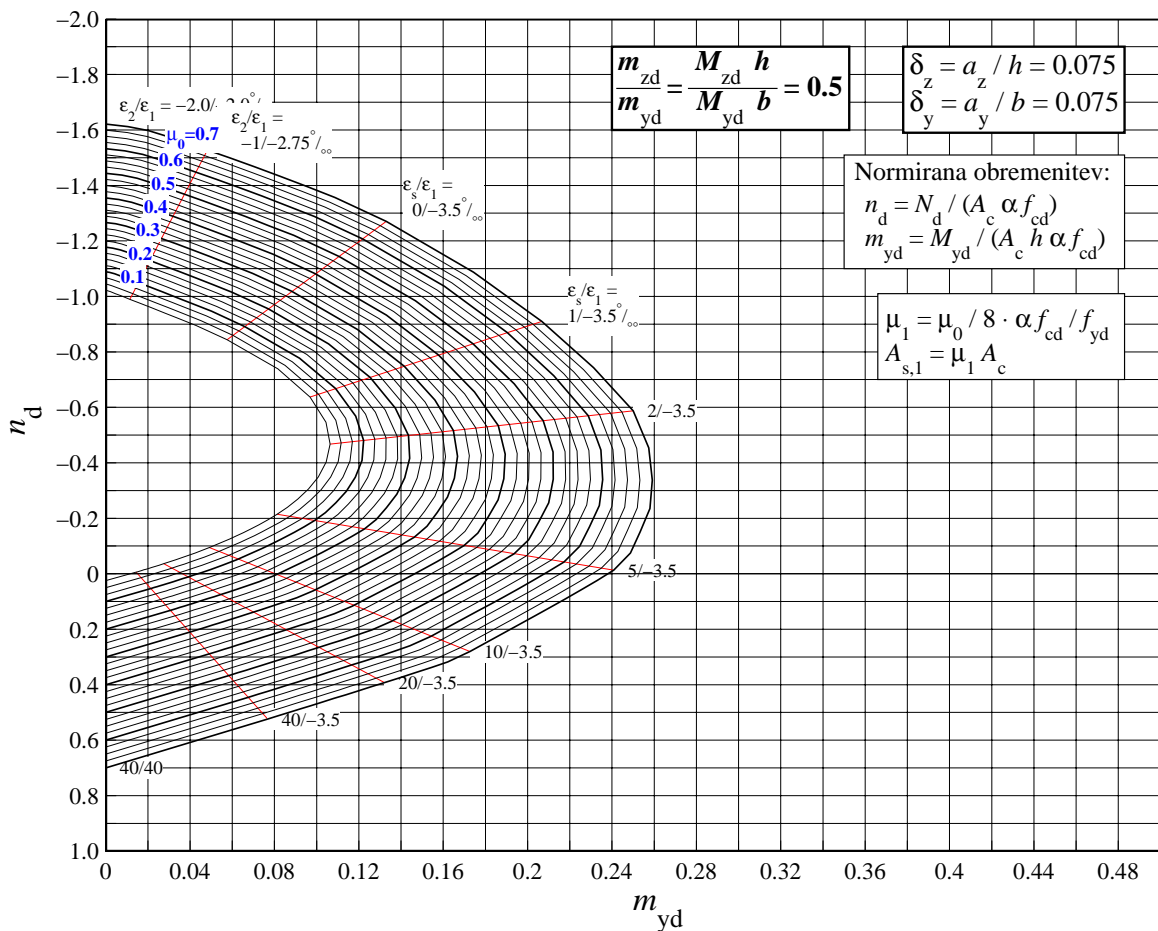
Slika 72: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



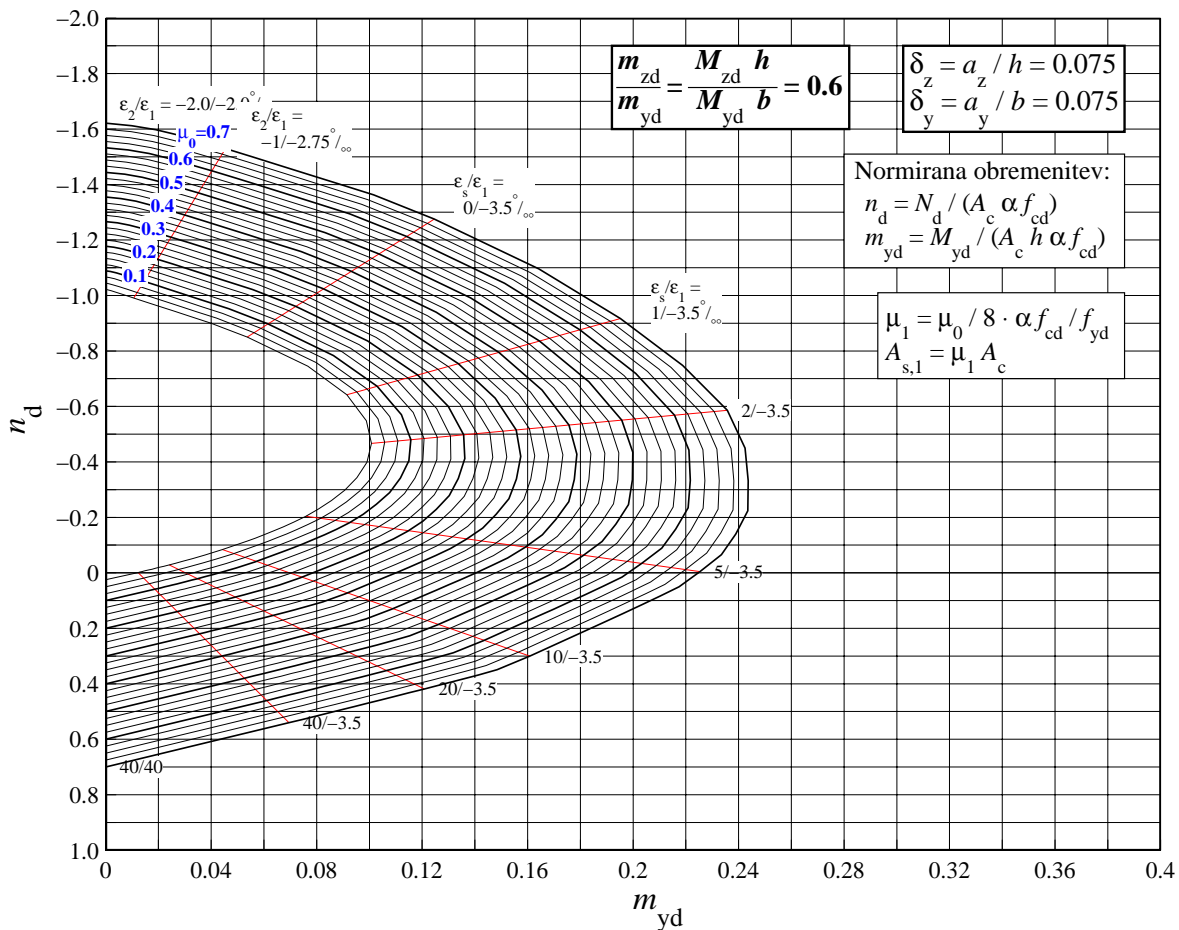
Slika 73: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



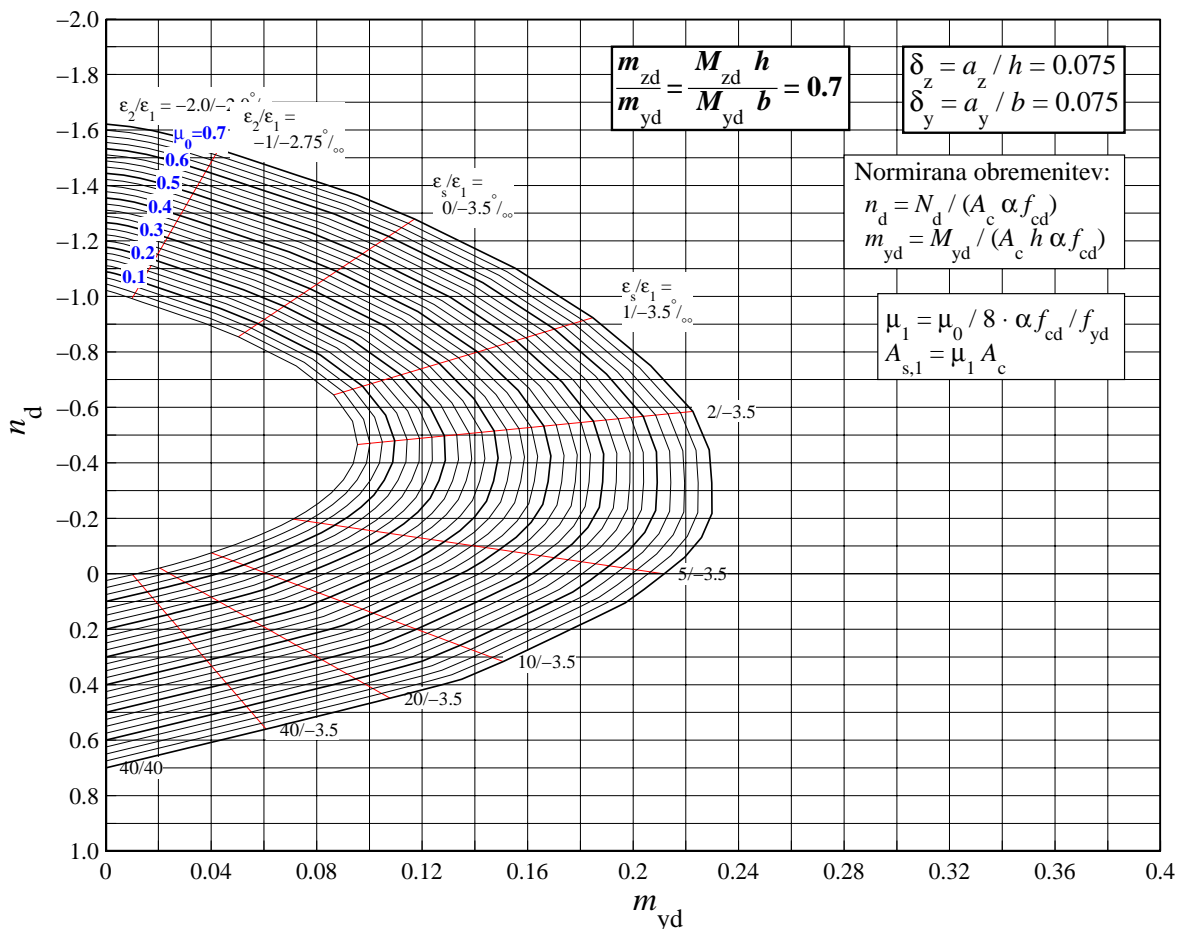
Slika 74: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



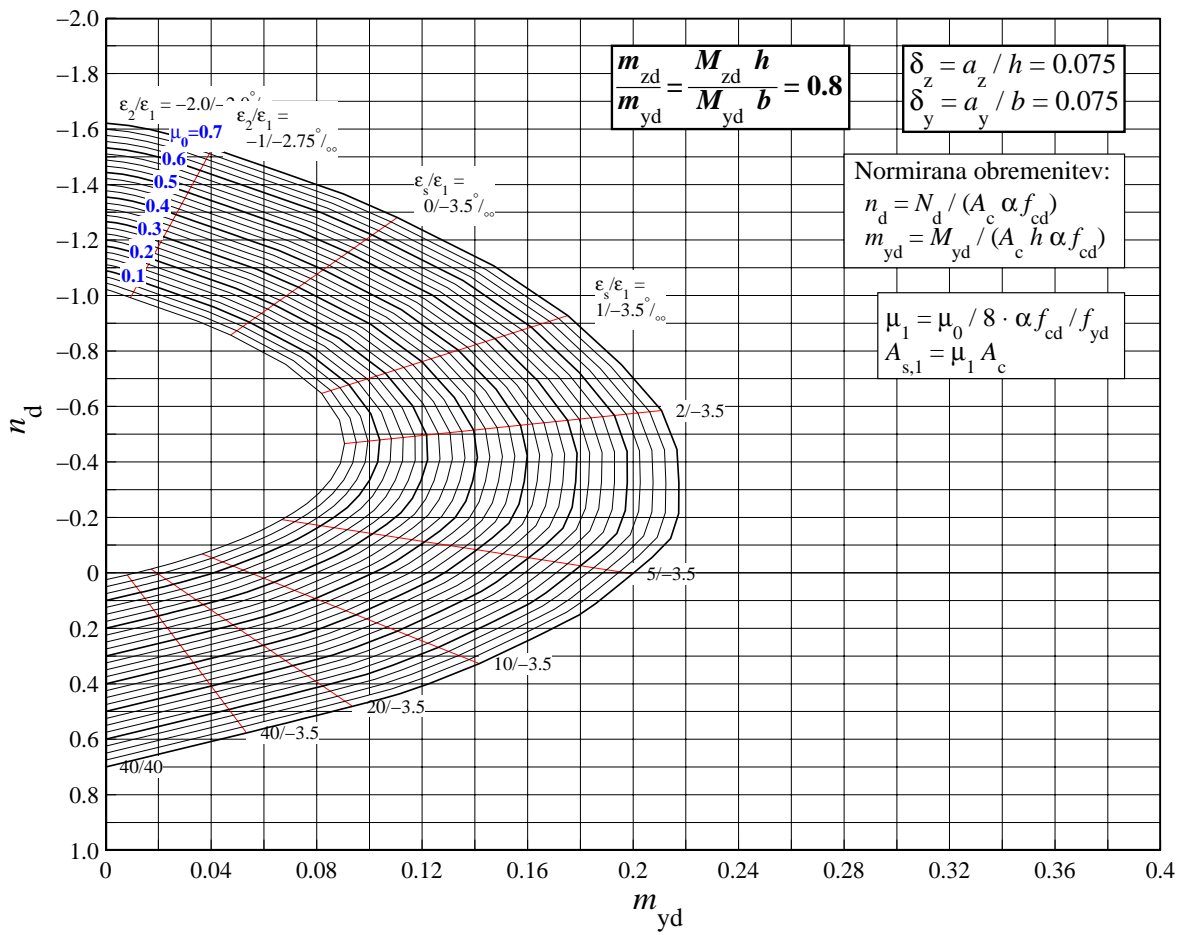
Slika 75: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



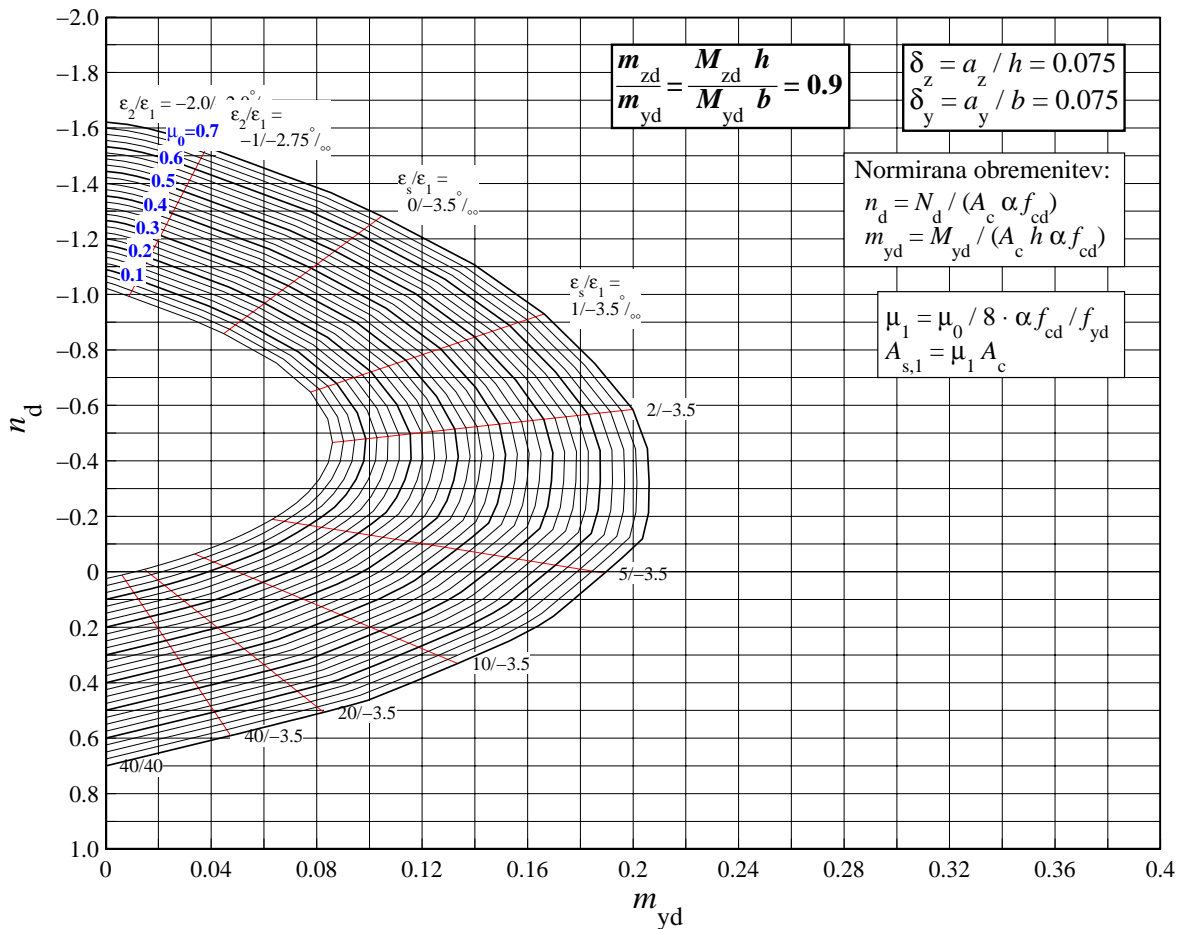
Slika 76: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



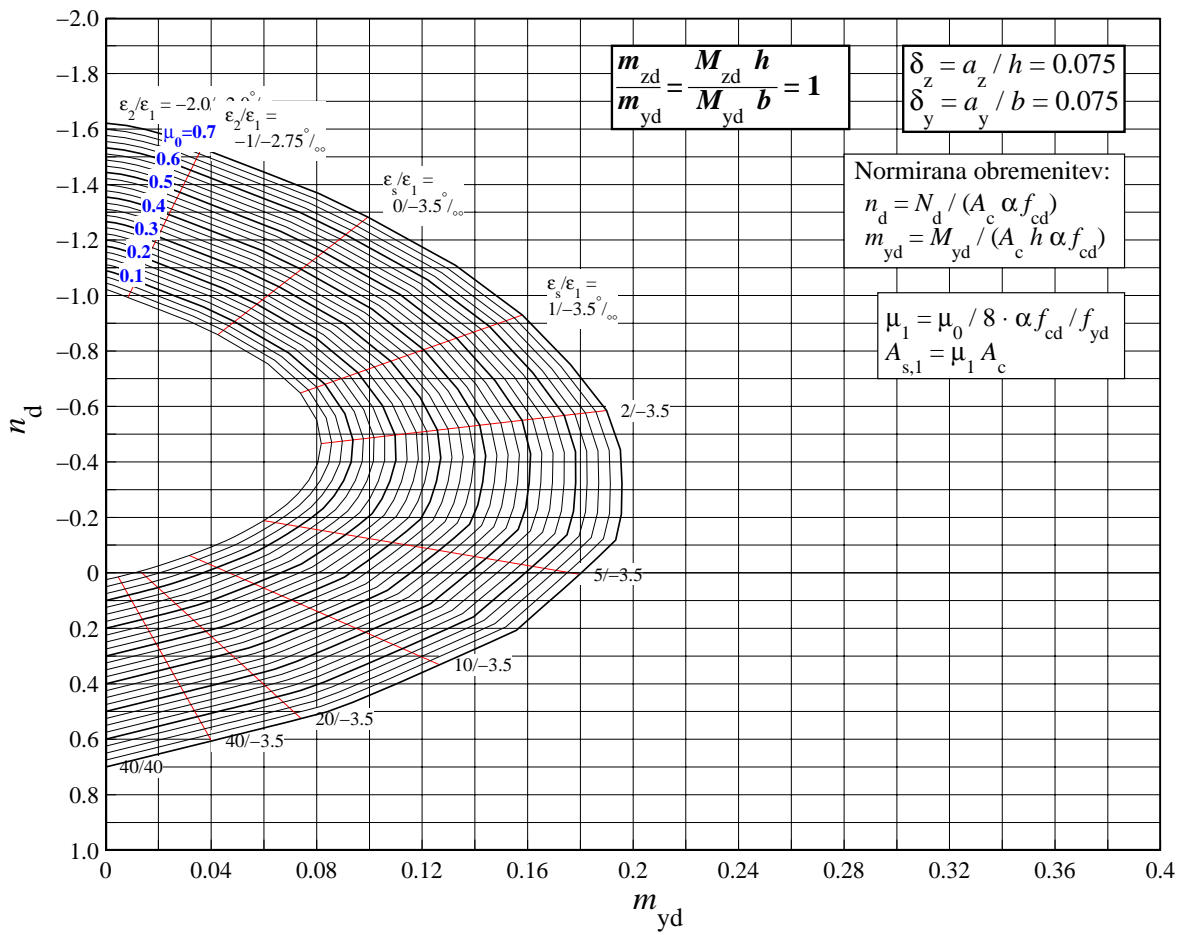
Slika 77: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



Slika 78: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.

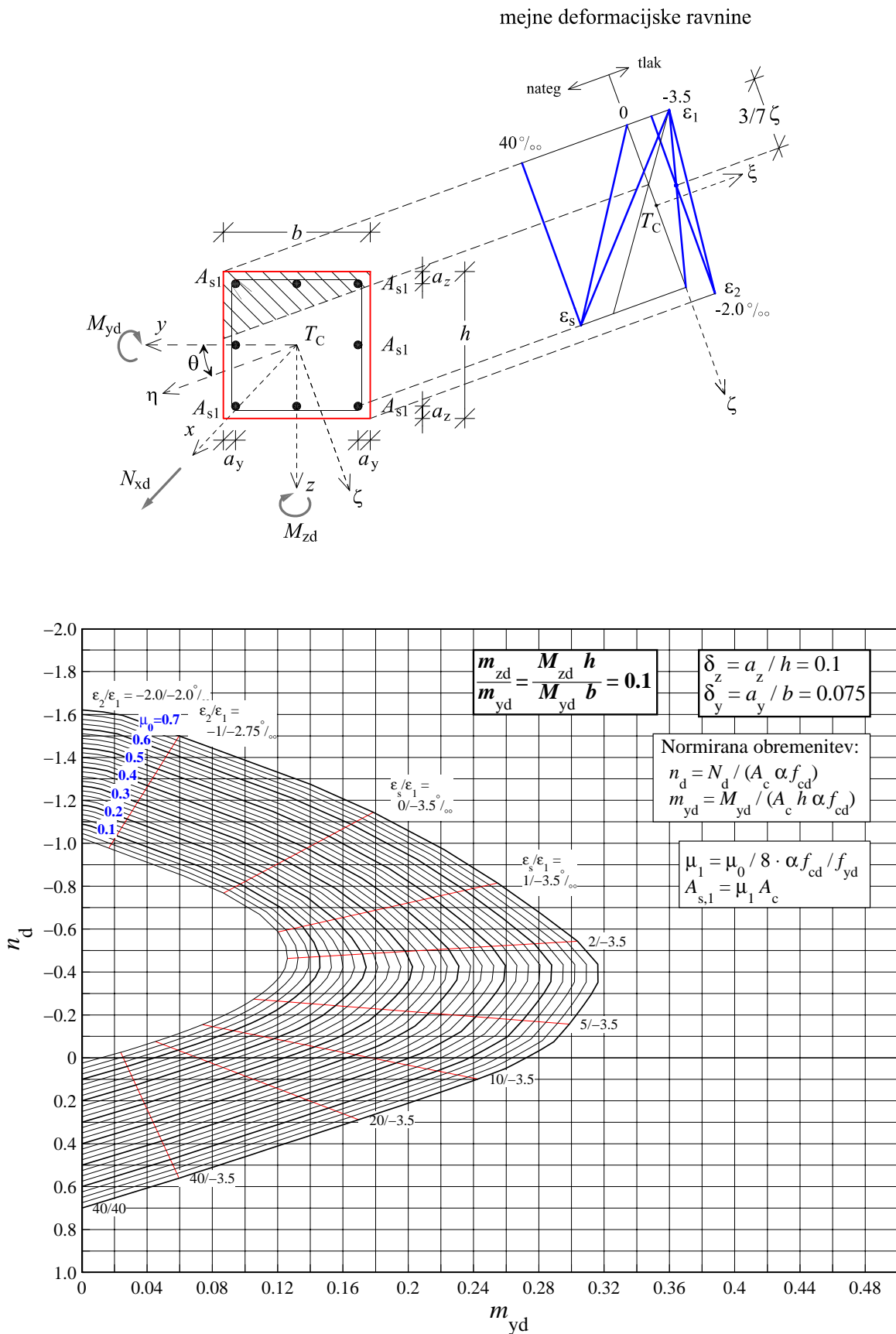


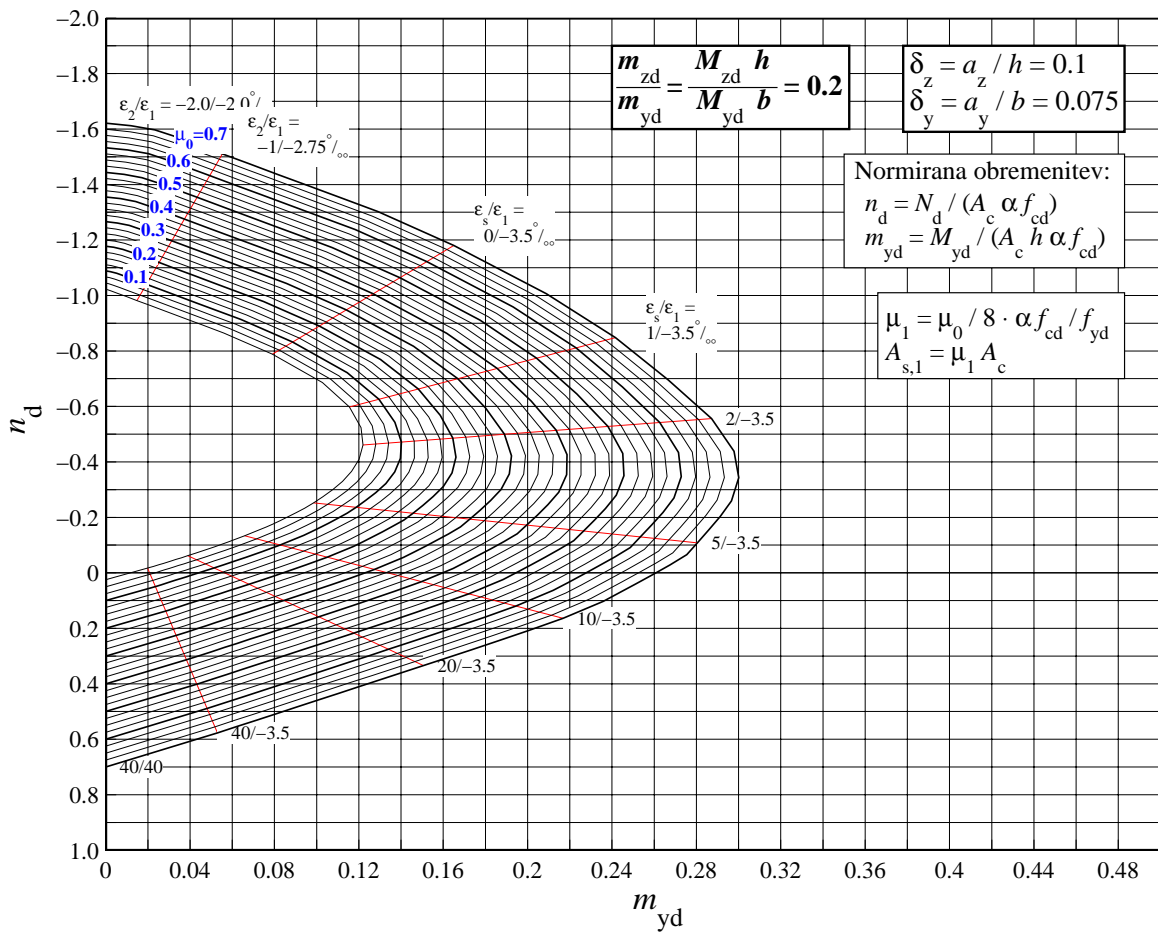
Slika 79: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.



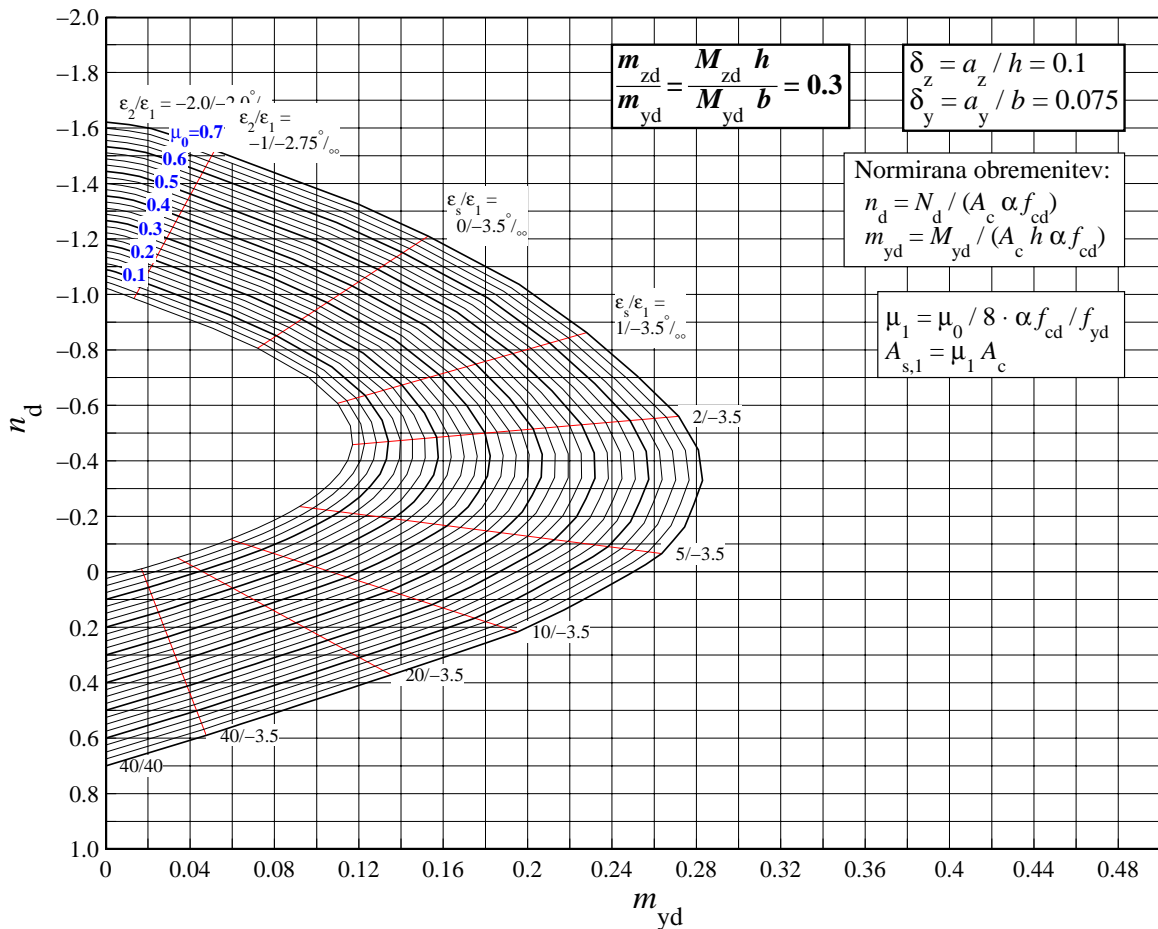
Slika 80: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 8 palic.

2.9 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.1, \delta_y = 0.075$), S500

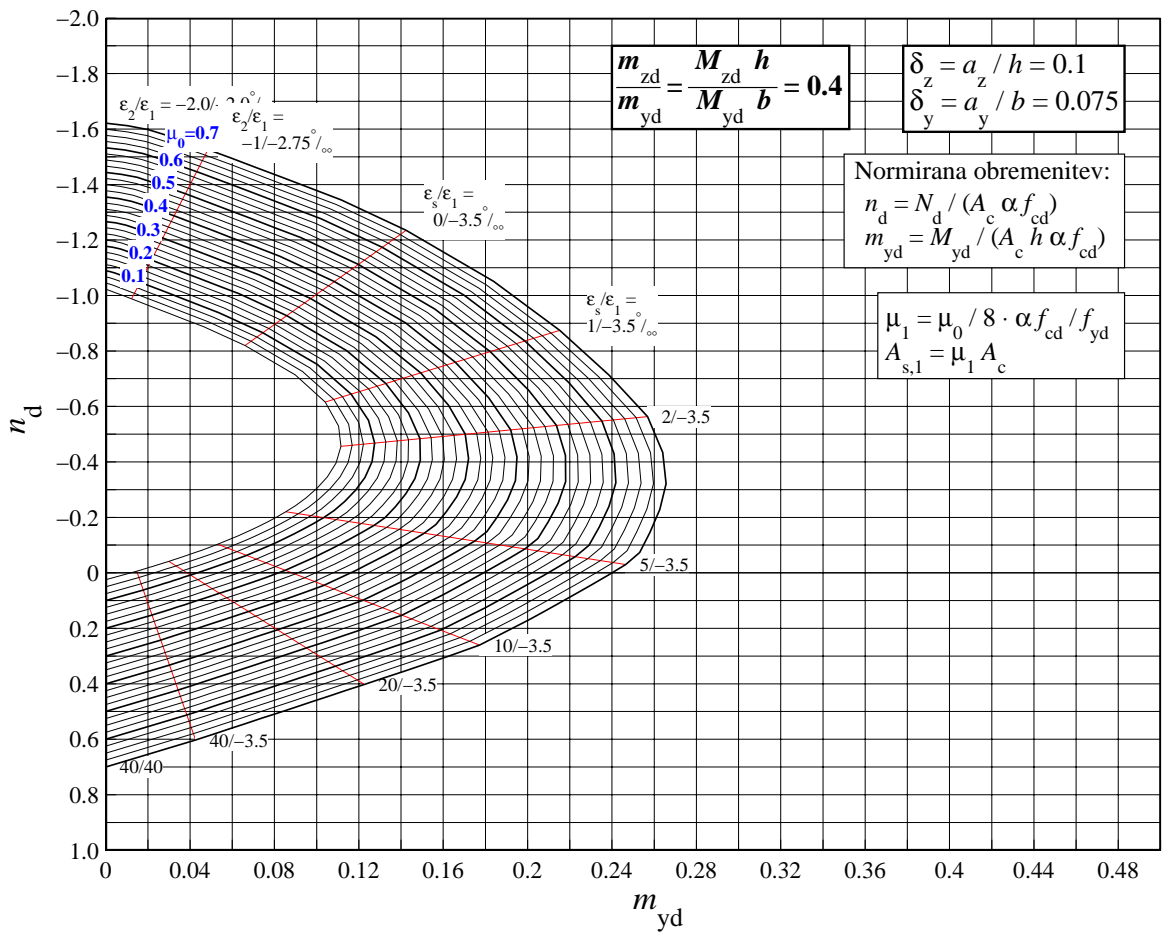




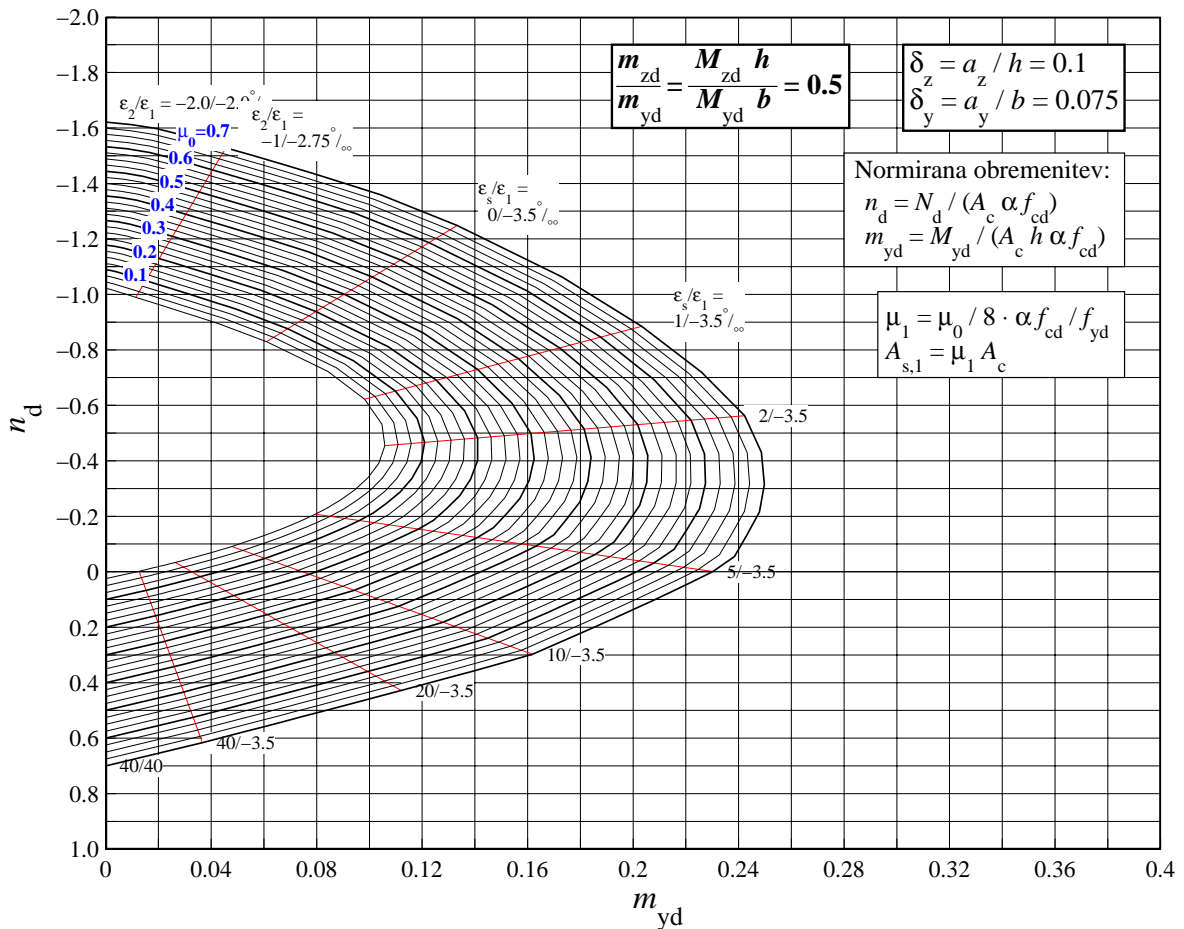
Slika 82: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



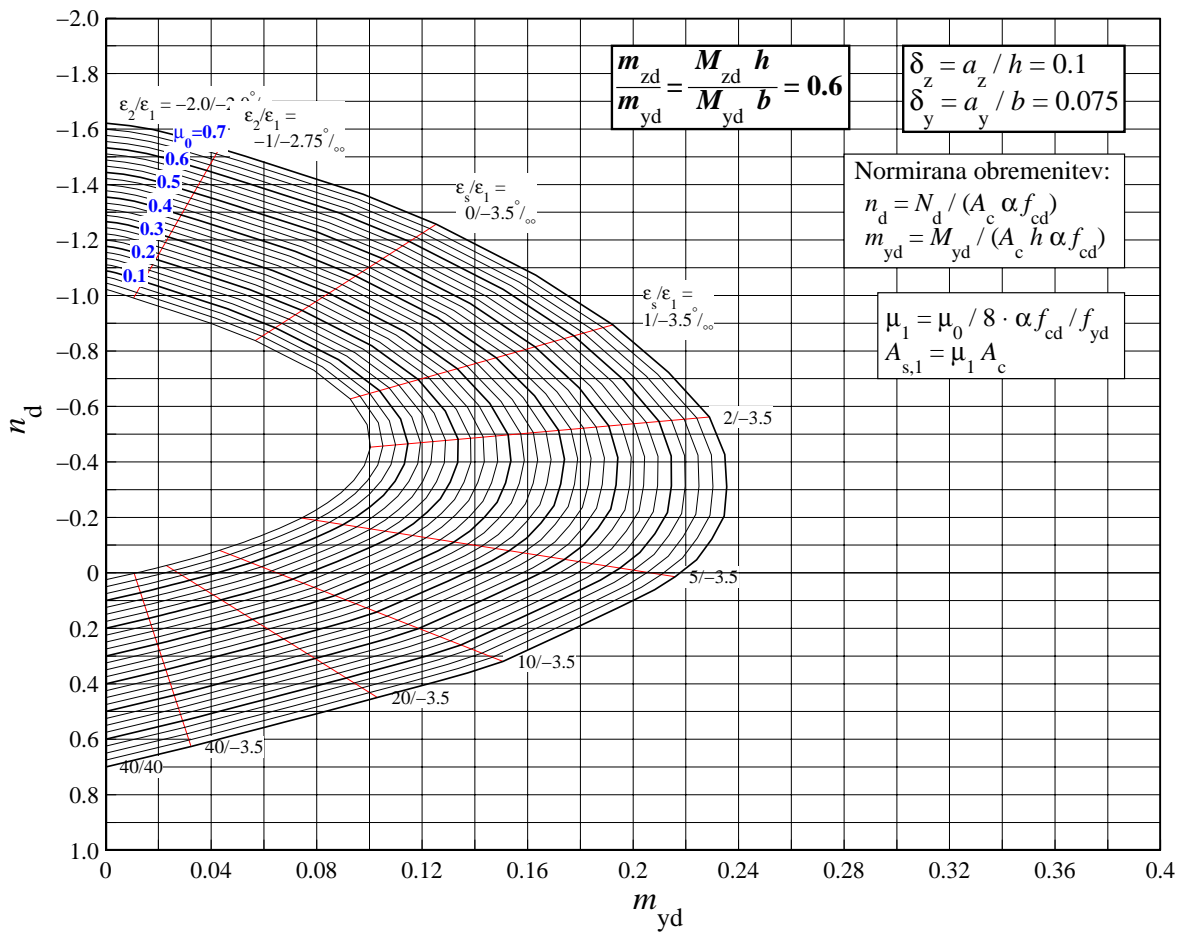
Slika 83: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



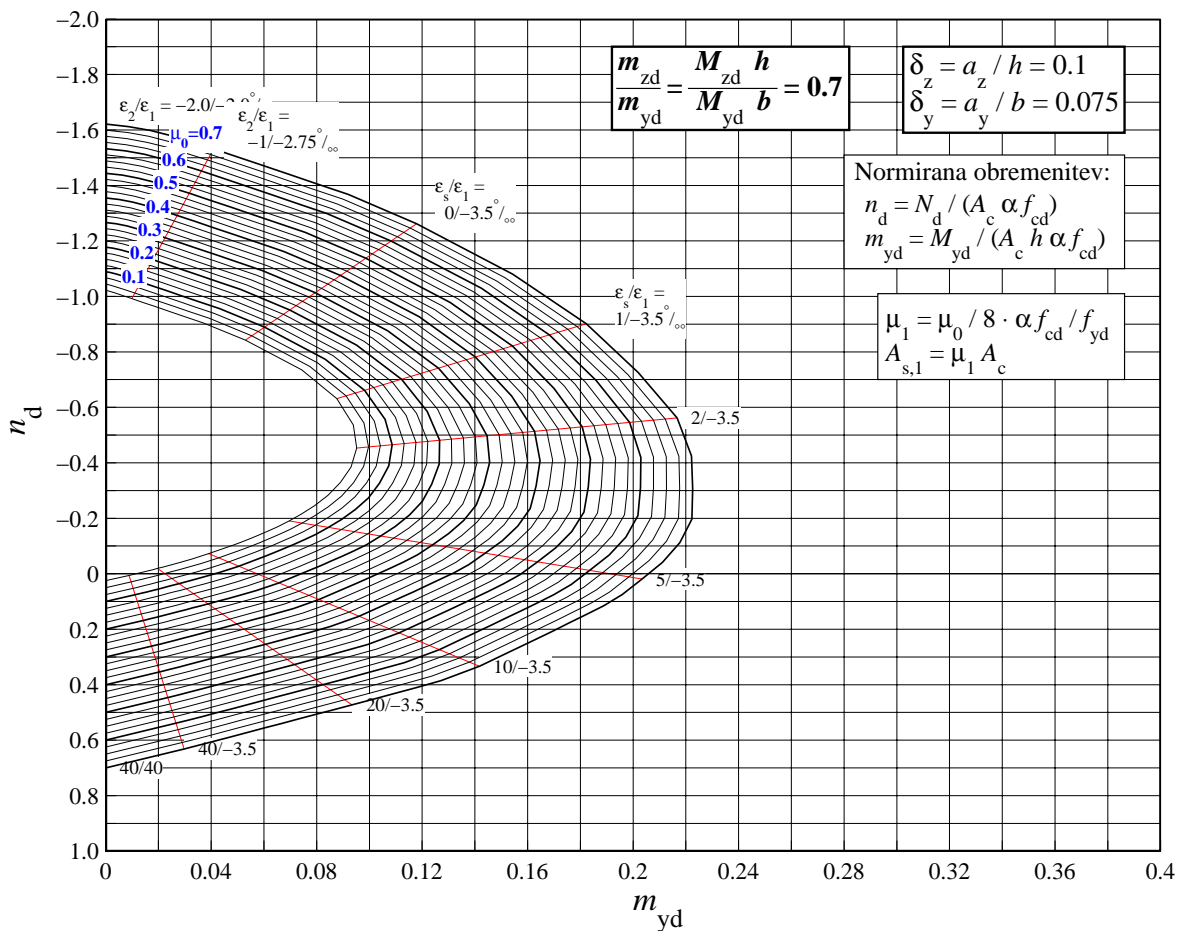
Slika 84: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



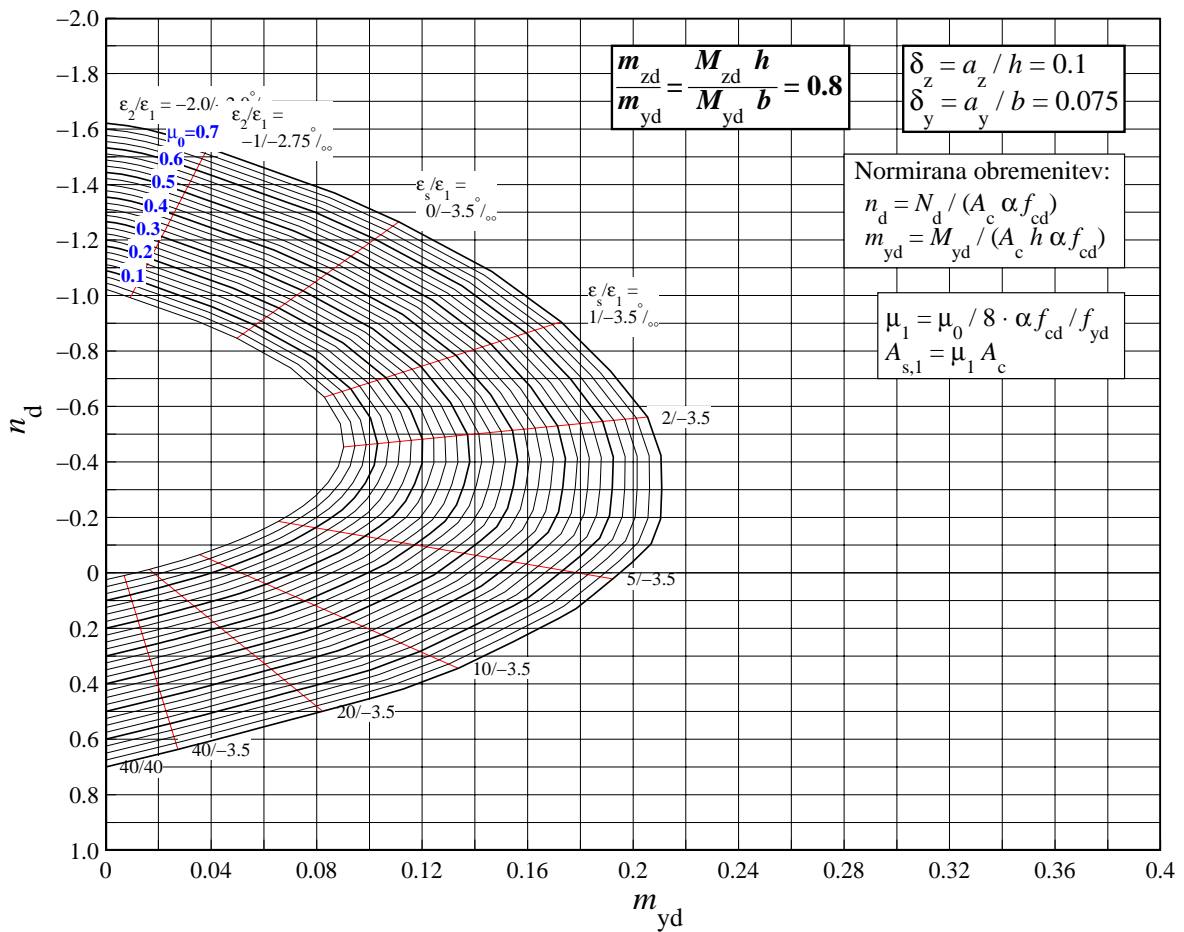
Slika 85: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



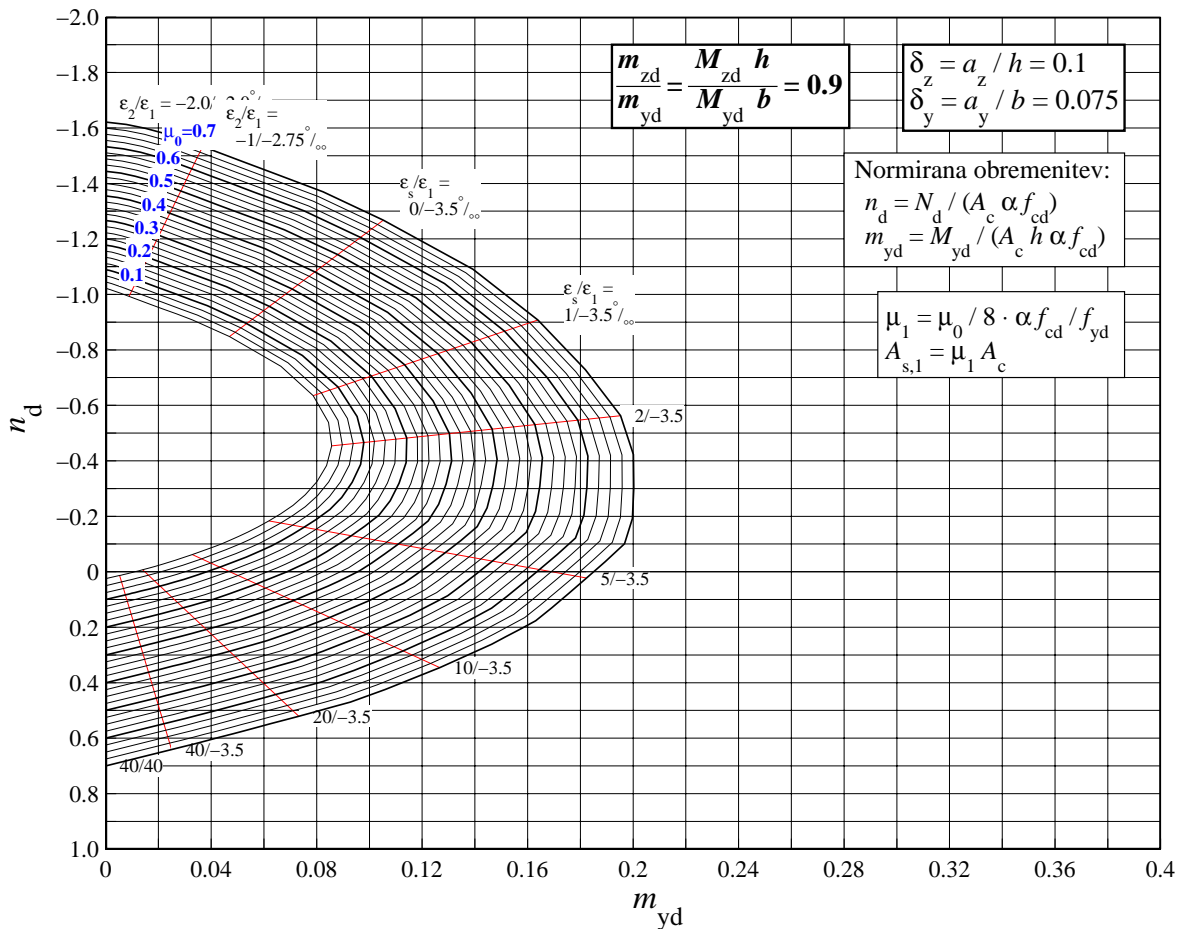
Slika 86: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



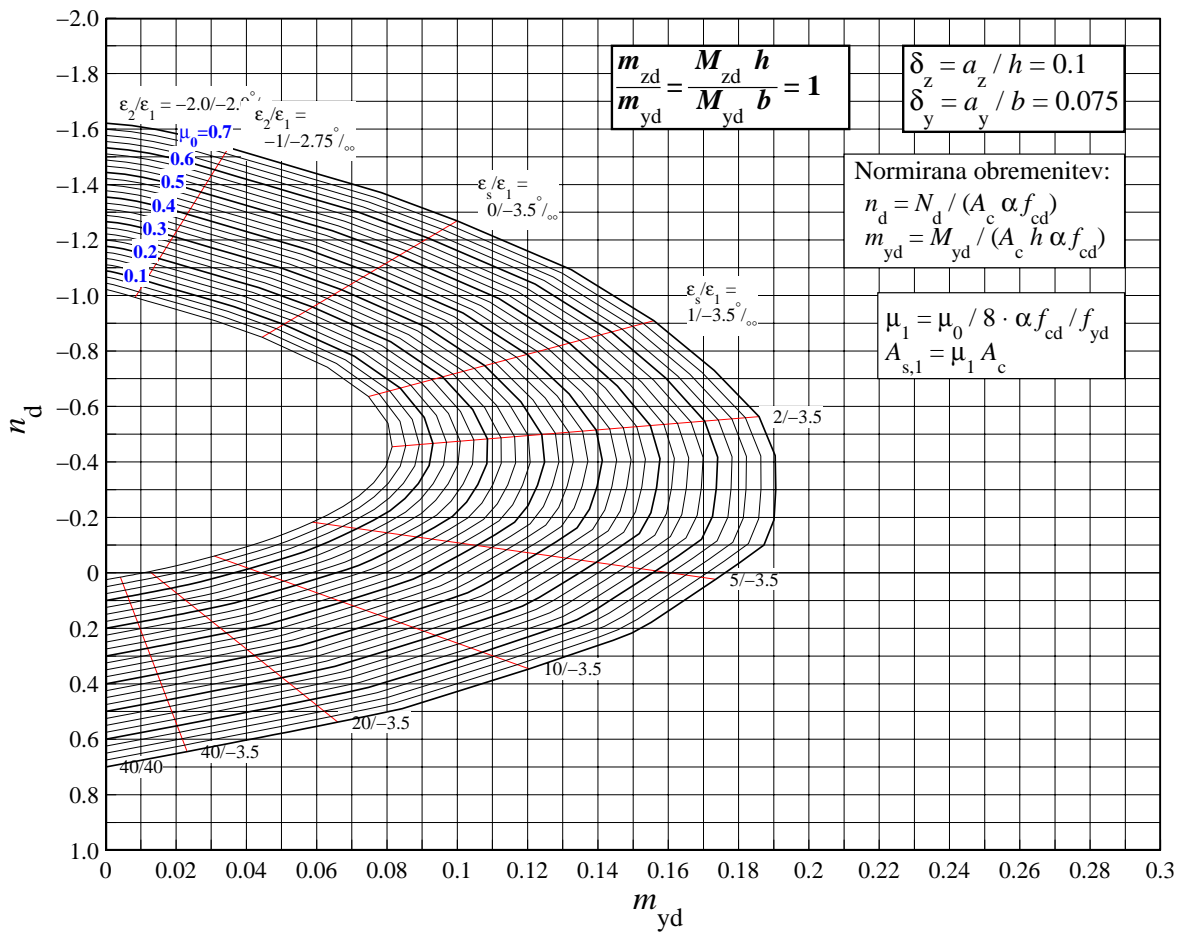
Slika 87: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



Slika 88: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.

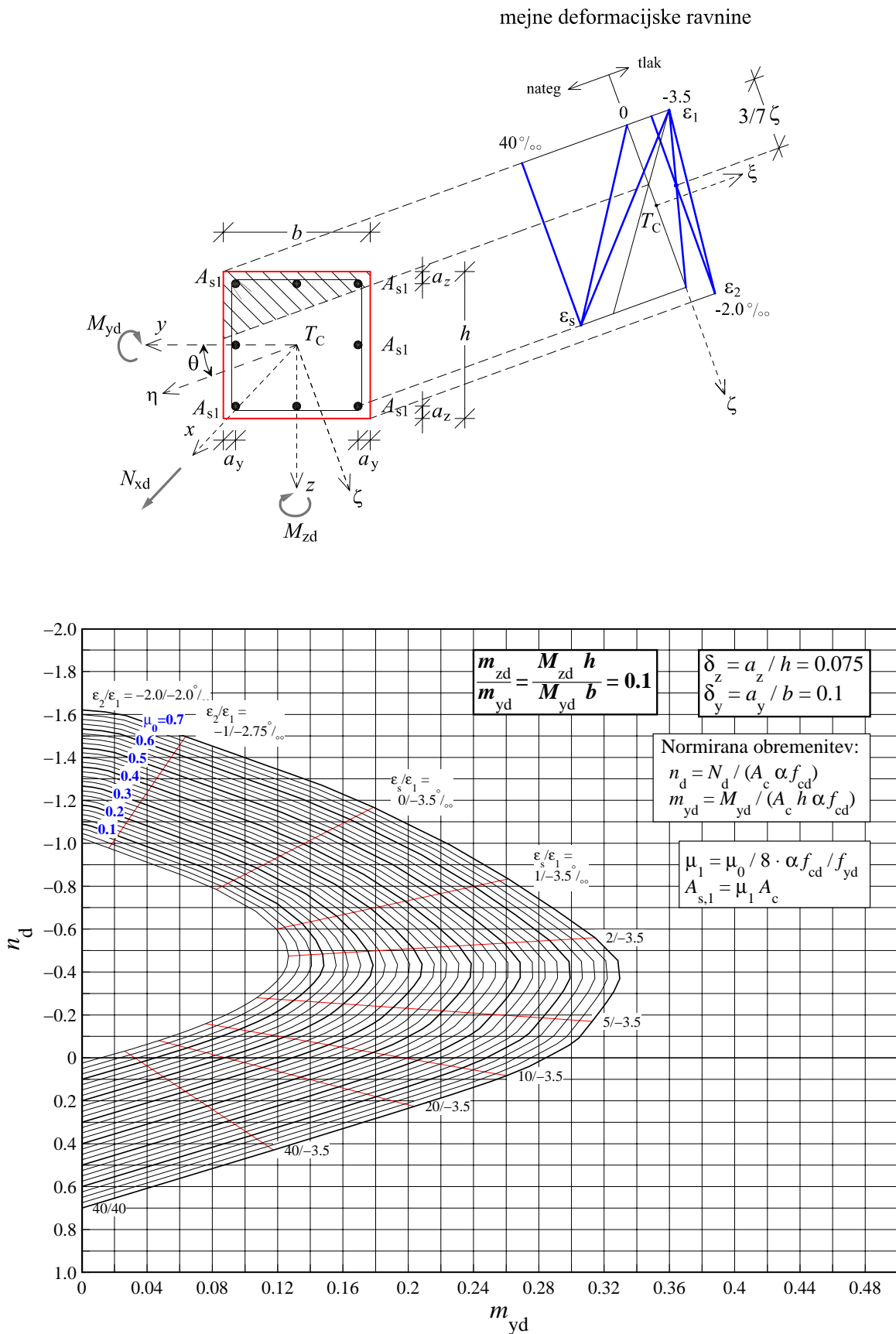


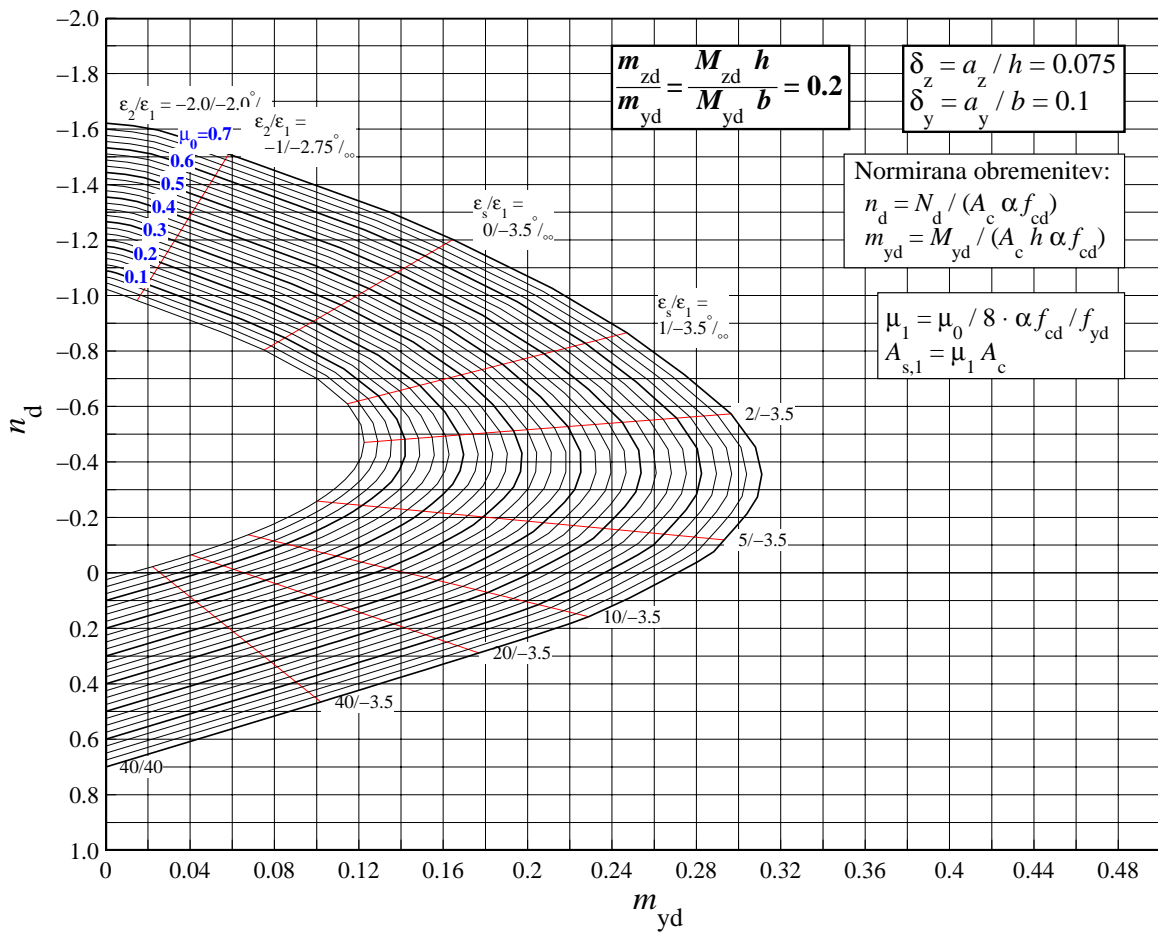
Slika 89: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.



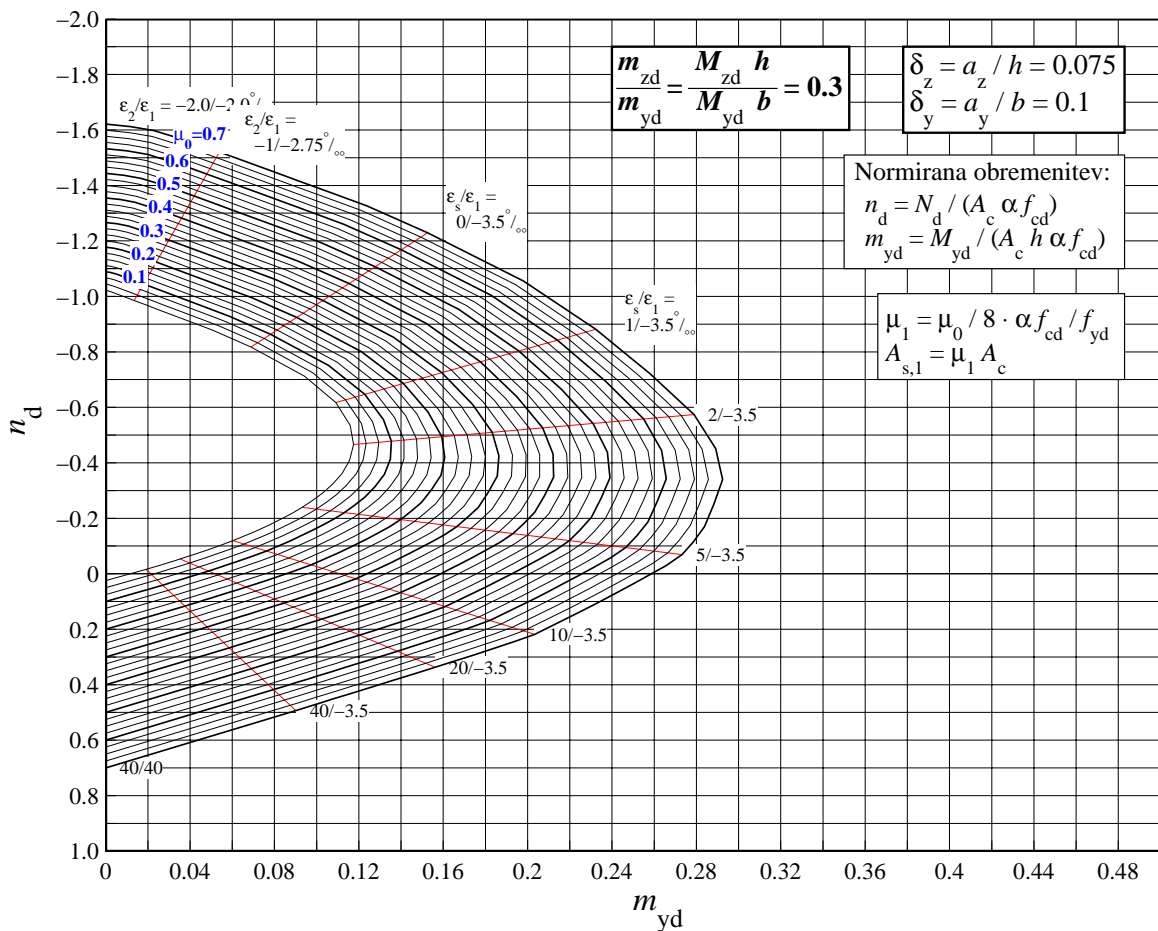
Slika 90: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 8 palic.

2.10 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.075, \delta_y = 0.1$), S500

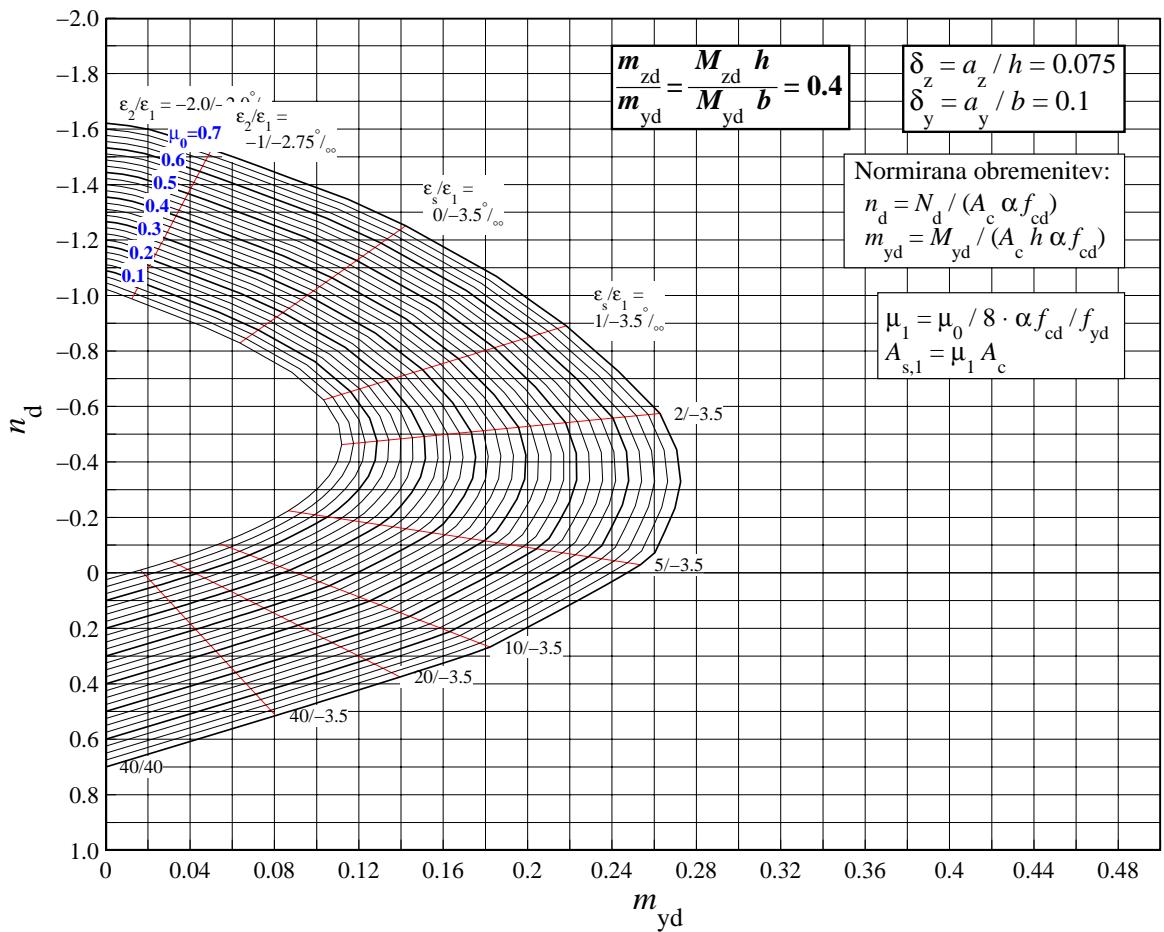




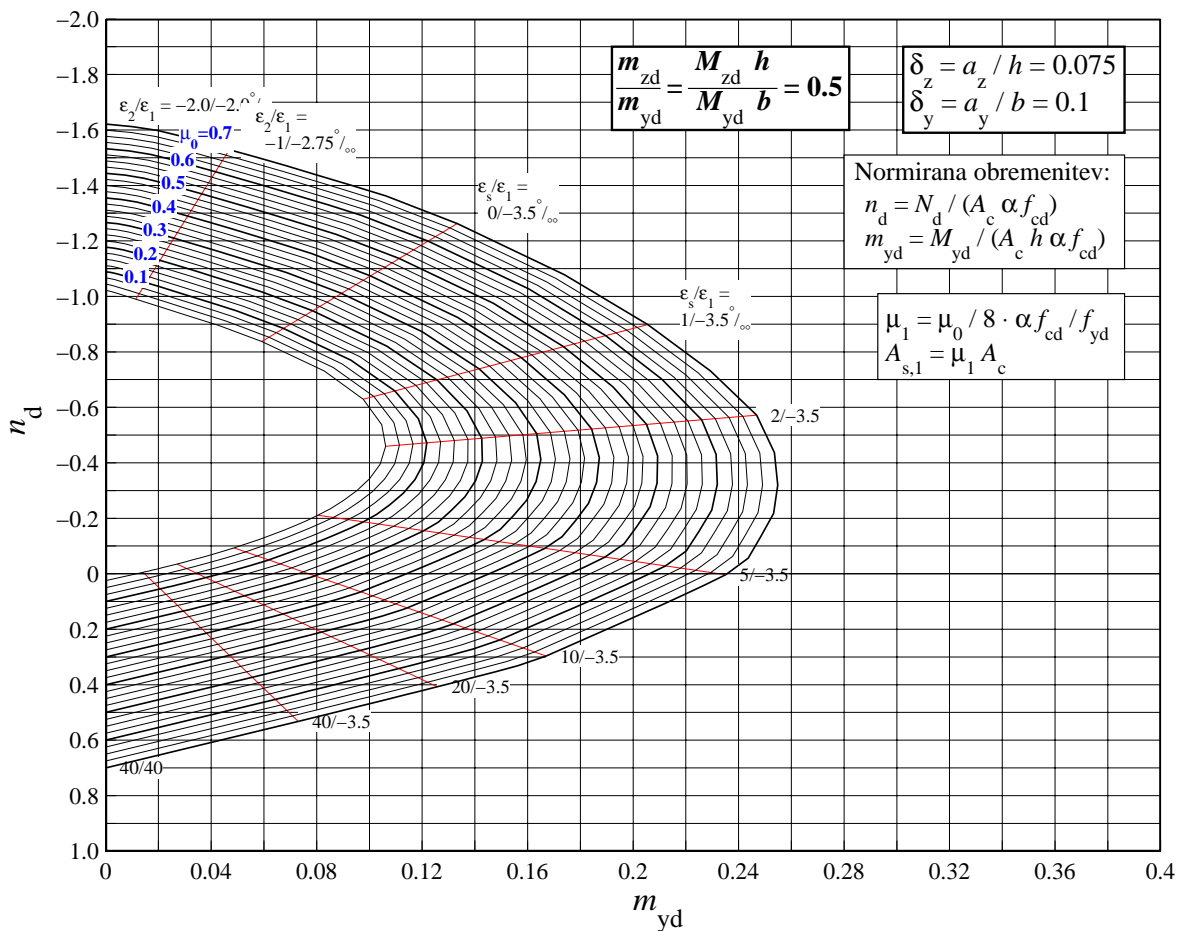
Slika 92: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



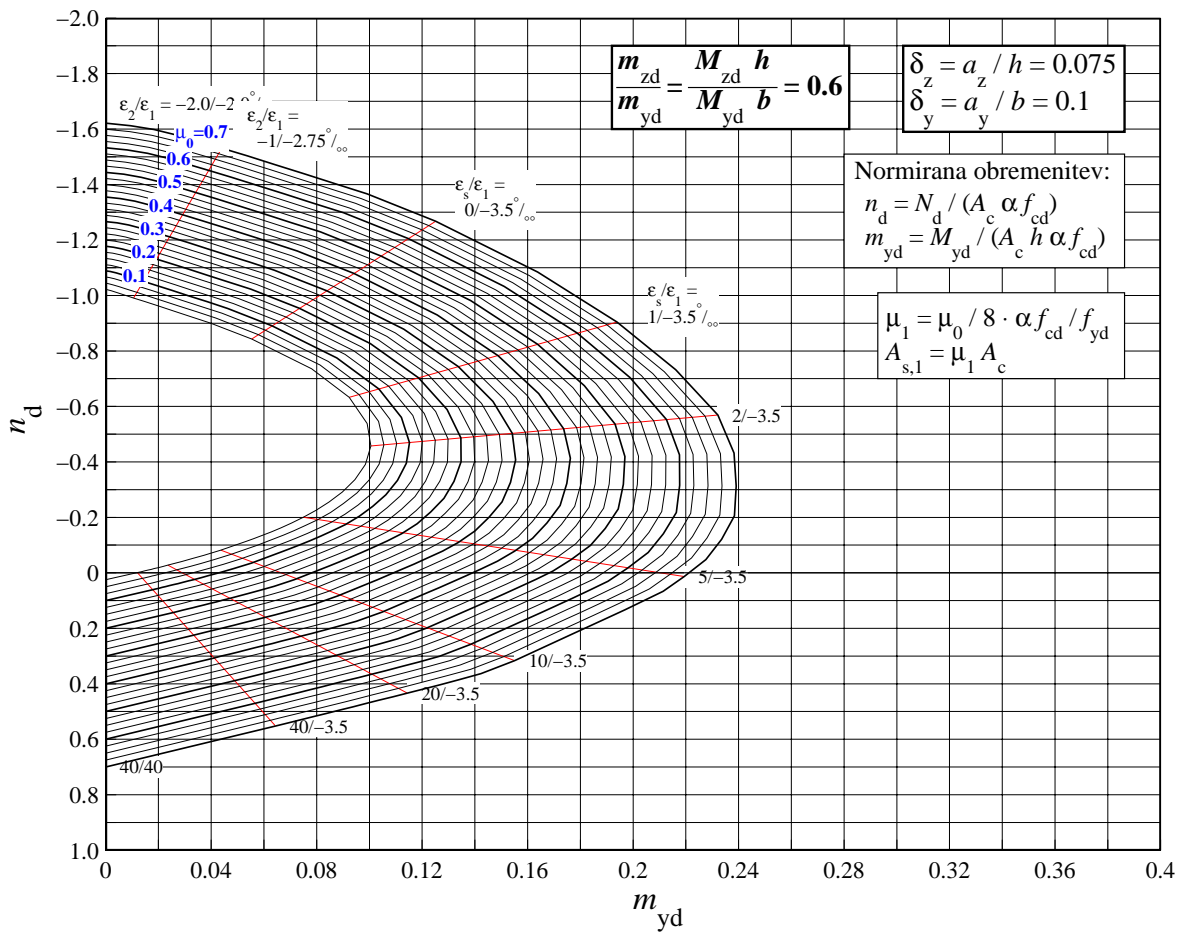
Slika 93: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



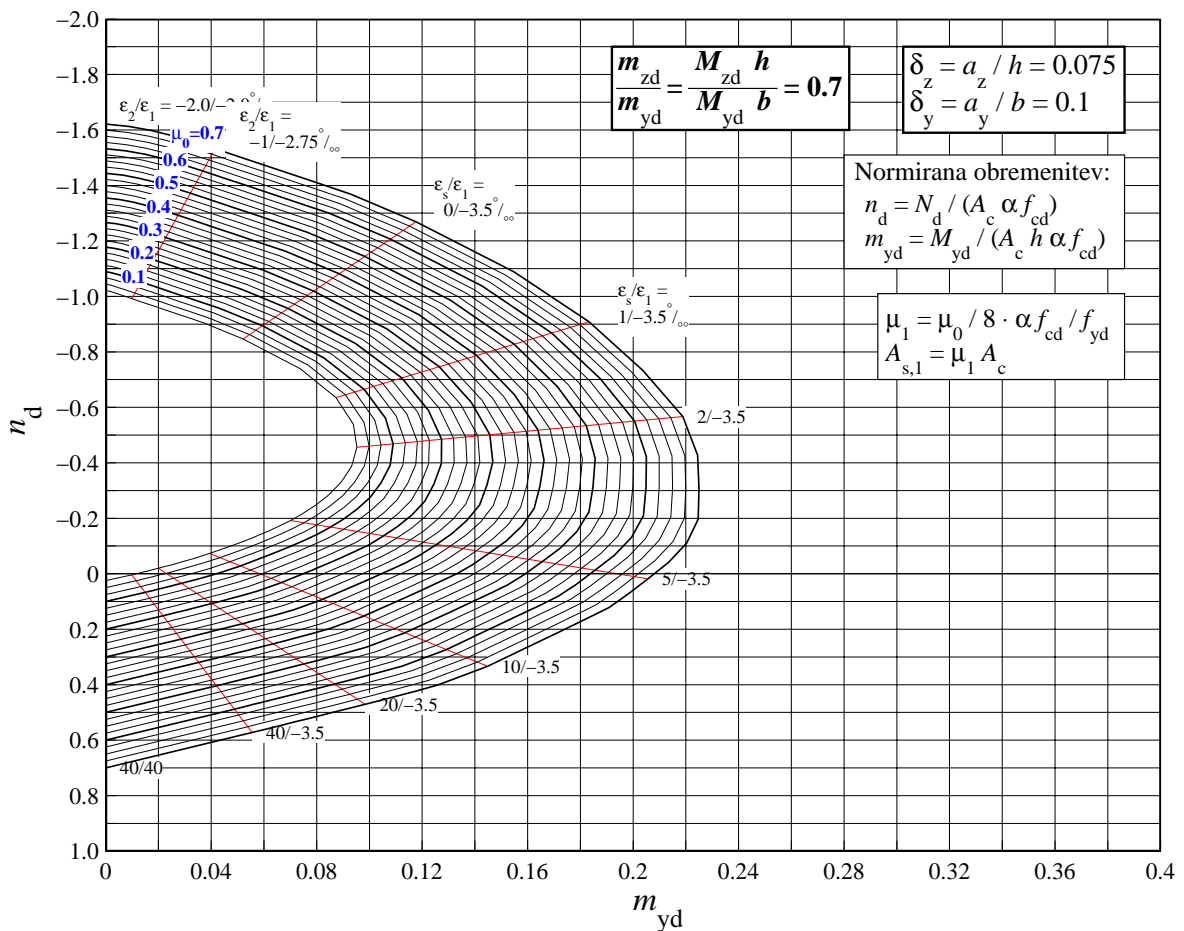
Slika 94: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



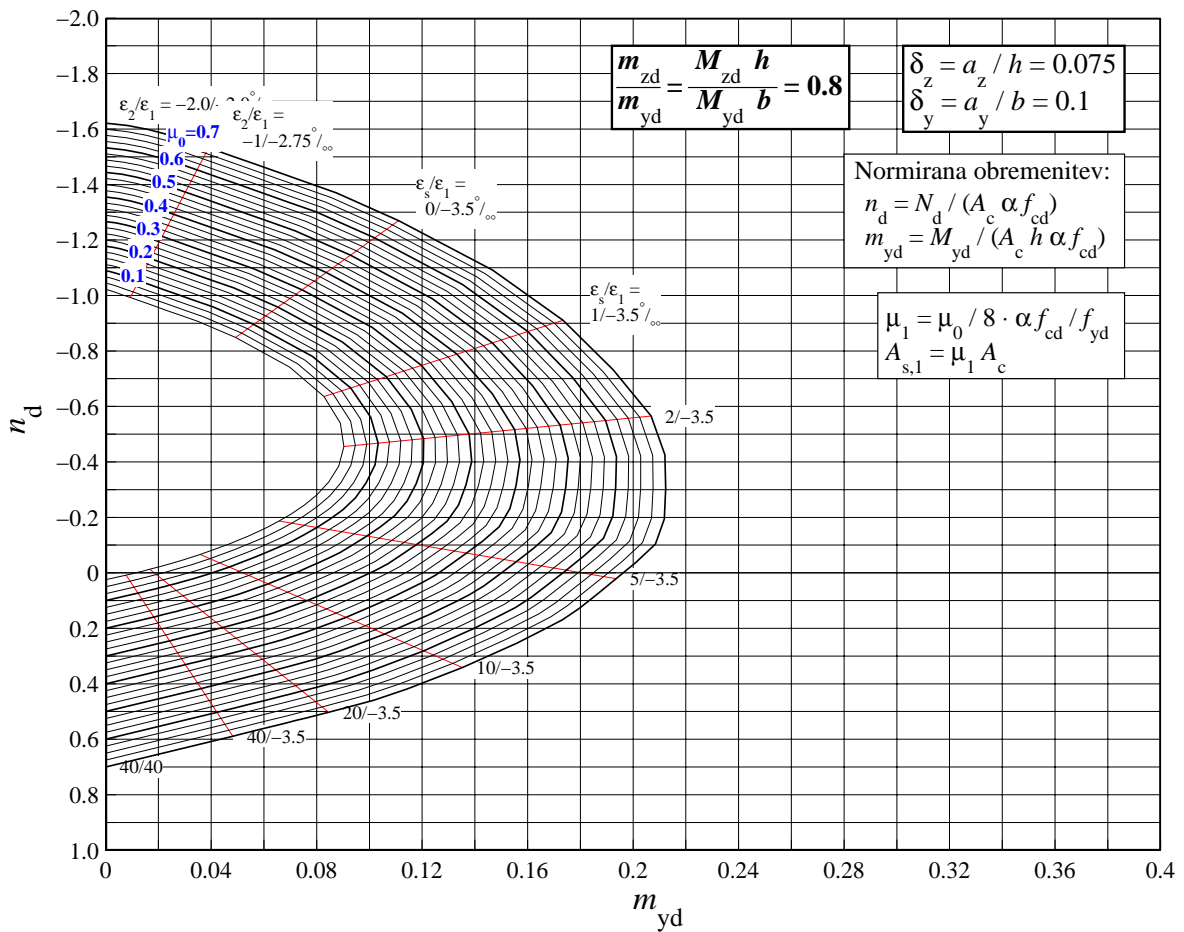
Slika 95: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



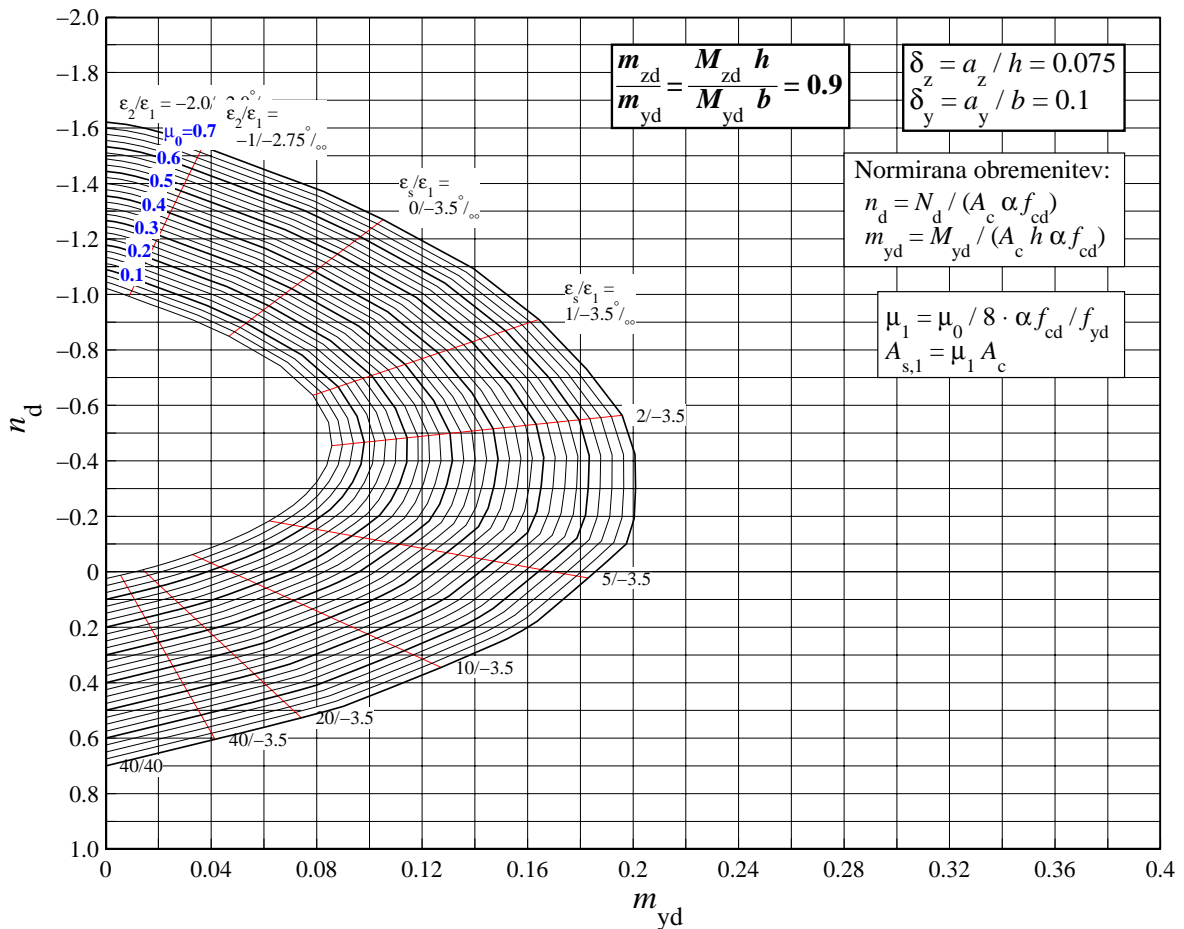
Slika 96: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



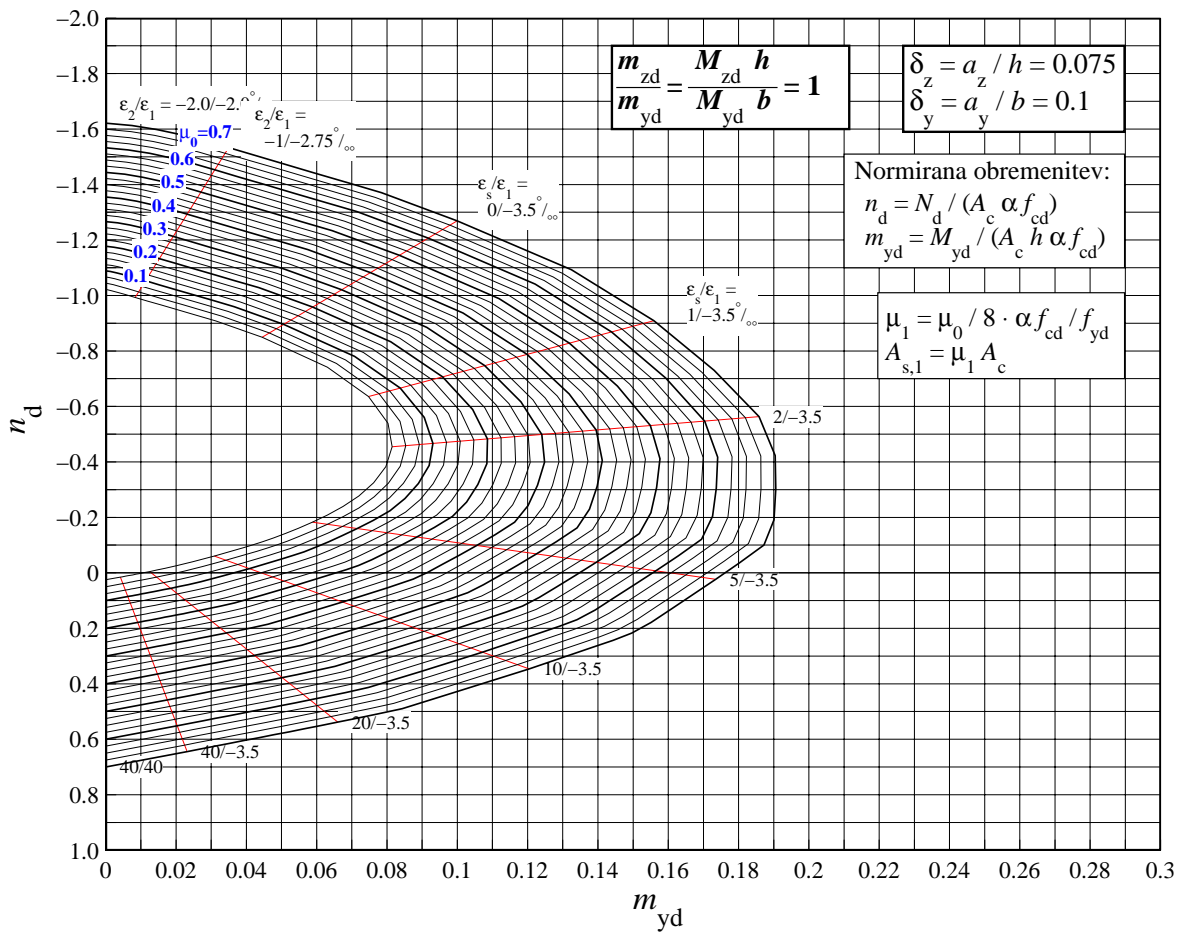
Slika 97: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



Slika 98: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.

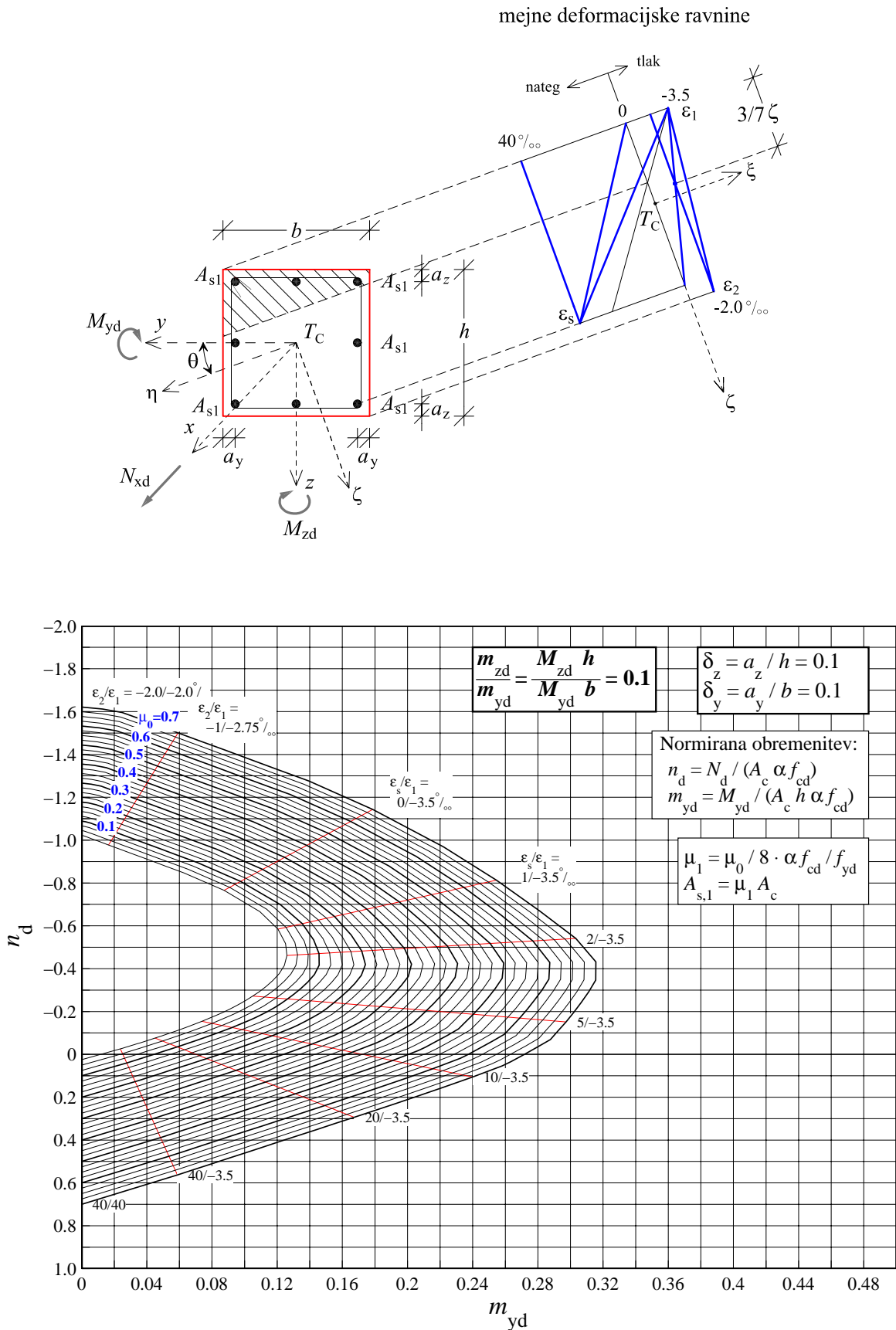


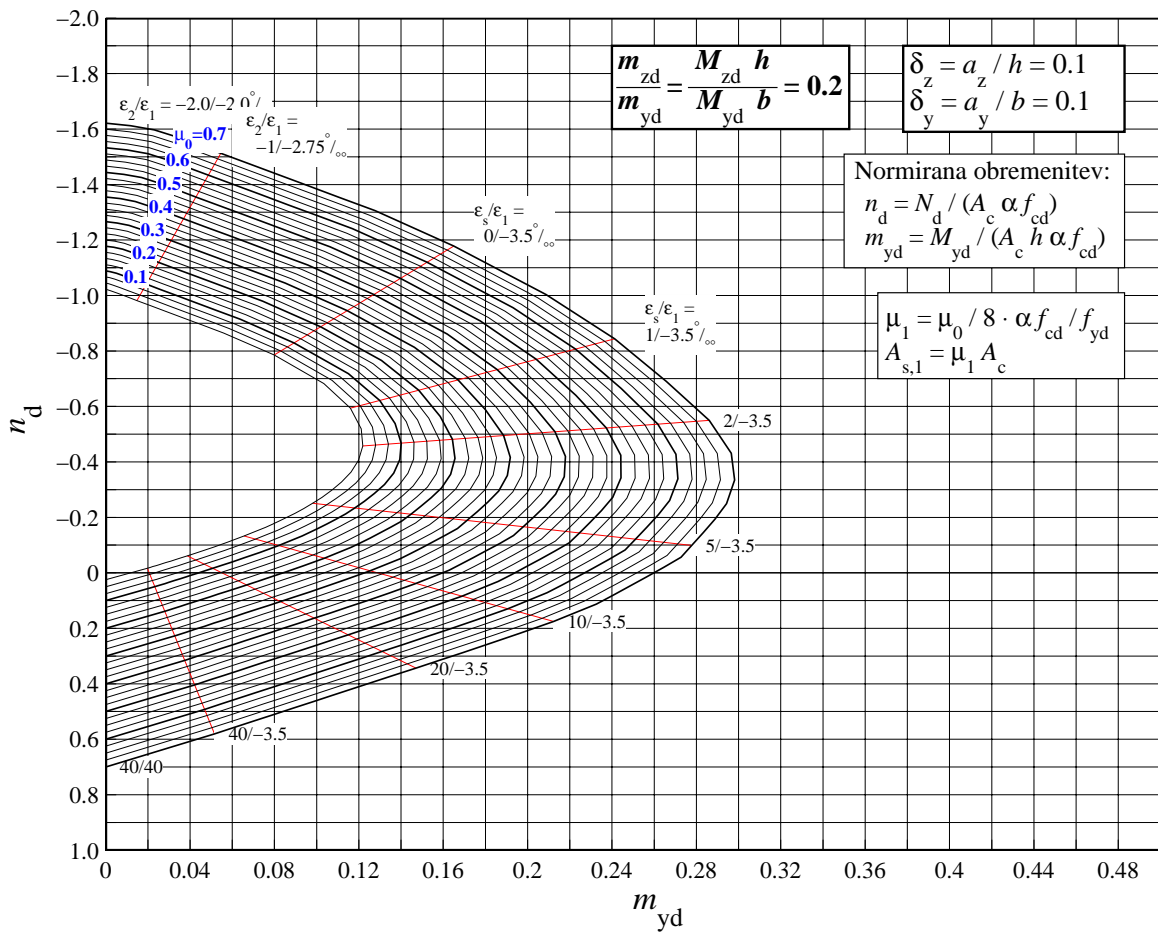
Slika 99: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.



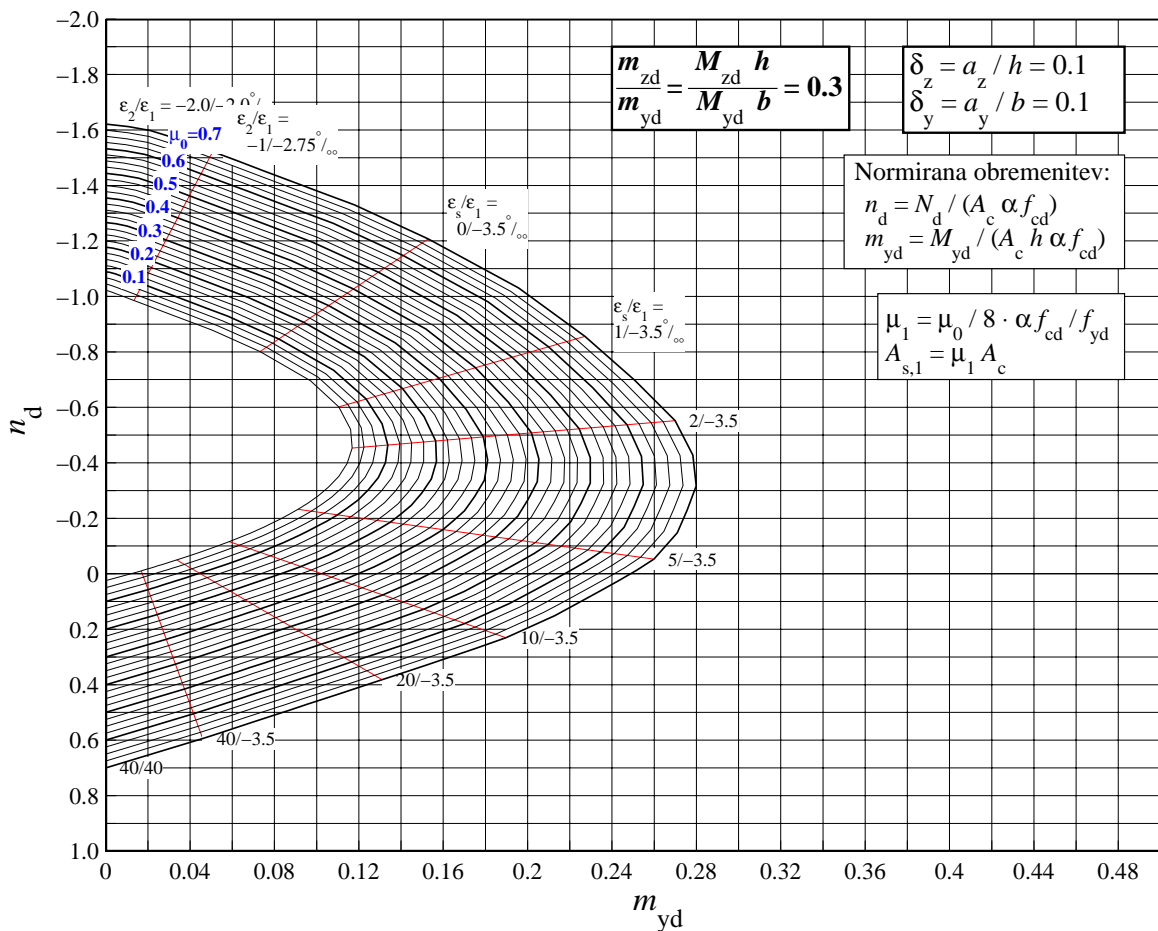
Slika 100: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 8 palic.

2.11 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.1, \delta_y = 0.1$), S500

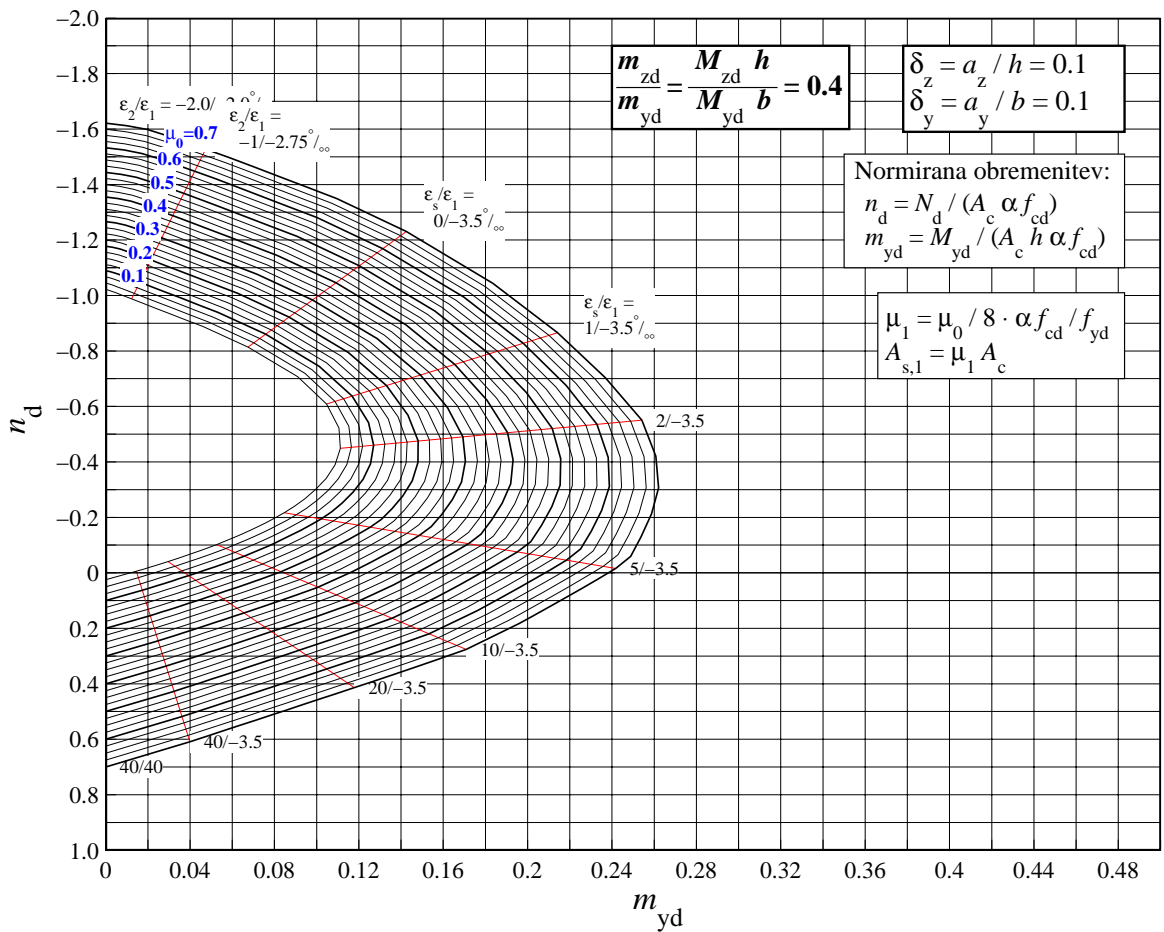




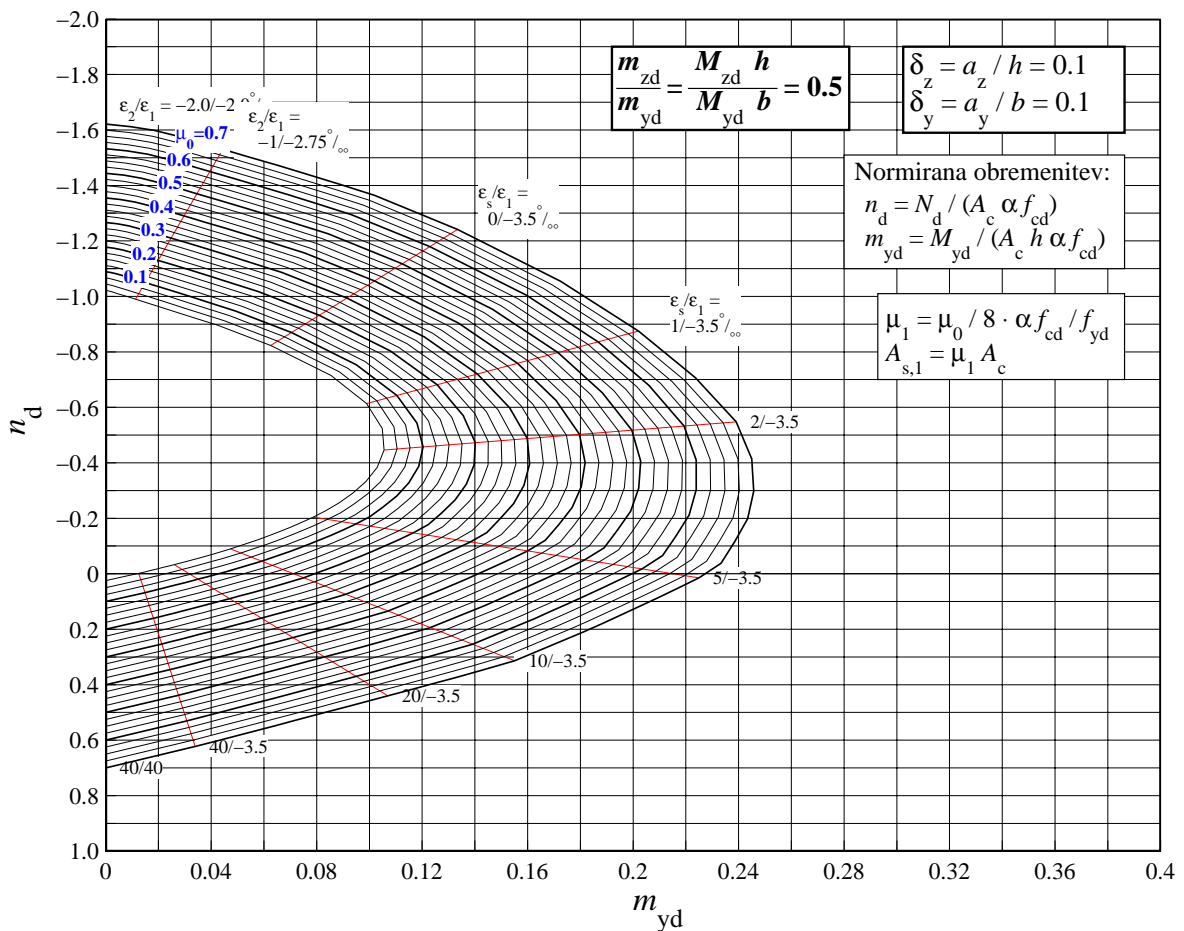
Slika 102: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



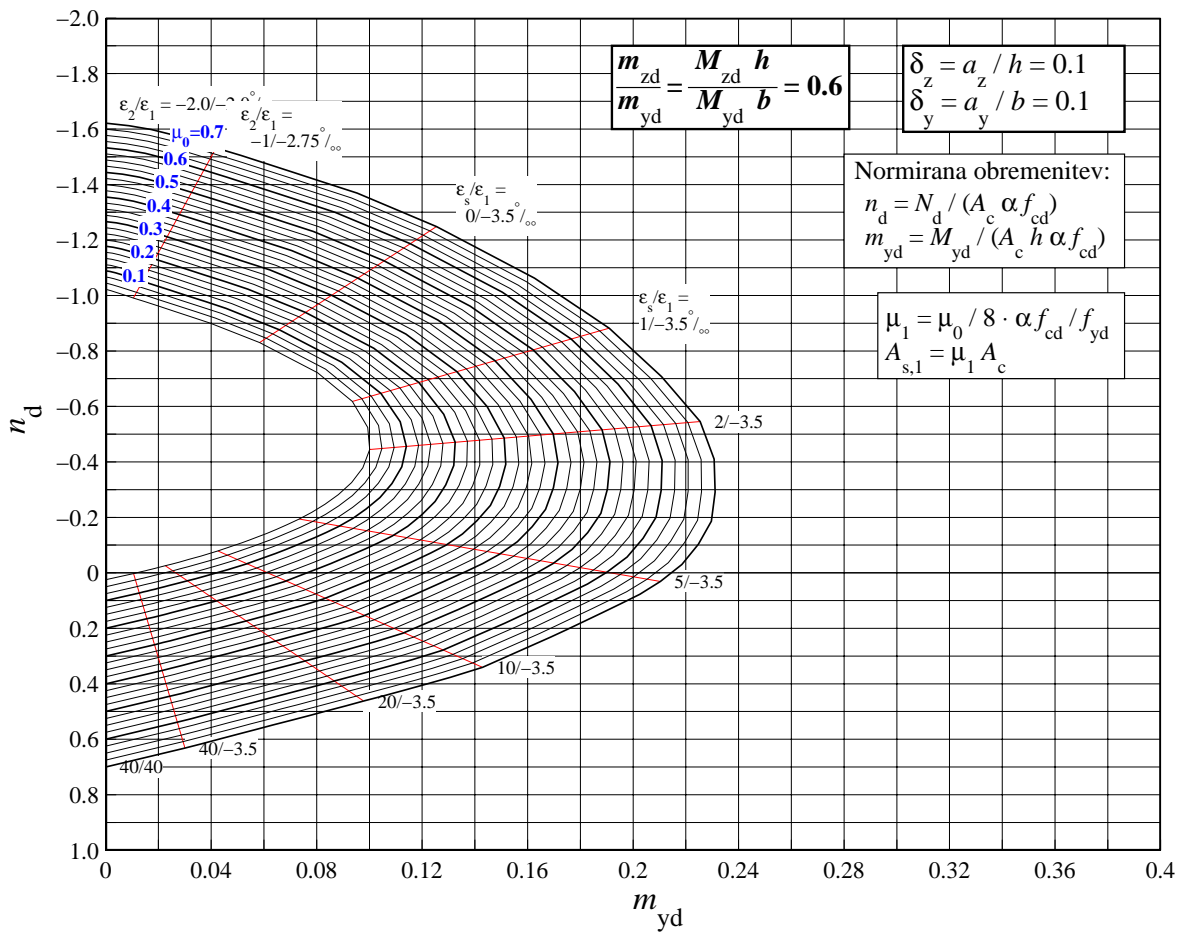
Slika 103: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



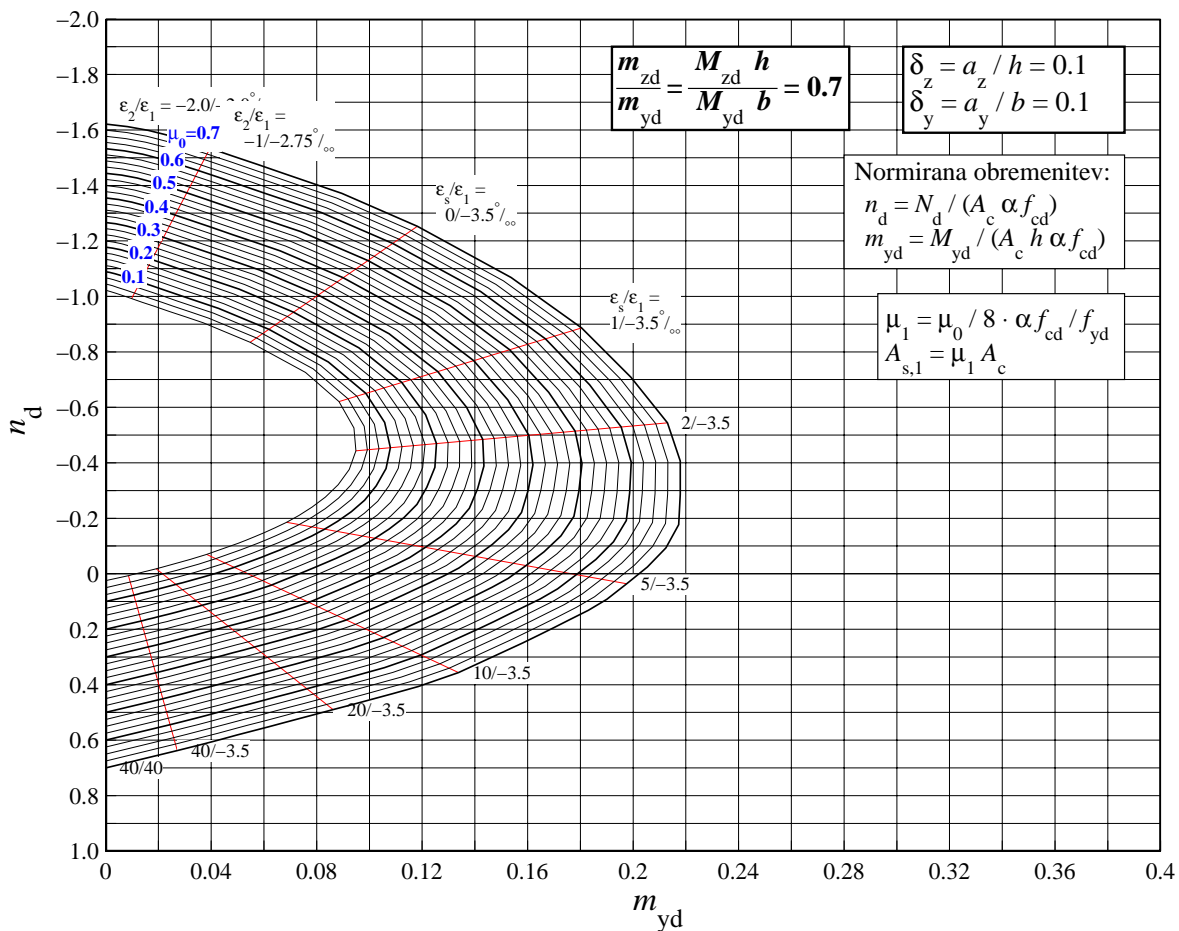
Slika 104: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



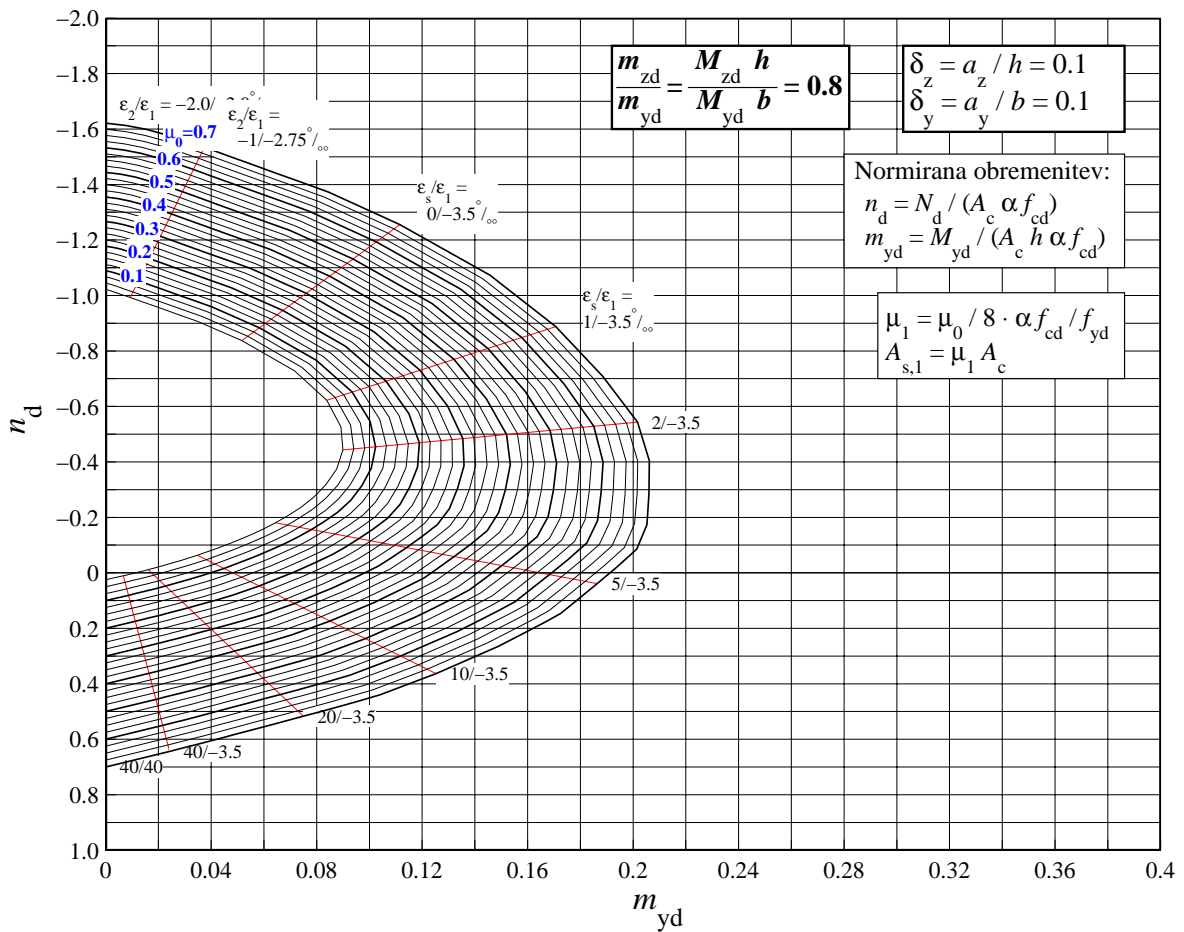
Slika 105: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



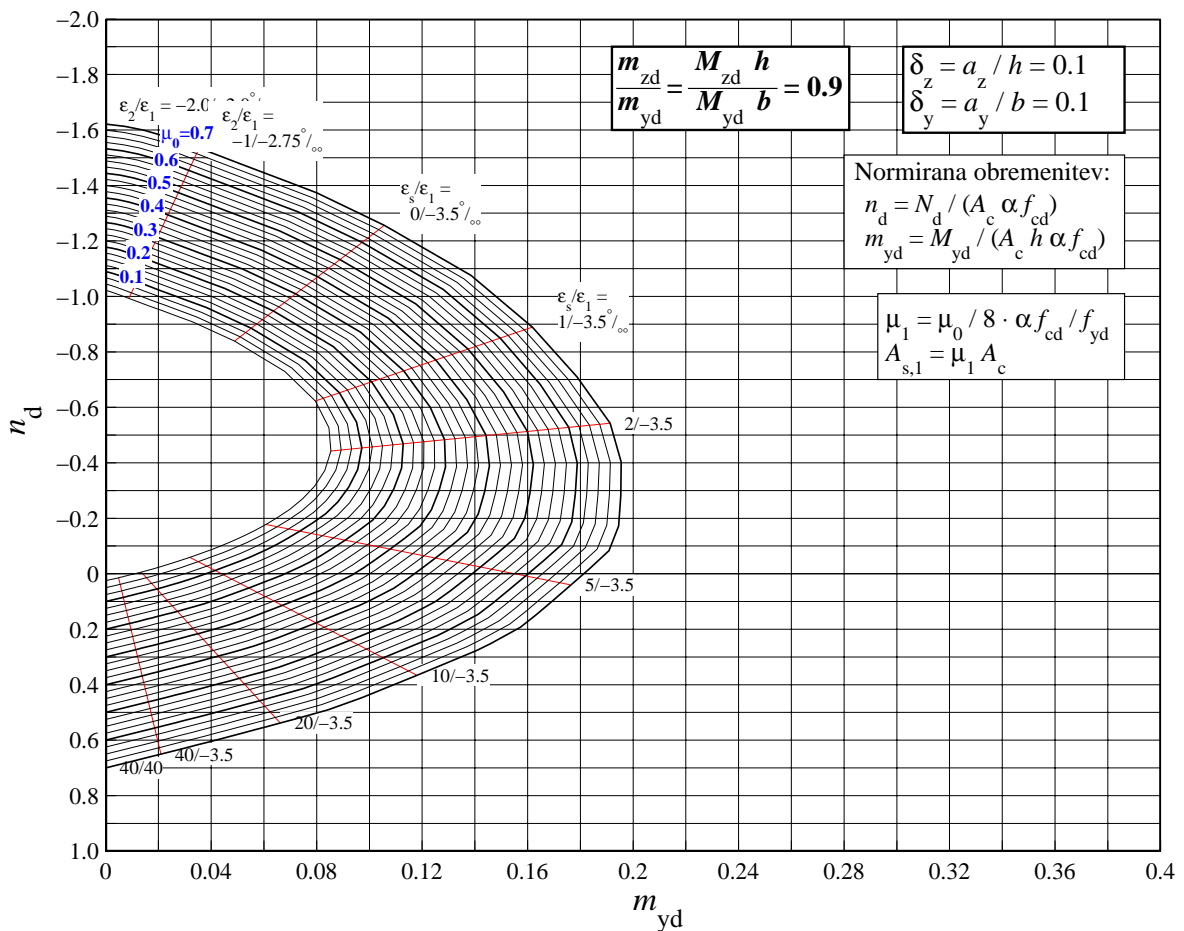
Slika 106: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



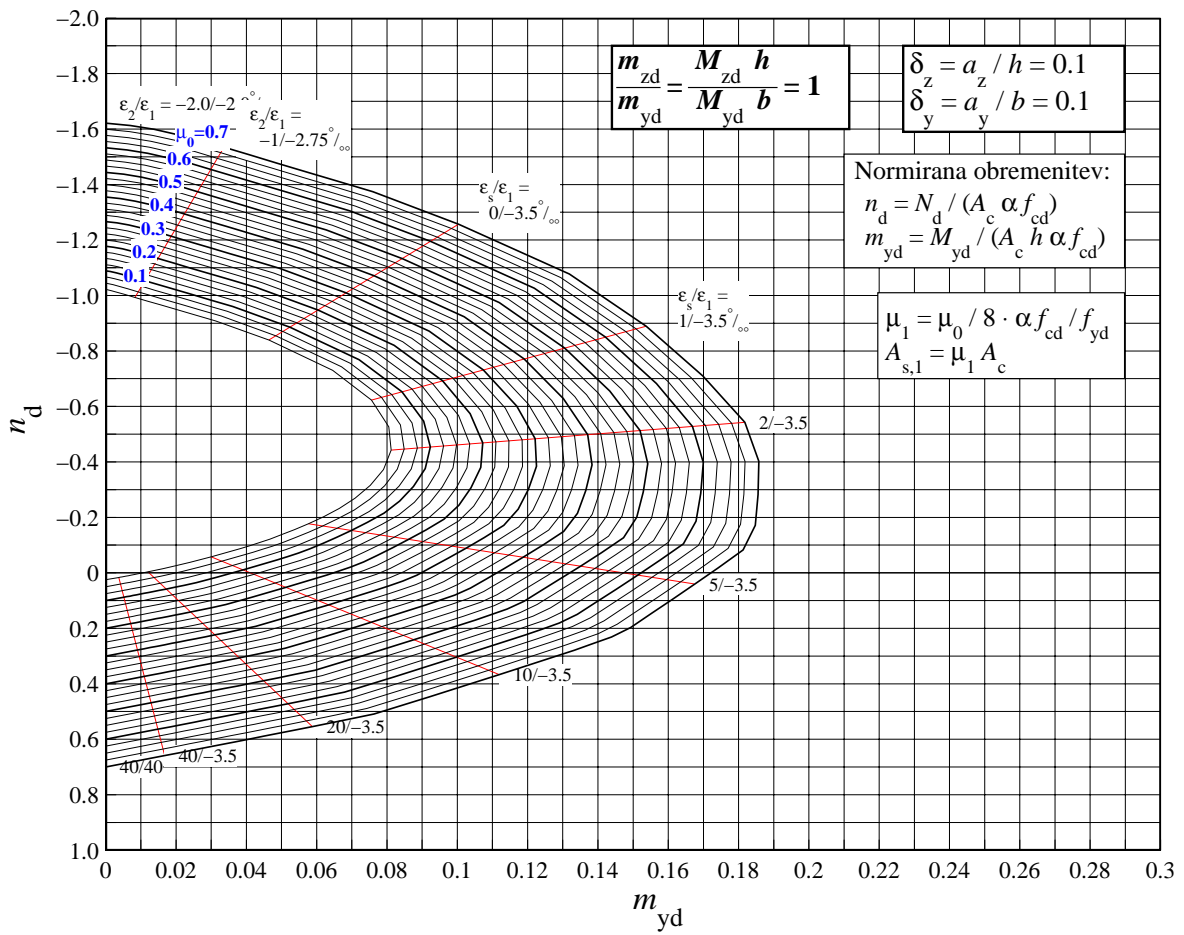
Slika 107: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.



Slika 108: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.

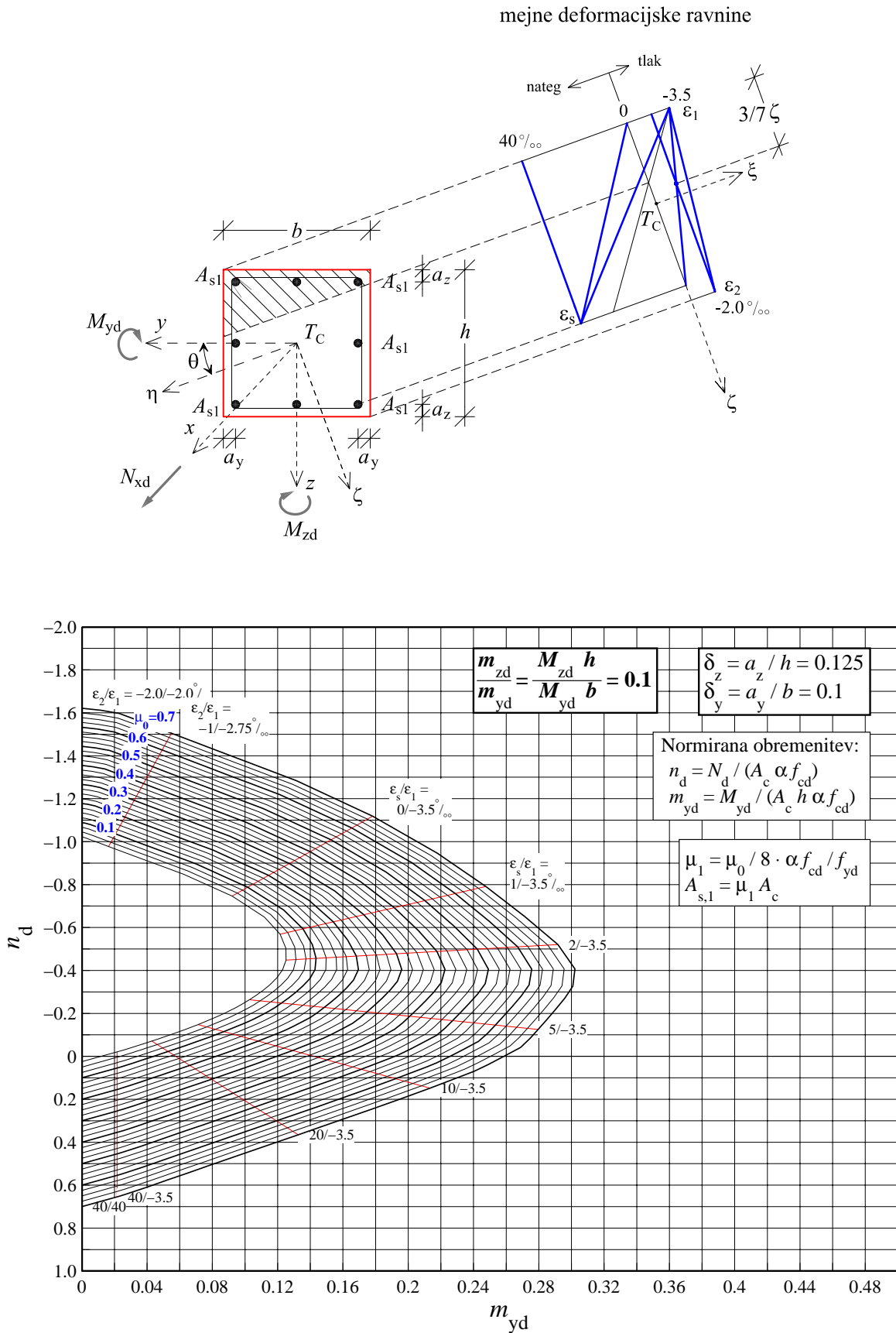


Slika 109: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.

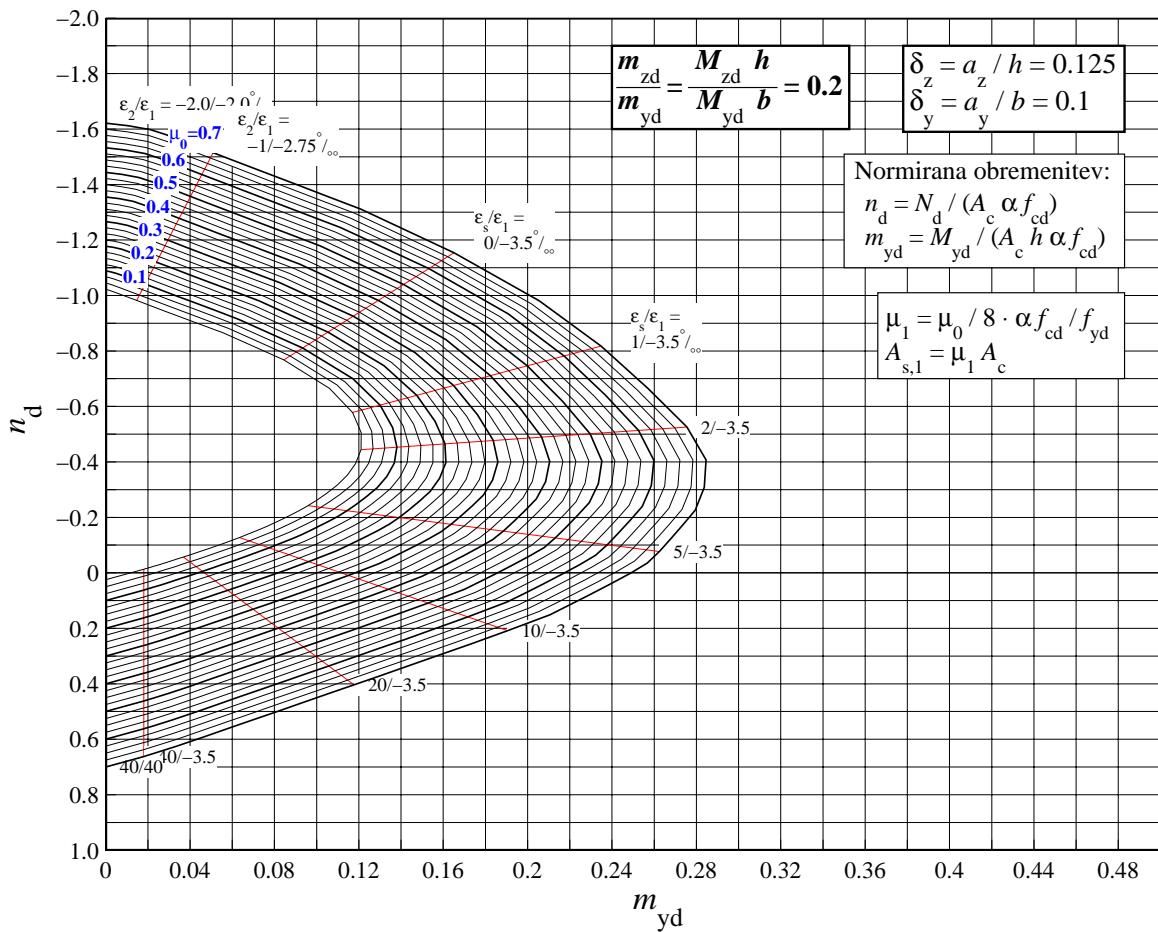


Slika 110: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 8 palic.

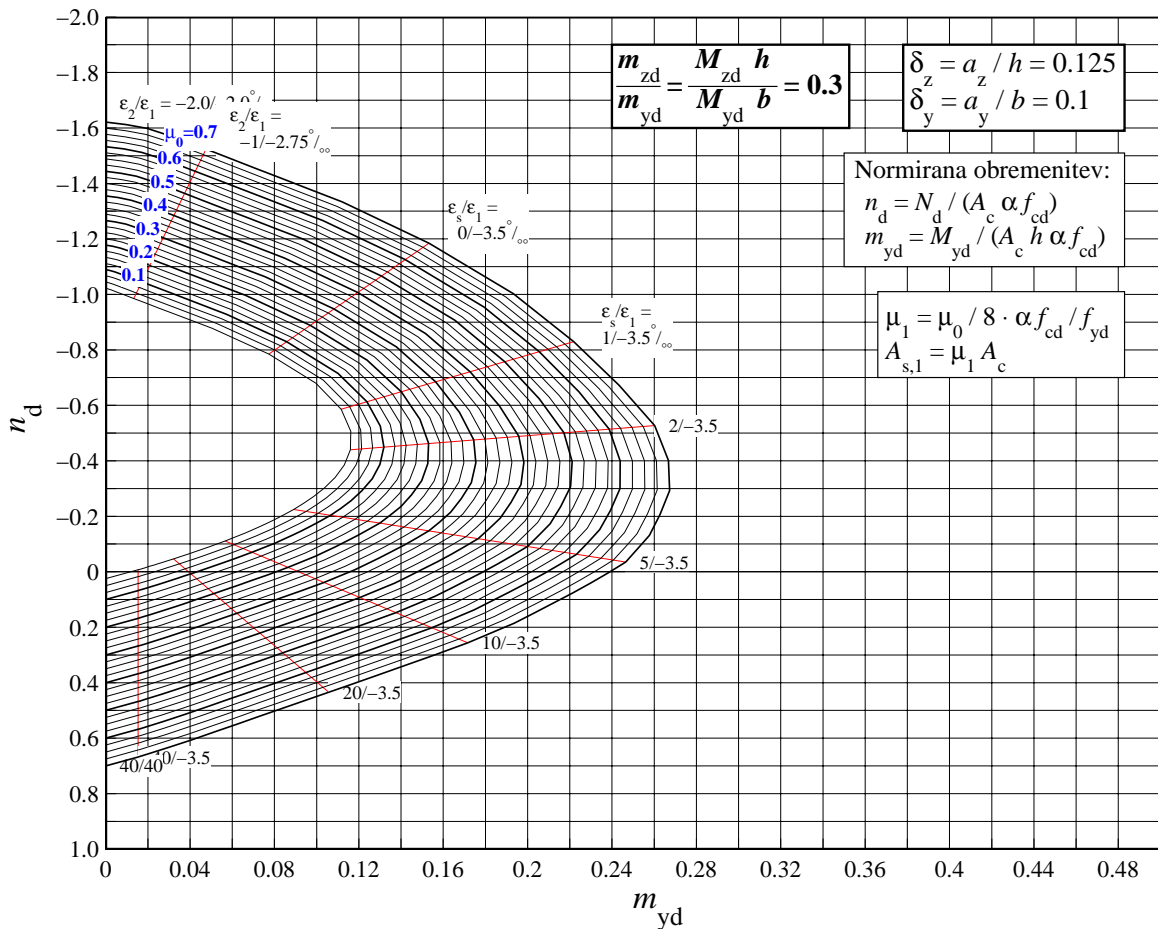
2.12 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.125, \delta_y = 0.1$), S500



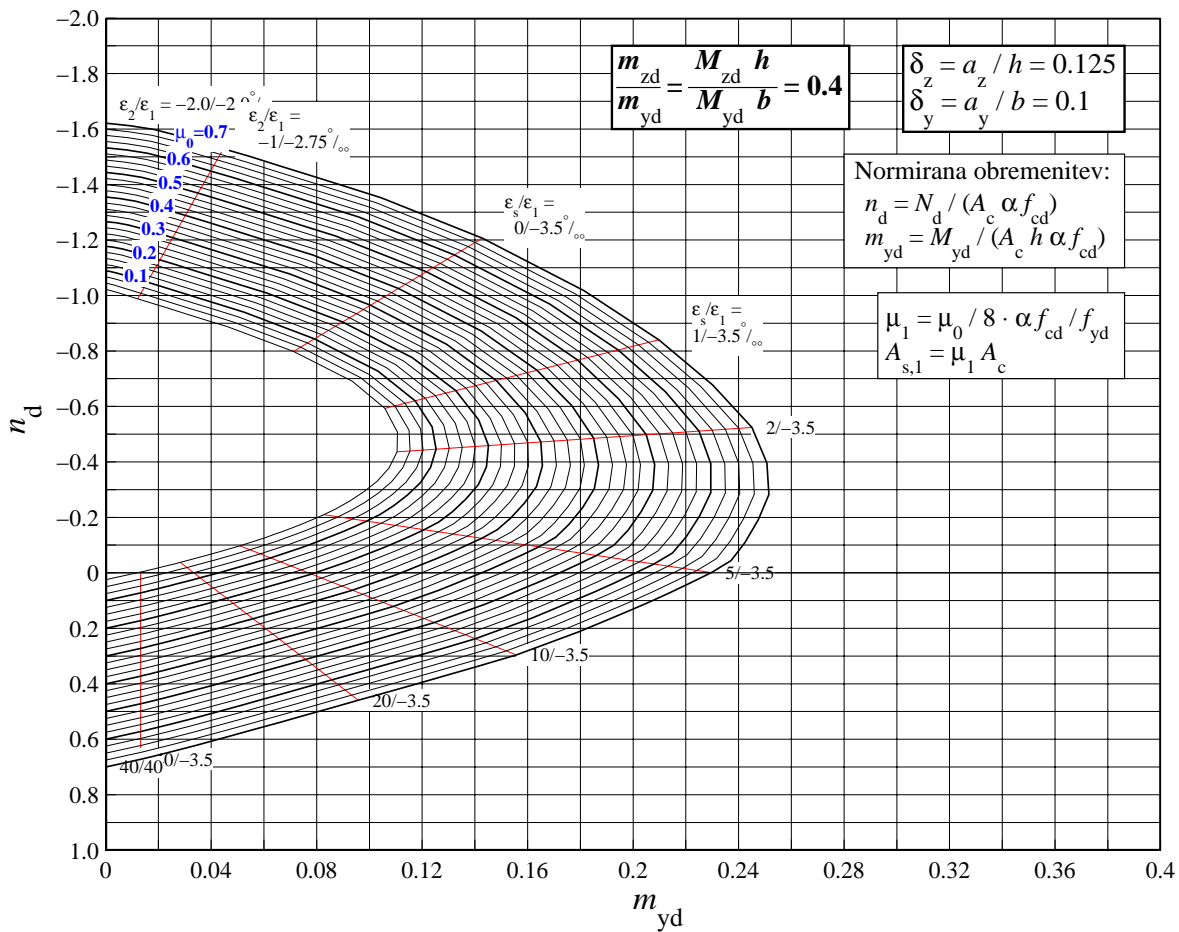
Slika 111: Pravokotni prerez: $\delta_z = 0.125, \delta_y = 0.1$, 8 palic.



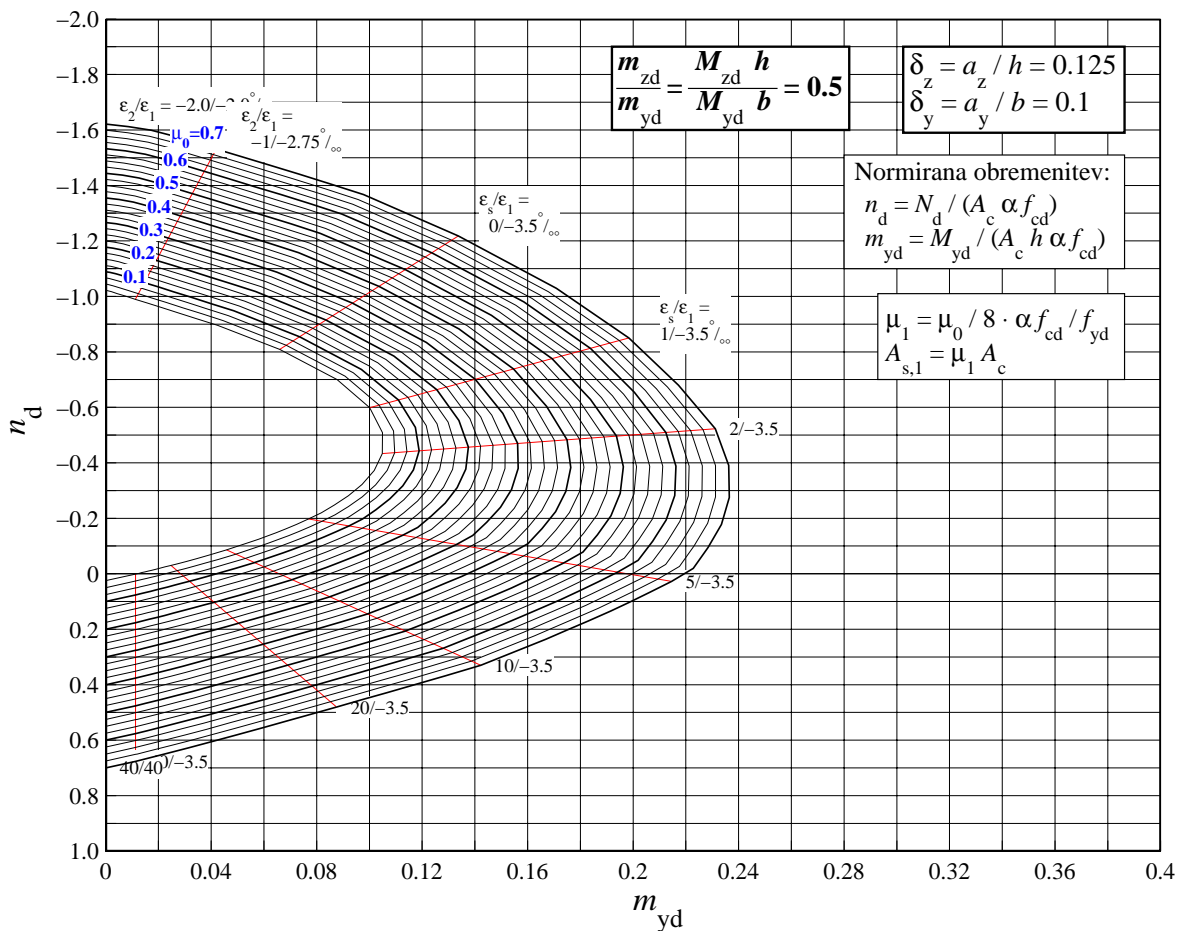
Slika 112: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



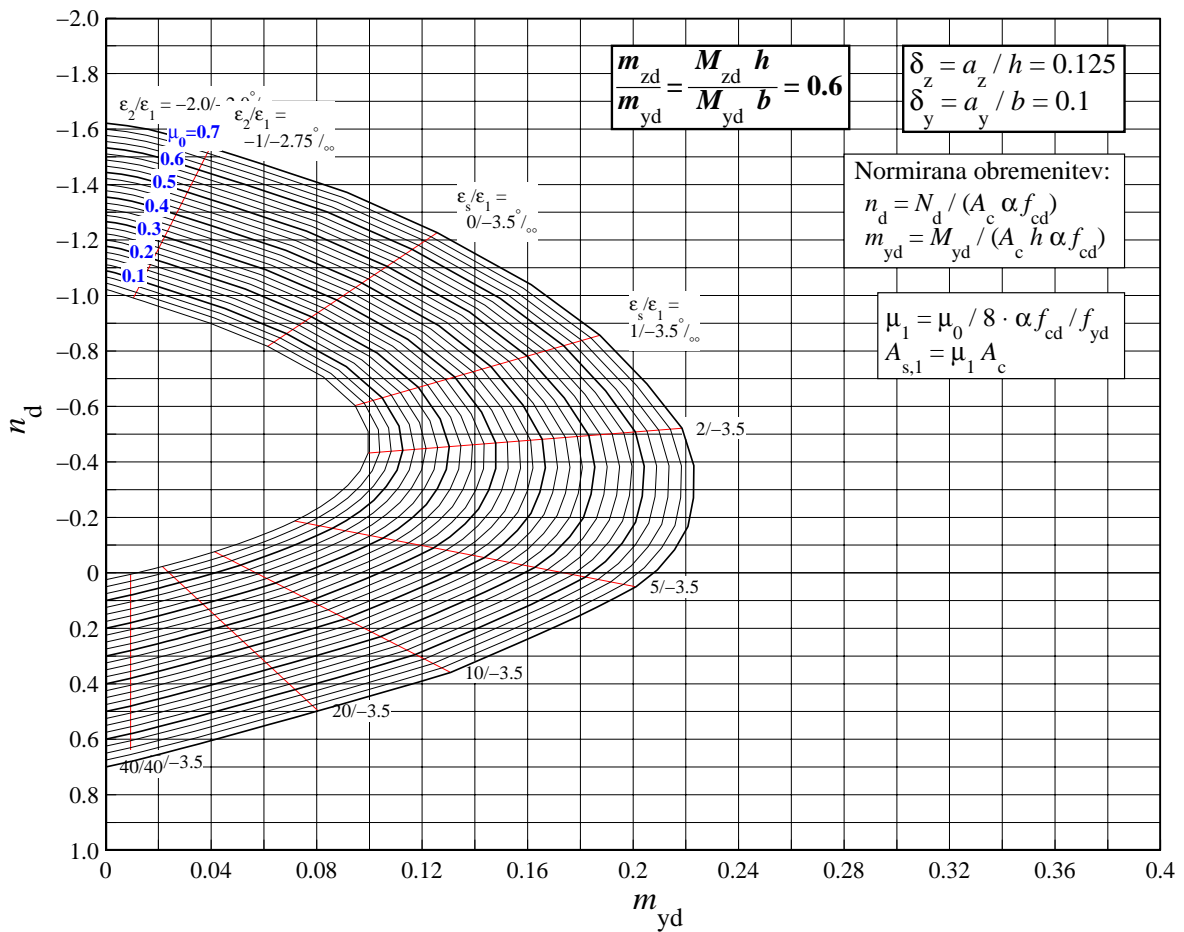
Slika 113: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



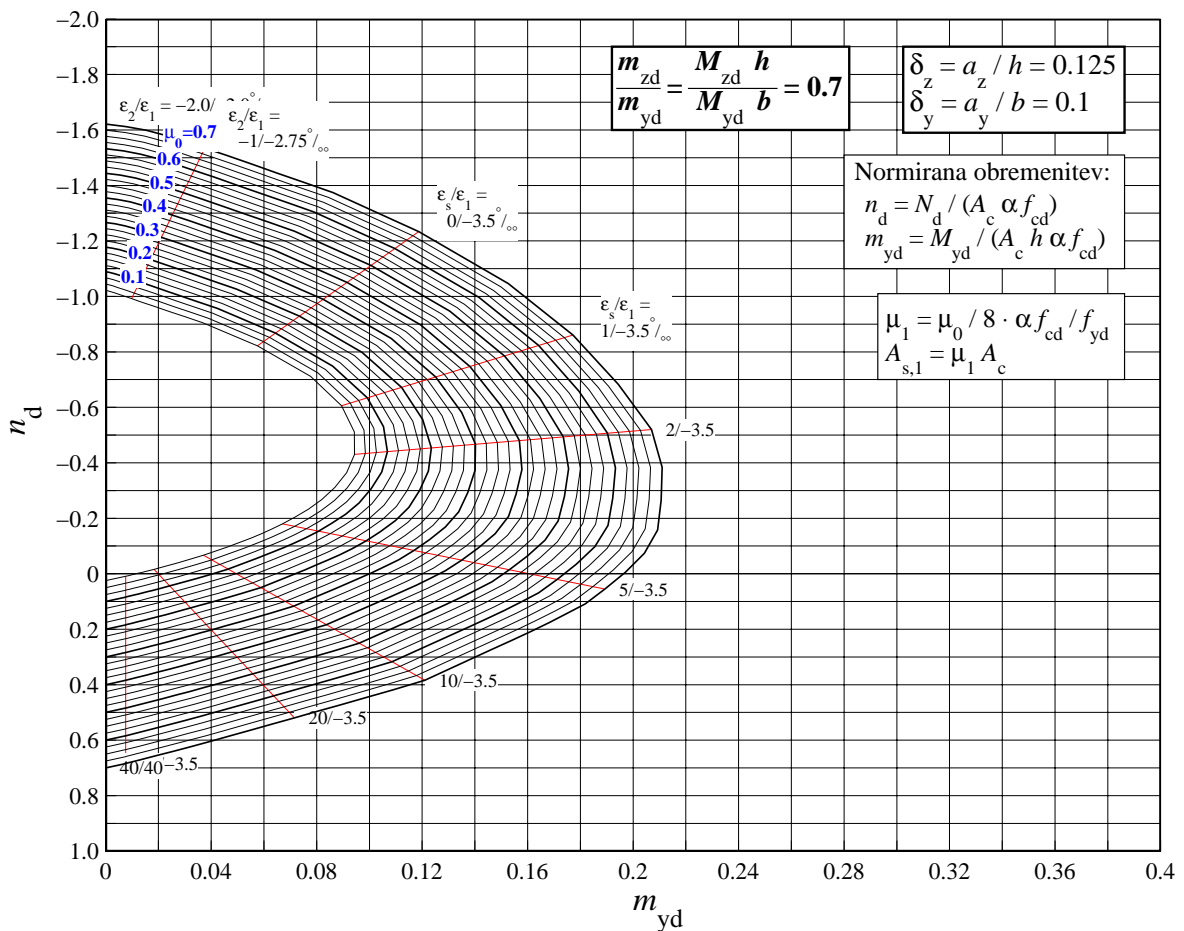
Slika 114: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



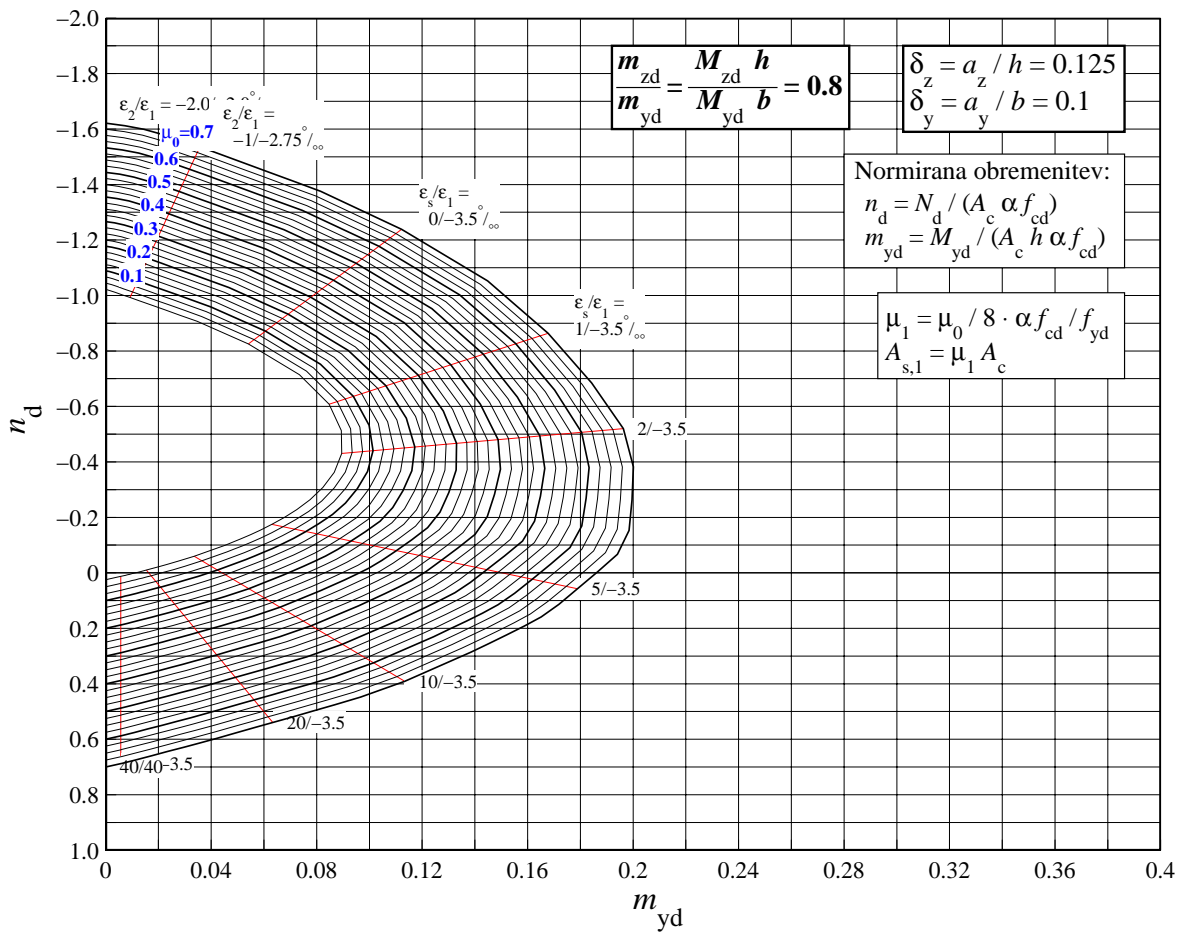
Slika 115: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



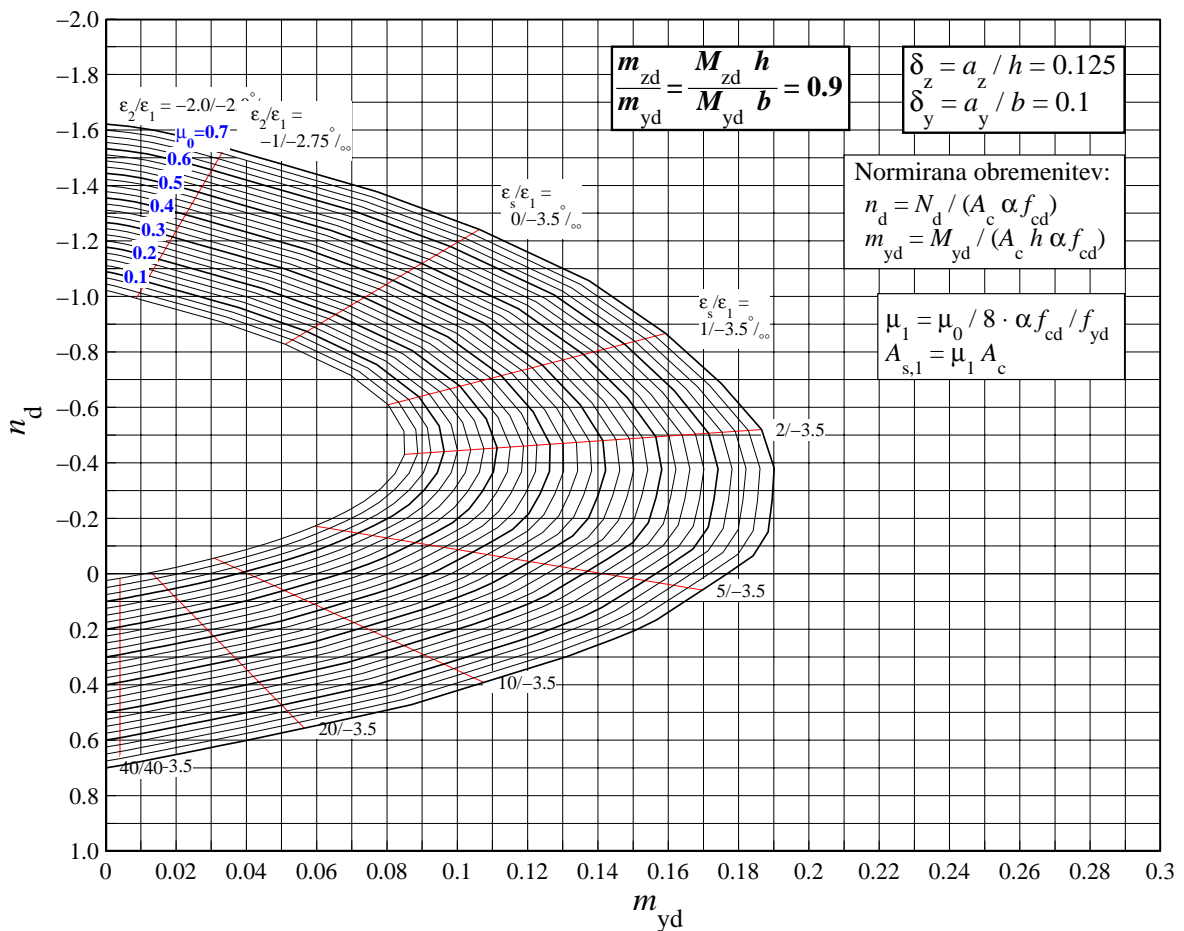
Slika 116: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



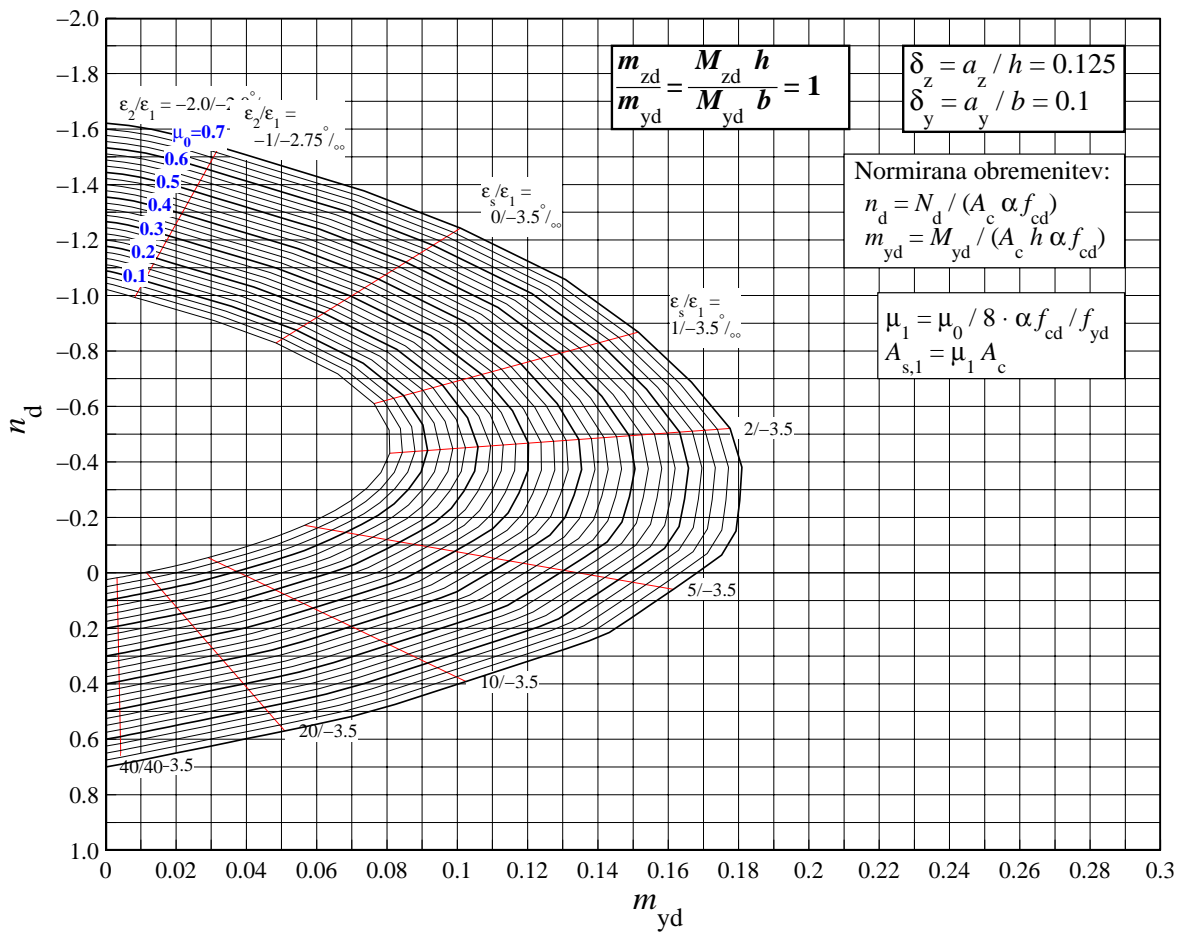
Slika 117: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.



Slika 118: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.

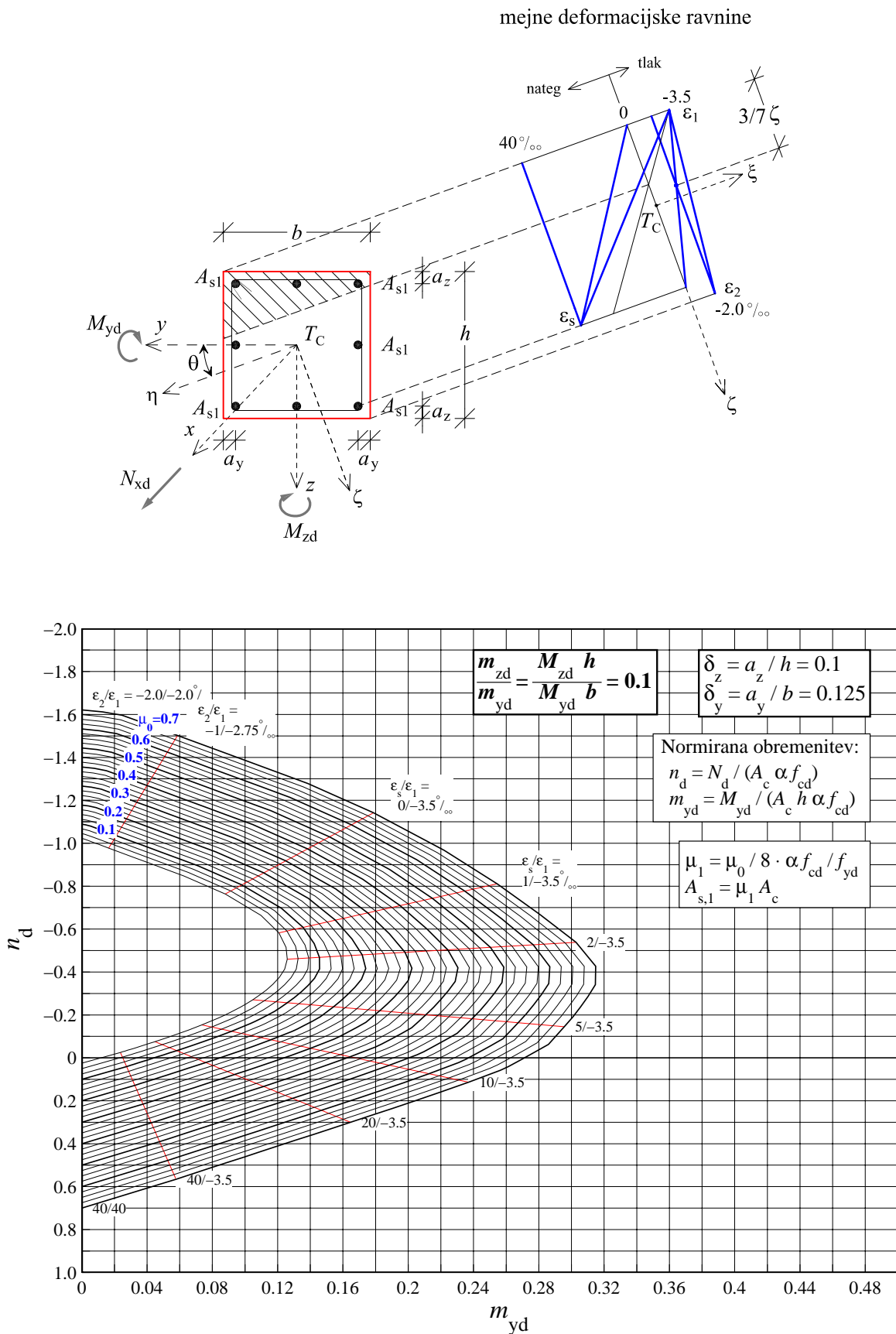


Slika 119: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.

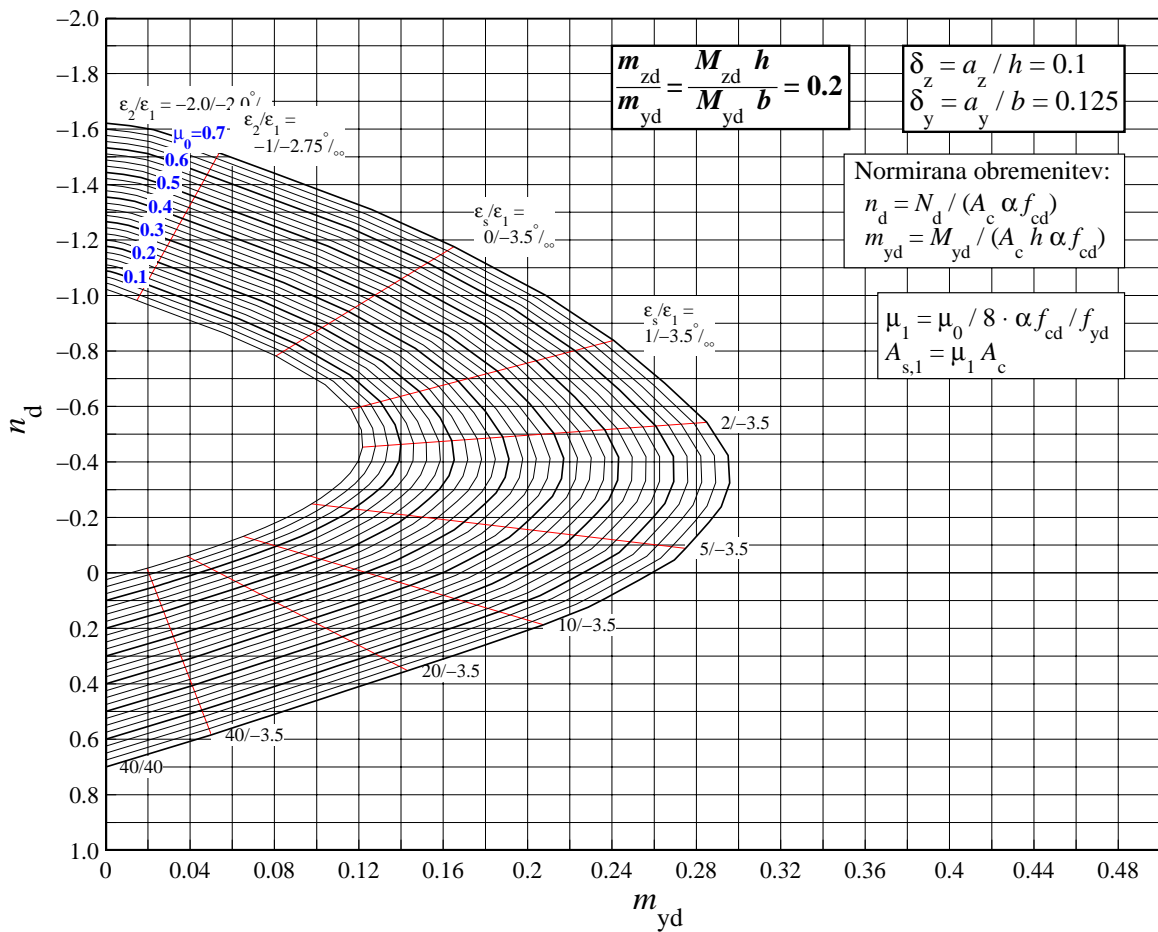


Slika 120: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.1$, 8 palic.

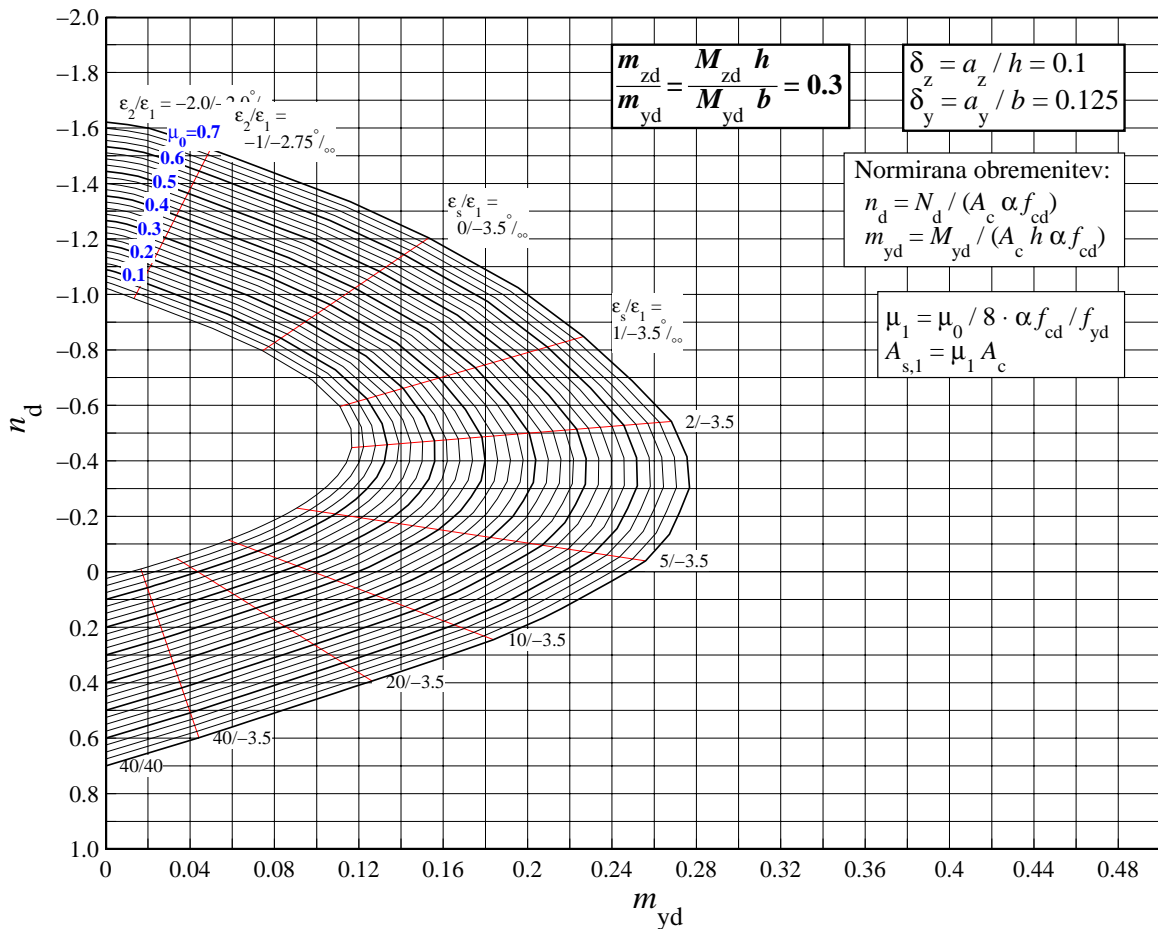
2.13 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.1, \delta_y = 0.125$), S500



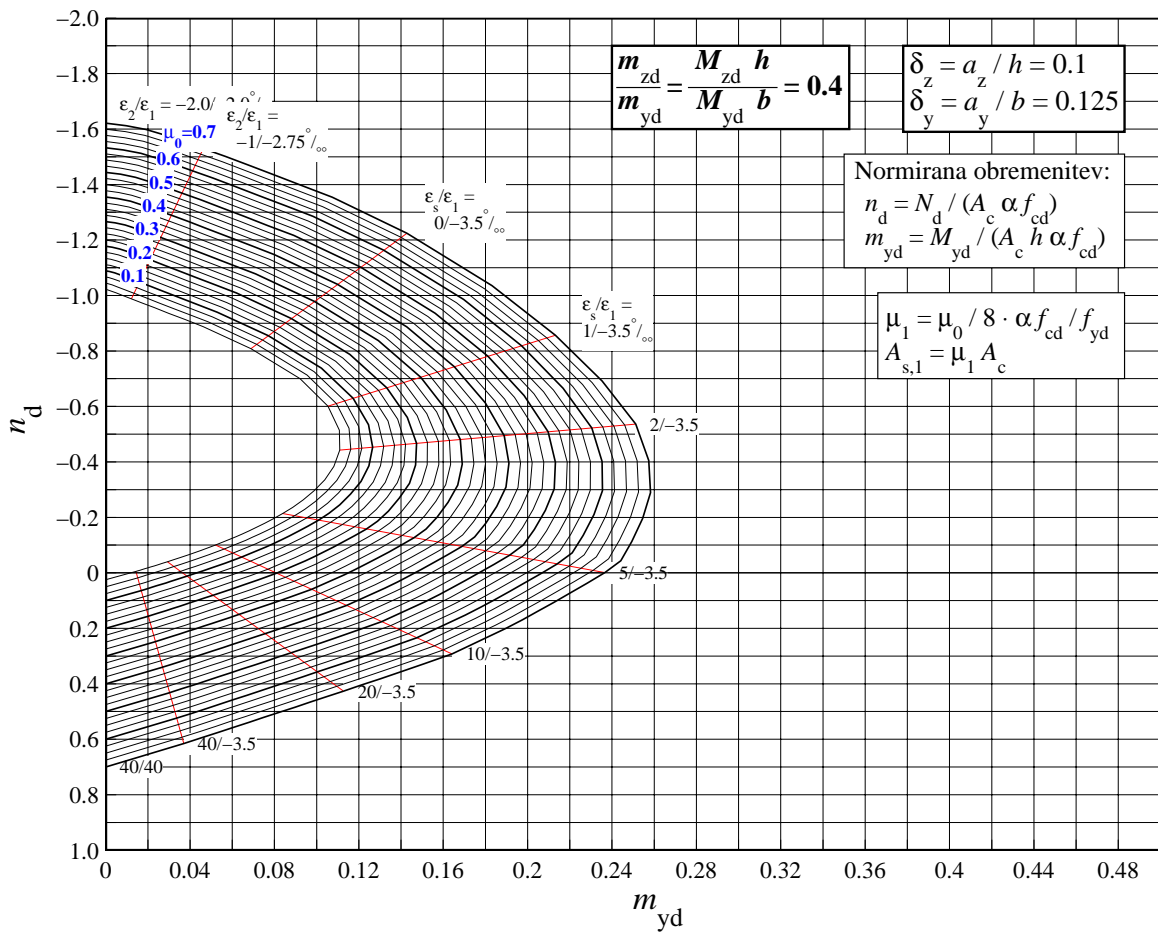
Slika 121: Pravokotni prerez: $\delta_z = 0.1, \delta_y = 0.125$, 8 palic.



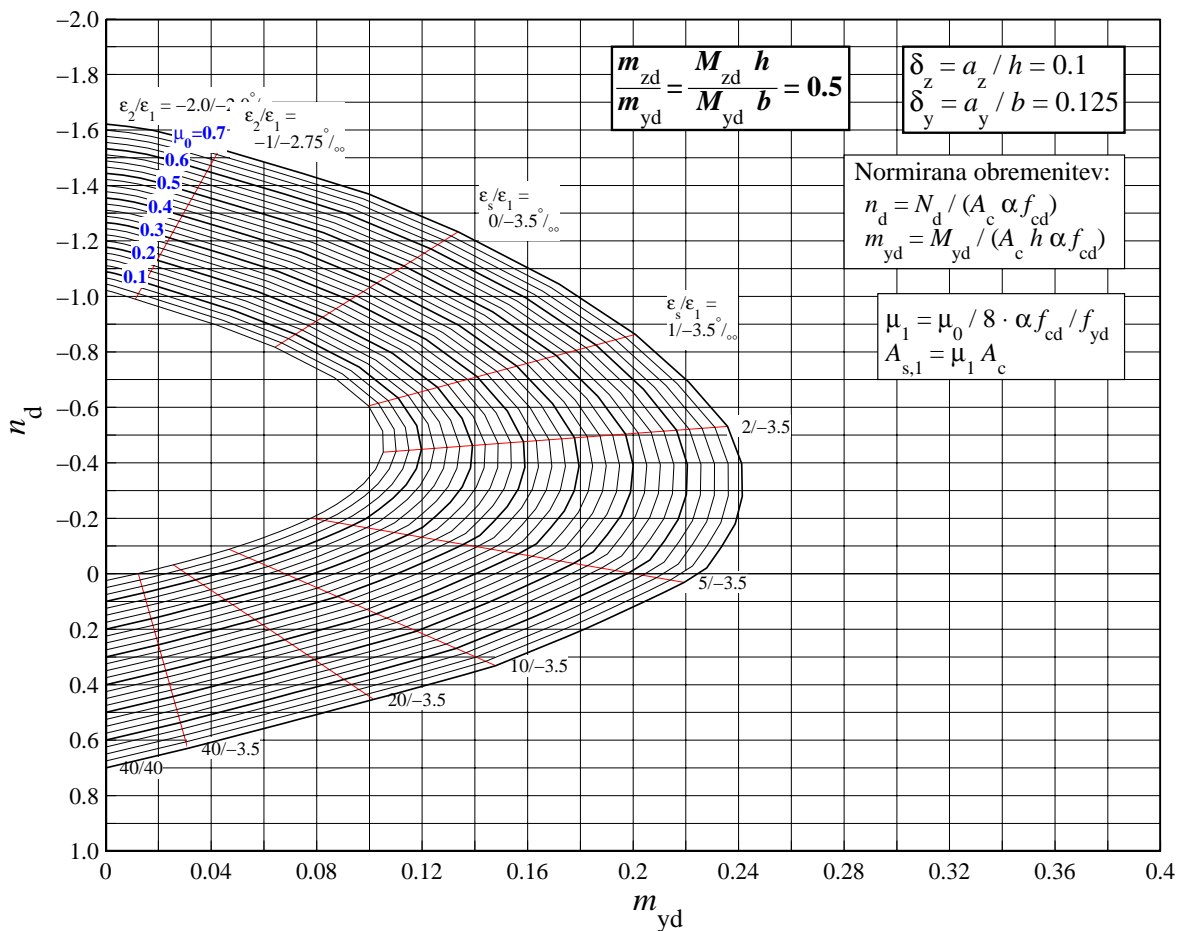
Slika 122: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



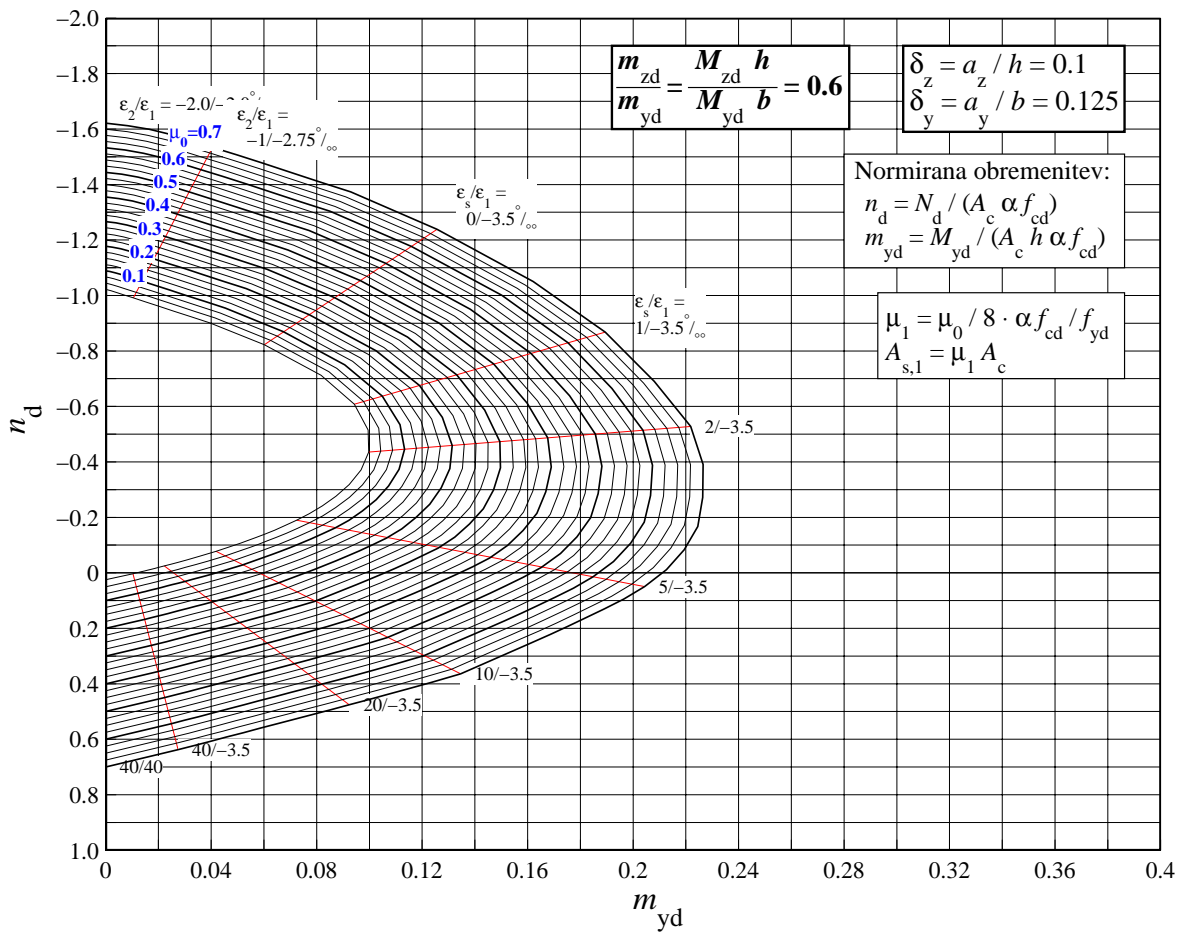
Slika 123: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



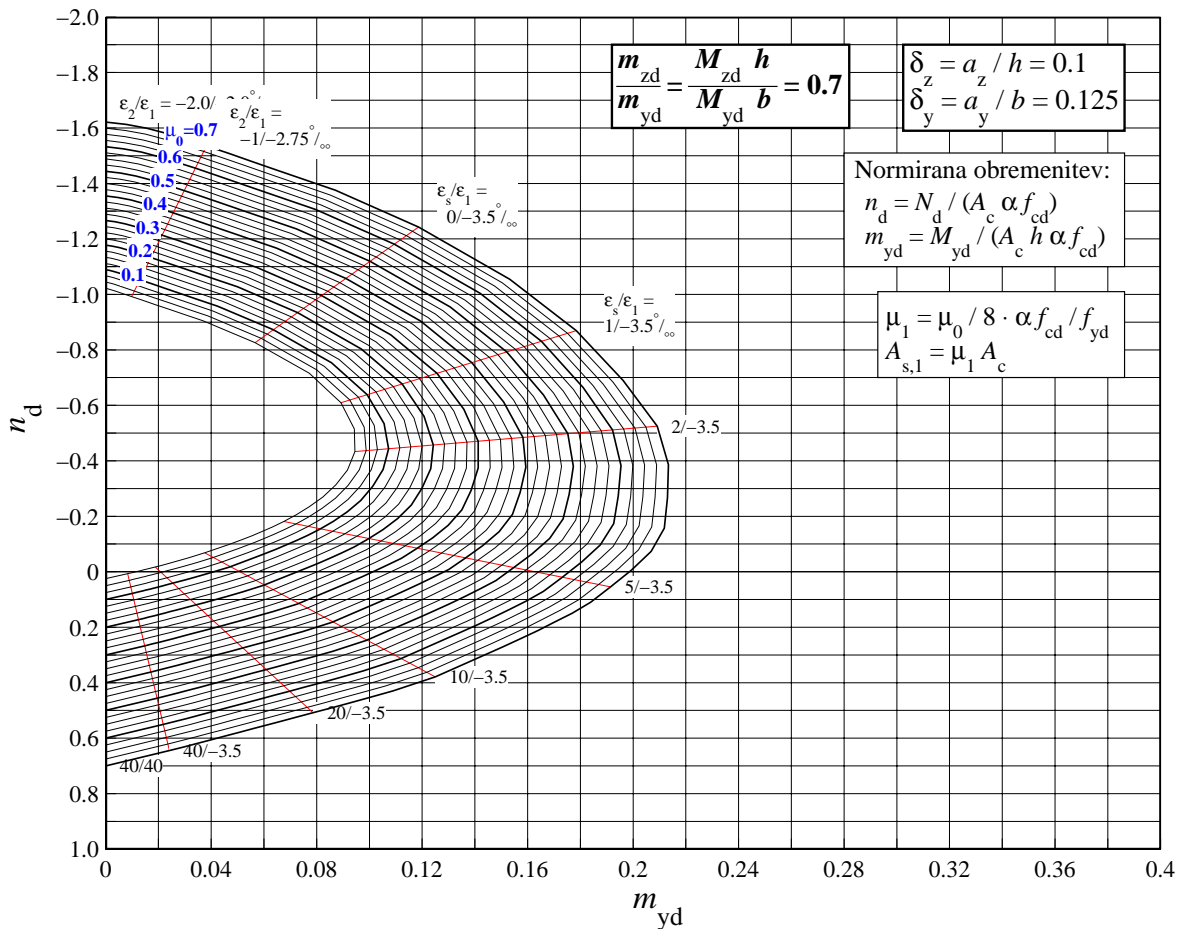
Slika 124: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



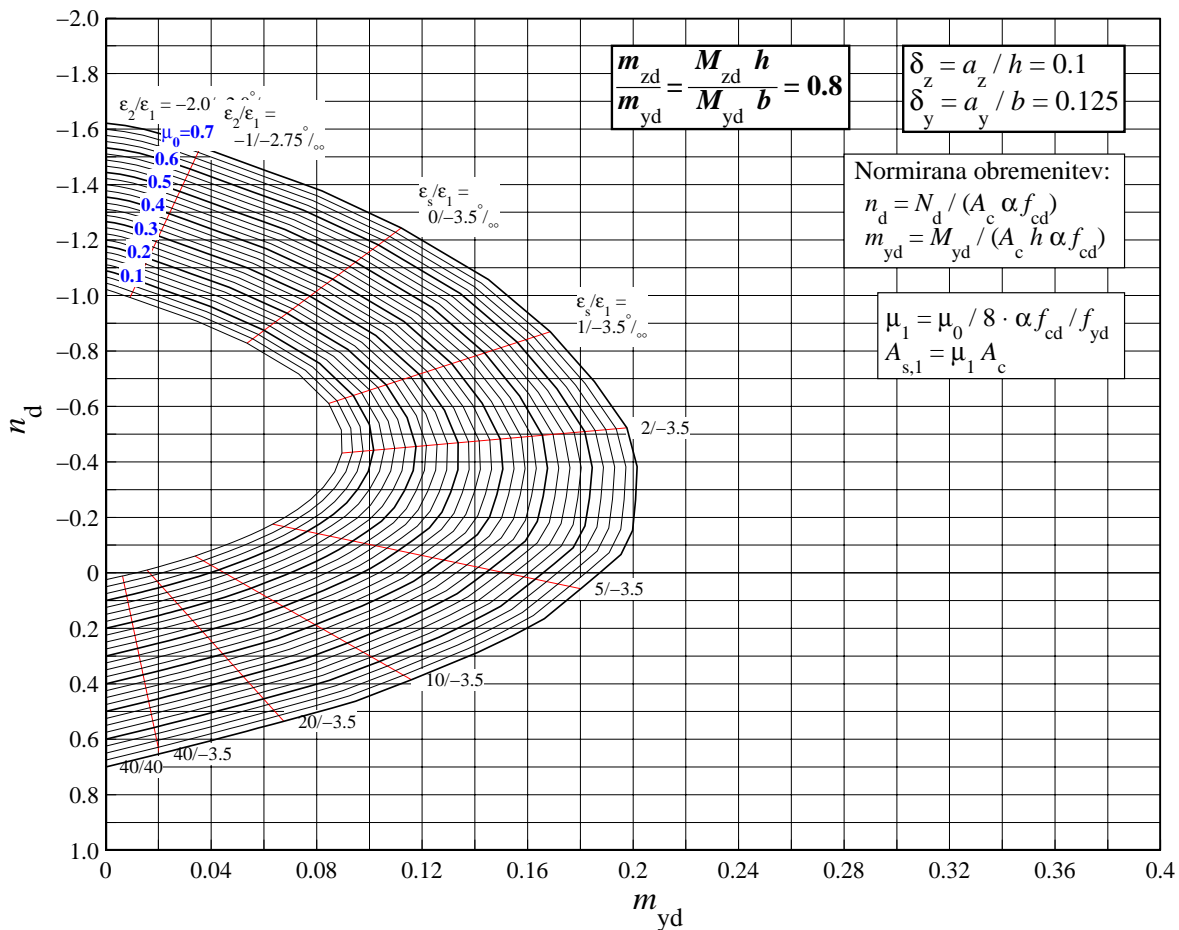
Slika 125: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



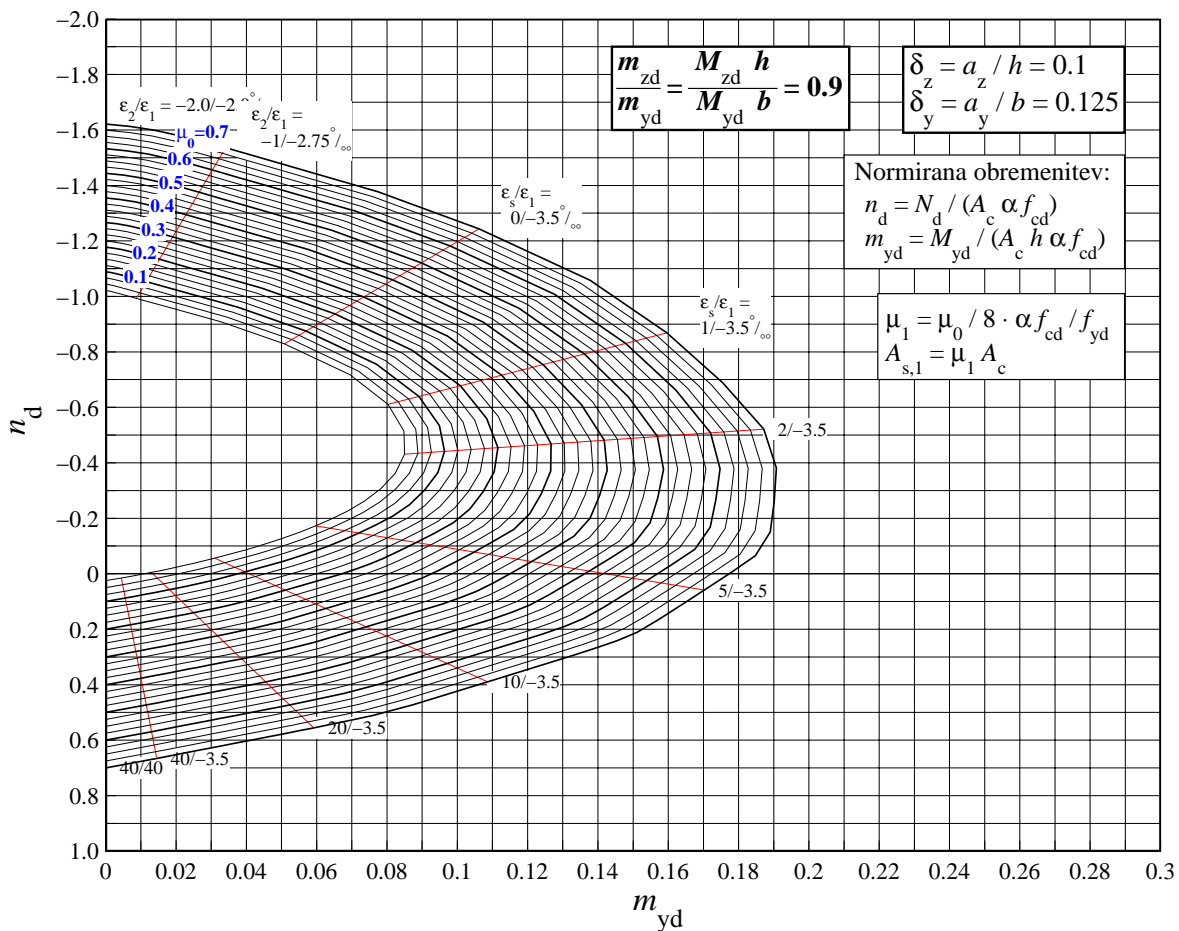
Slika 126: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



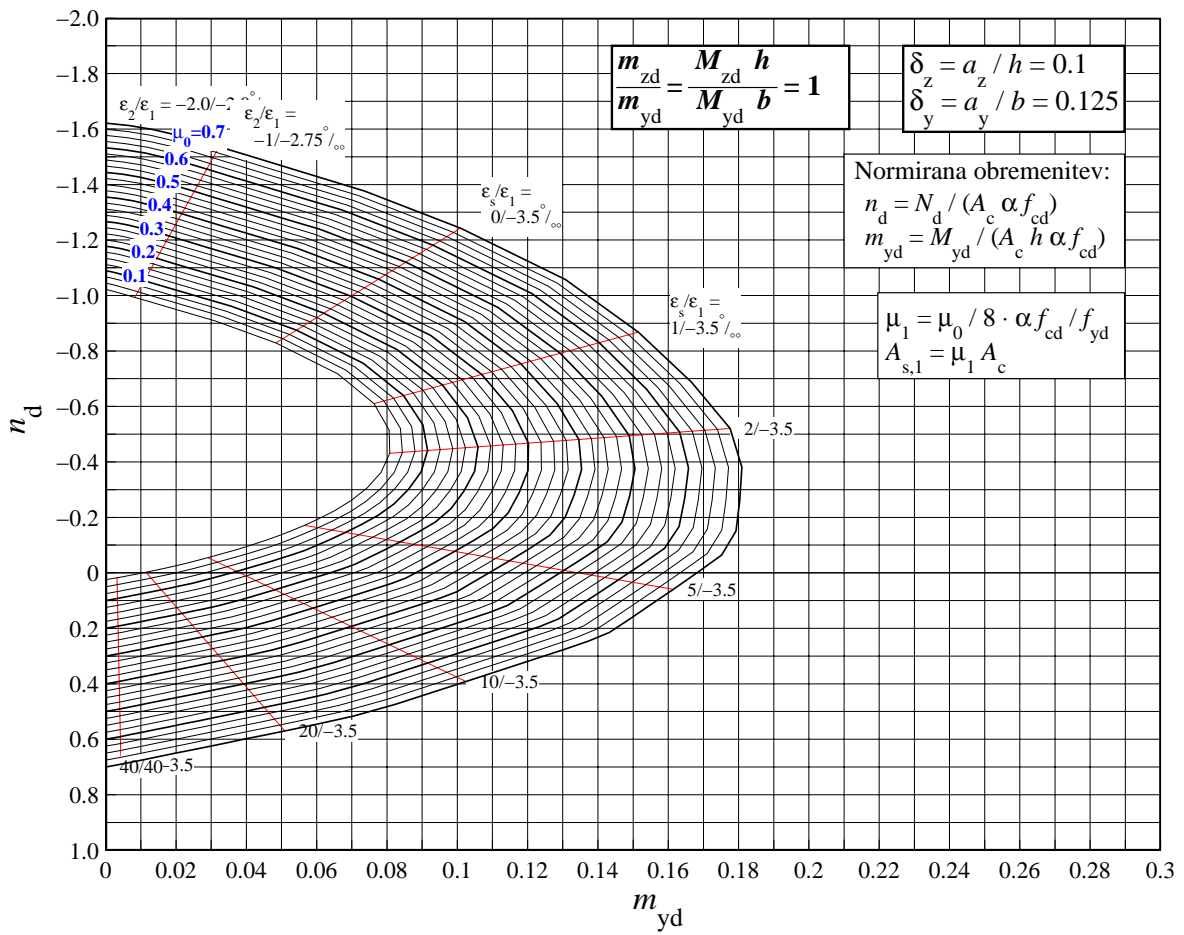
Slika 127: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.



Slika 128: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.

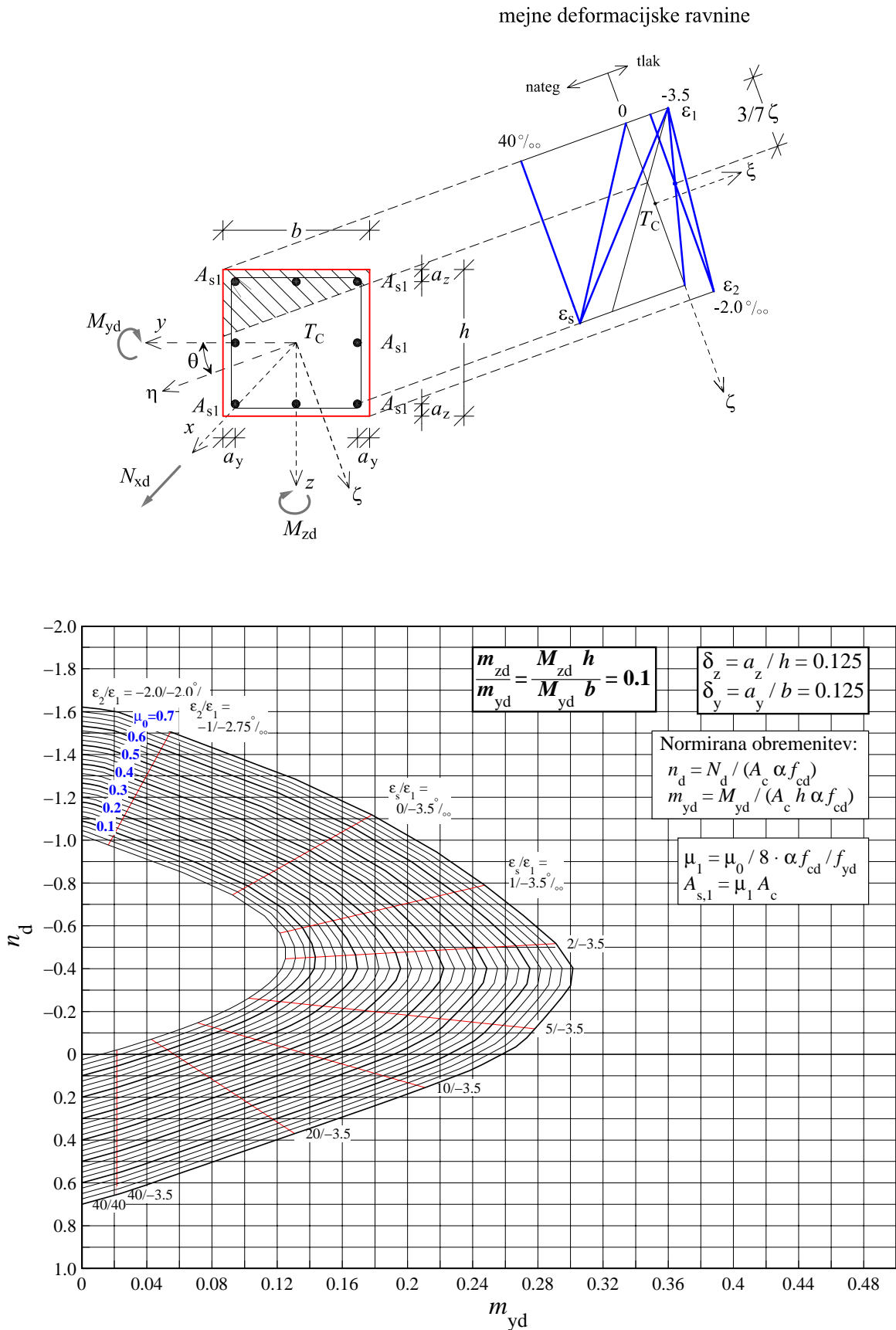


Slika 129: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.

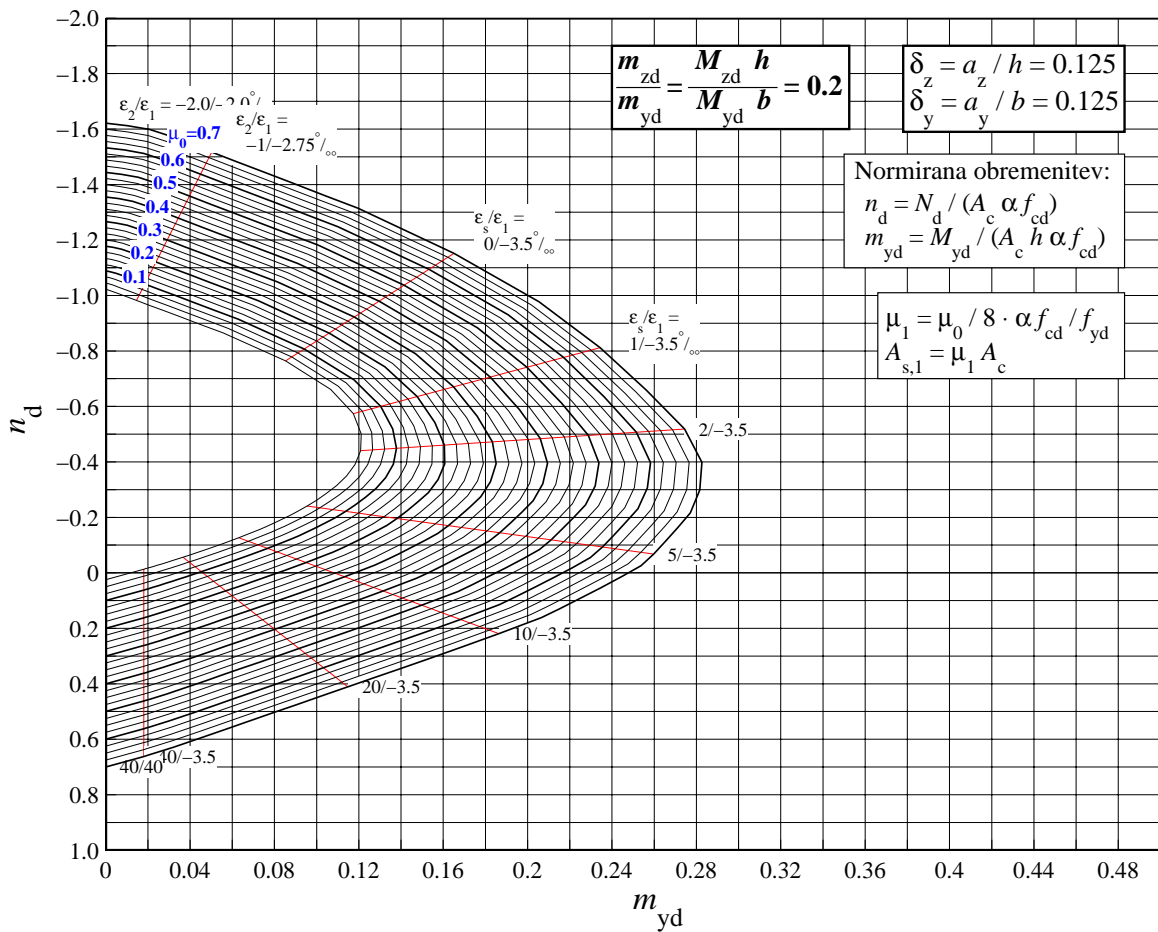


Slika 130: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.125$, 8 palic.

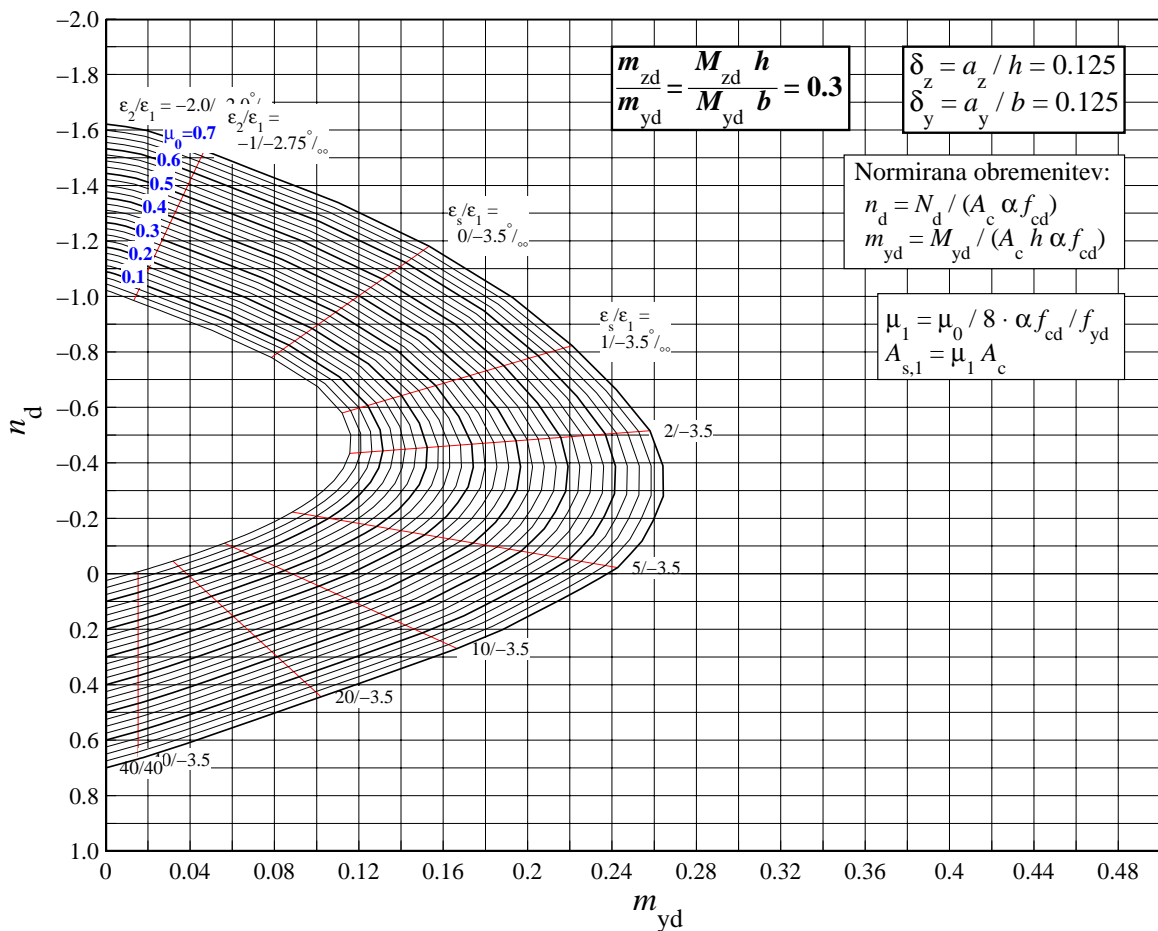
2.14 PRAVOKOTNI PREREZ, 8 palic ($\delta_z = 0.125, \delta_y = 0.125$), S500



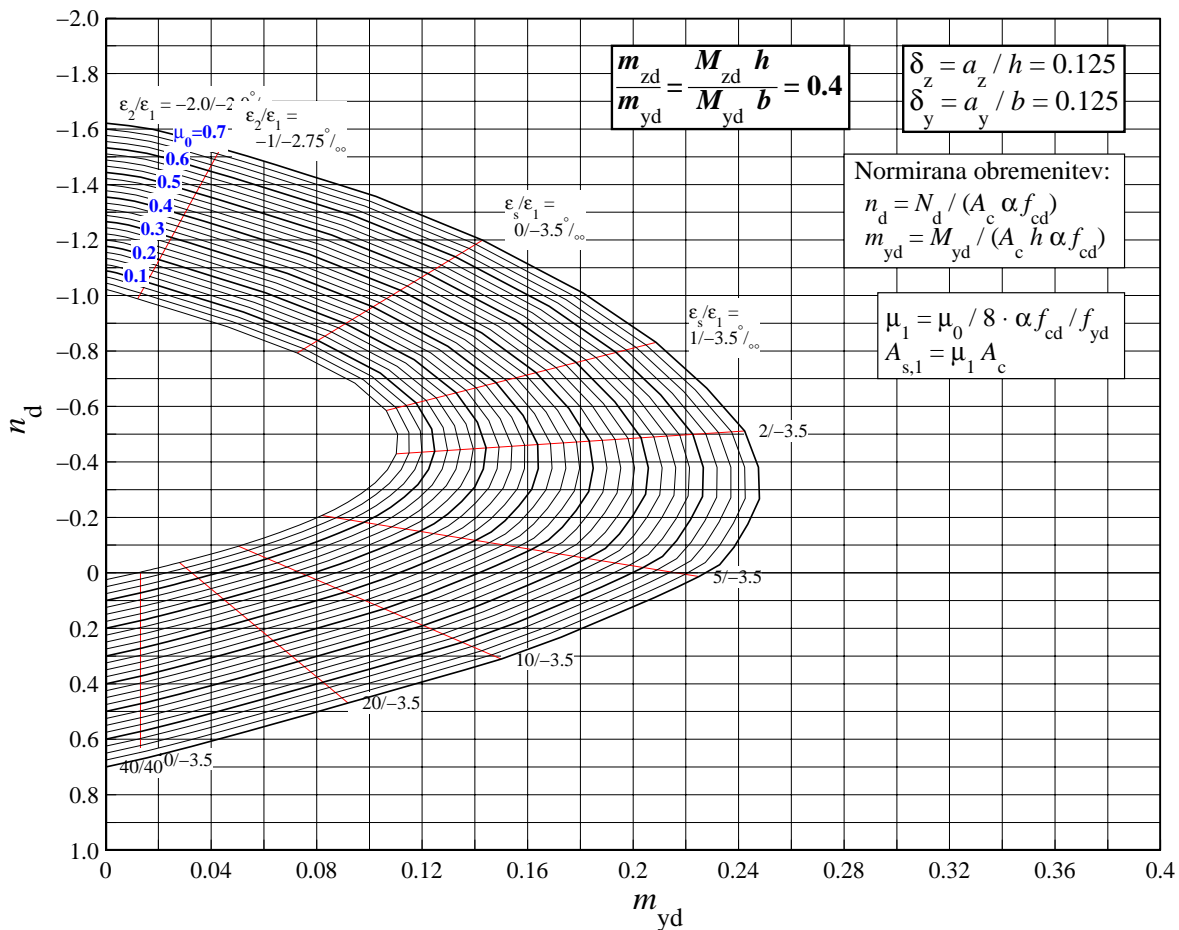
Slika 131: Pravokotni prerez: $\delta_z = 0.125, \delta_y = 0.125$, 8 palic.



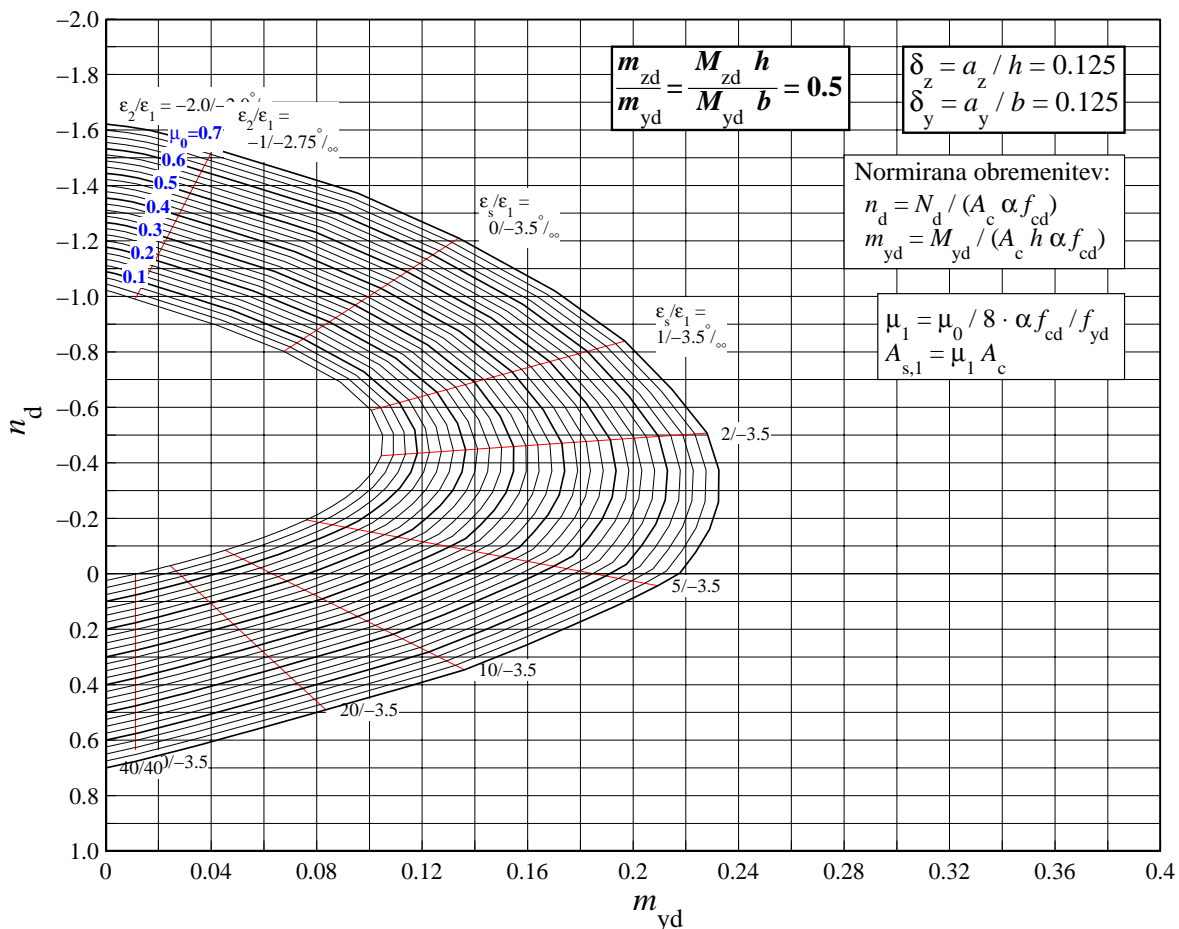
Slika 132: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



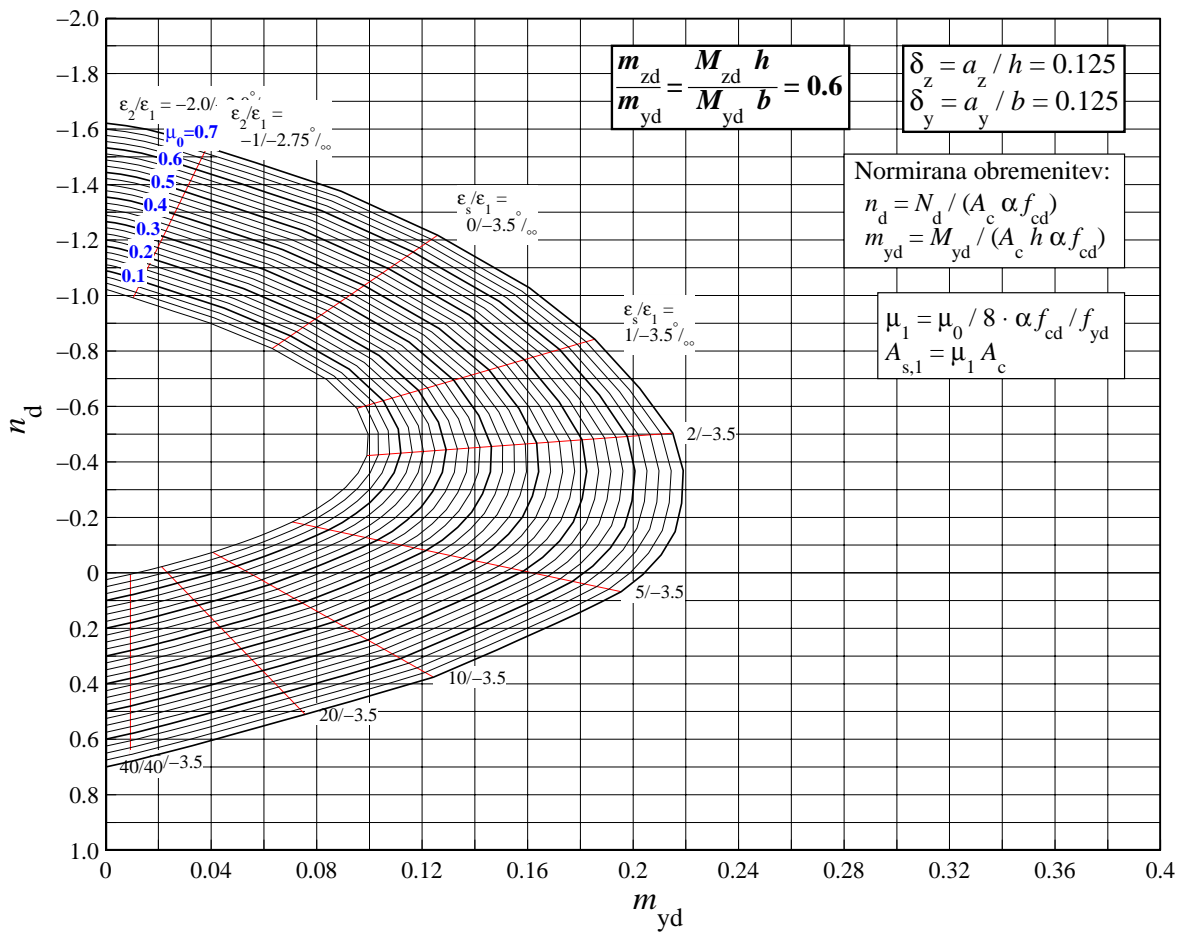
Slika 133: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



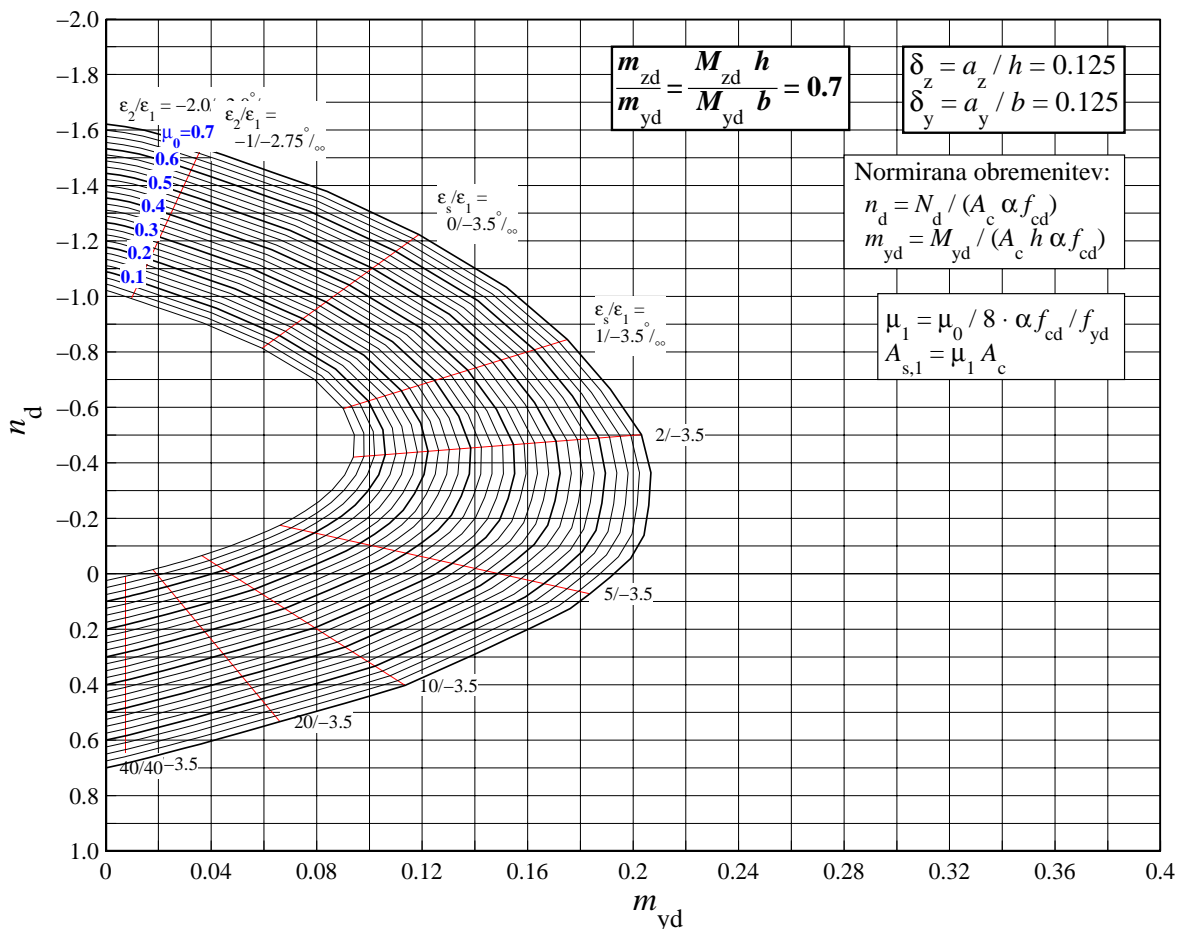
Slika 134: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



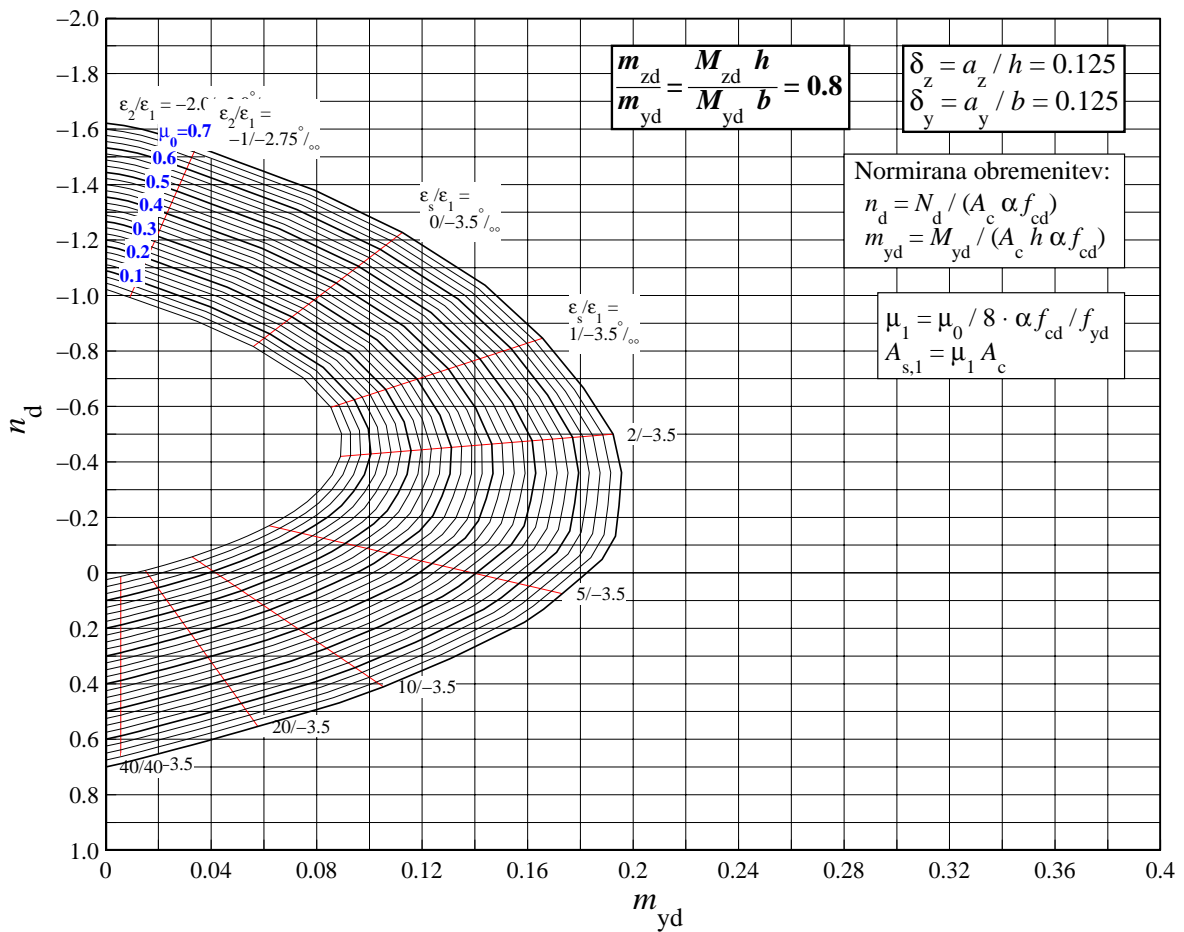
Slika 135: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



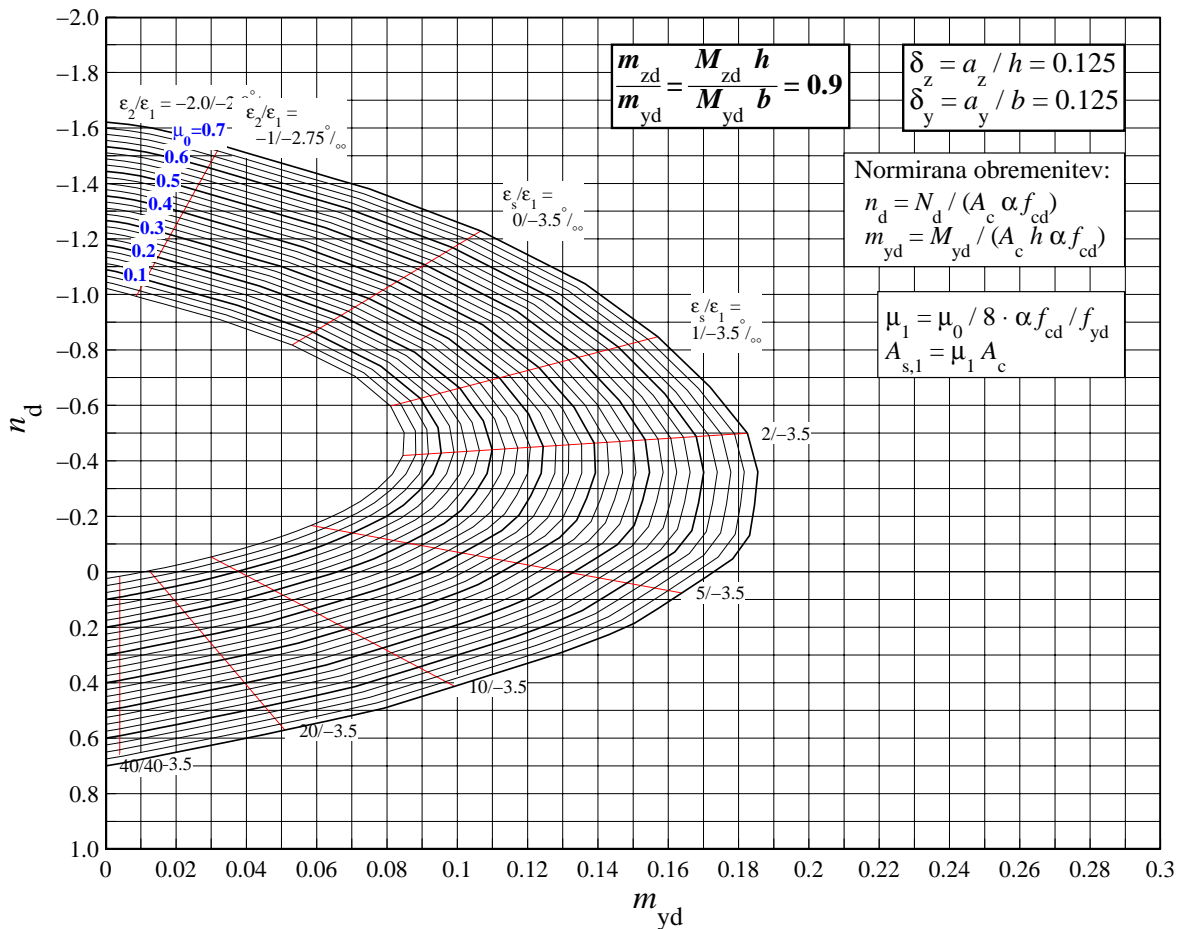
Slika 136: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



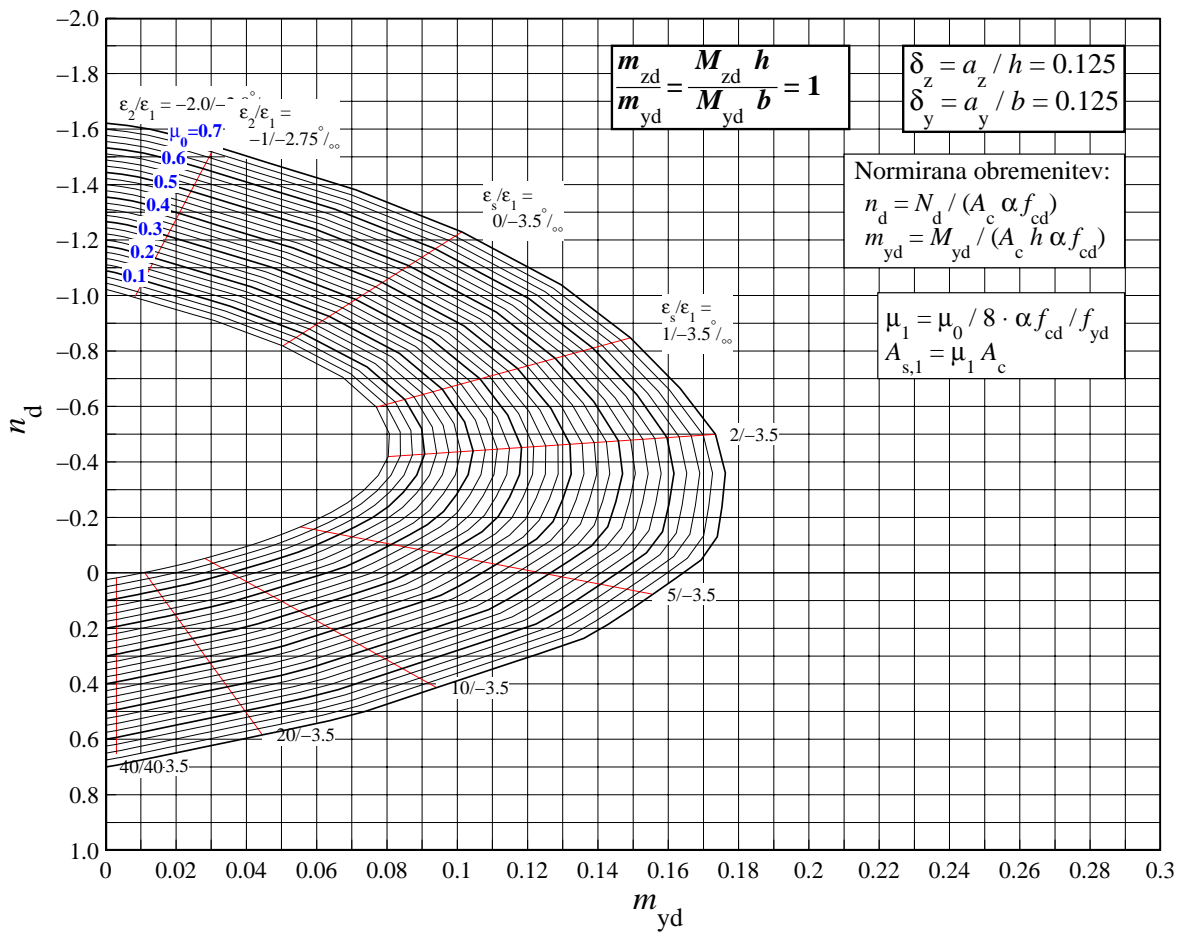
Slika 137: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.



Slika 138: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.

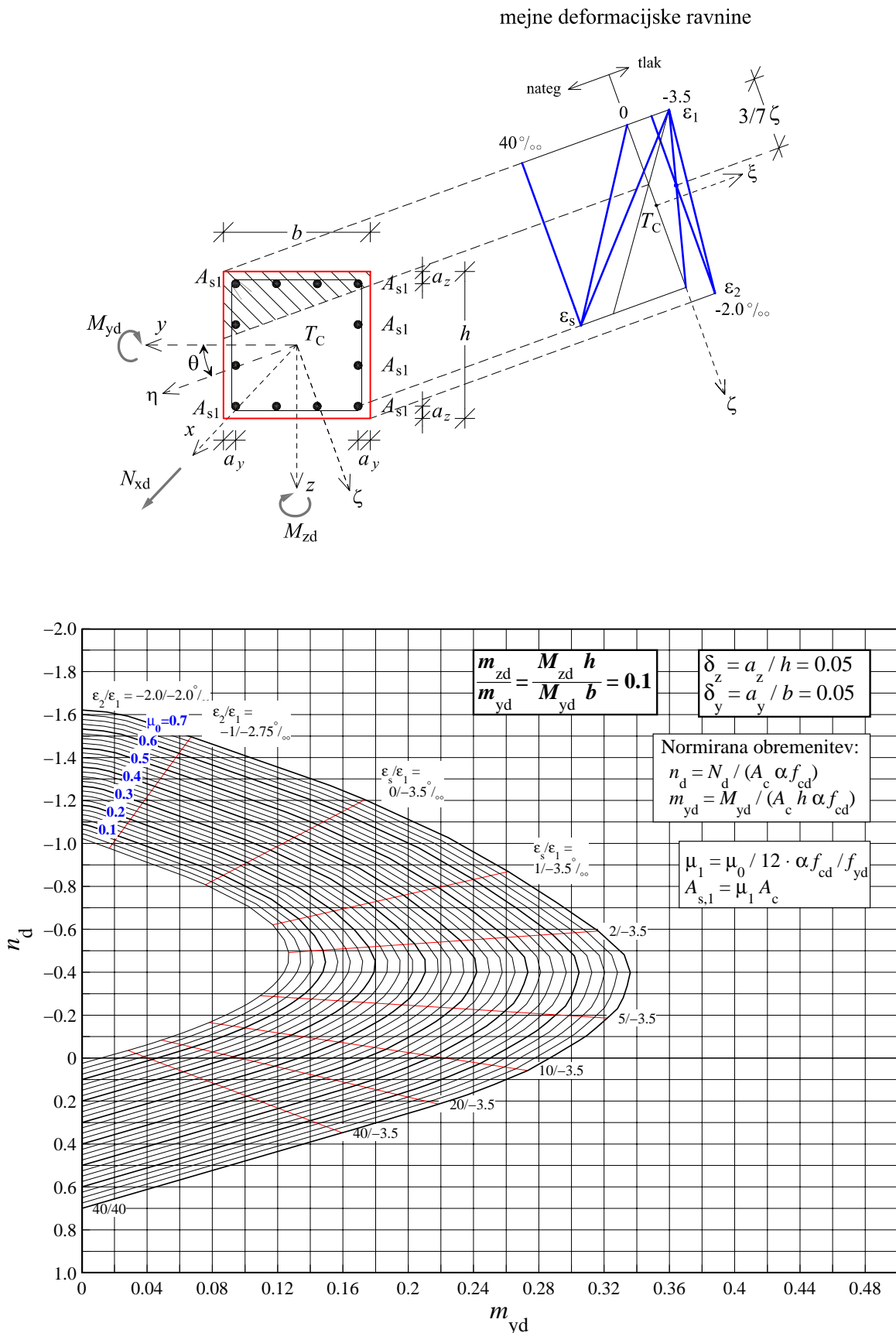


Slika 139: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.

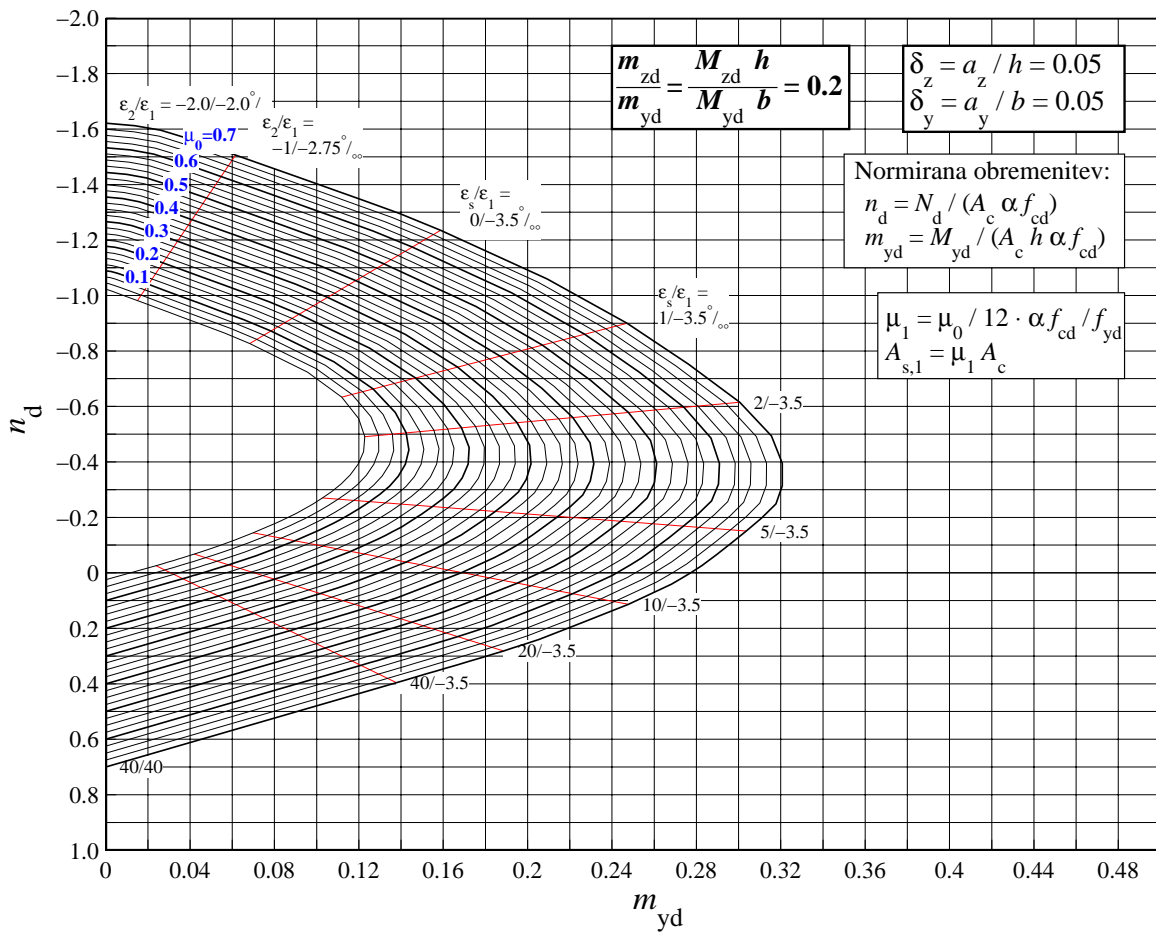


Slika 140: Pravokotni prerez: $\delta_z = 0.125$, $\delta_y = 0.125$, 8 palic.

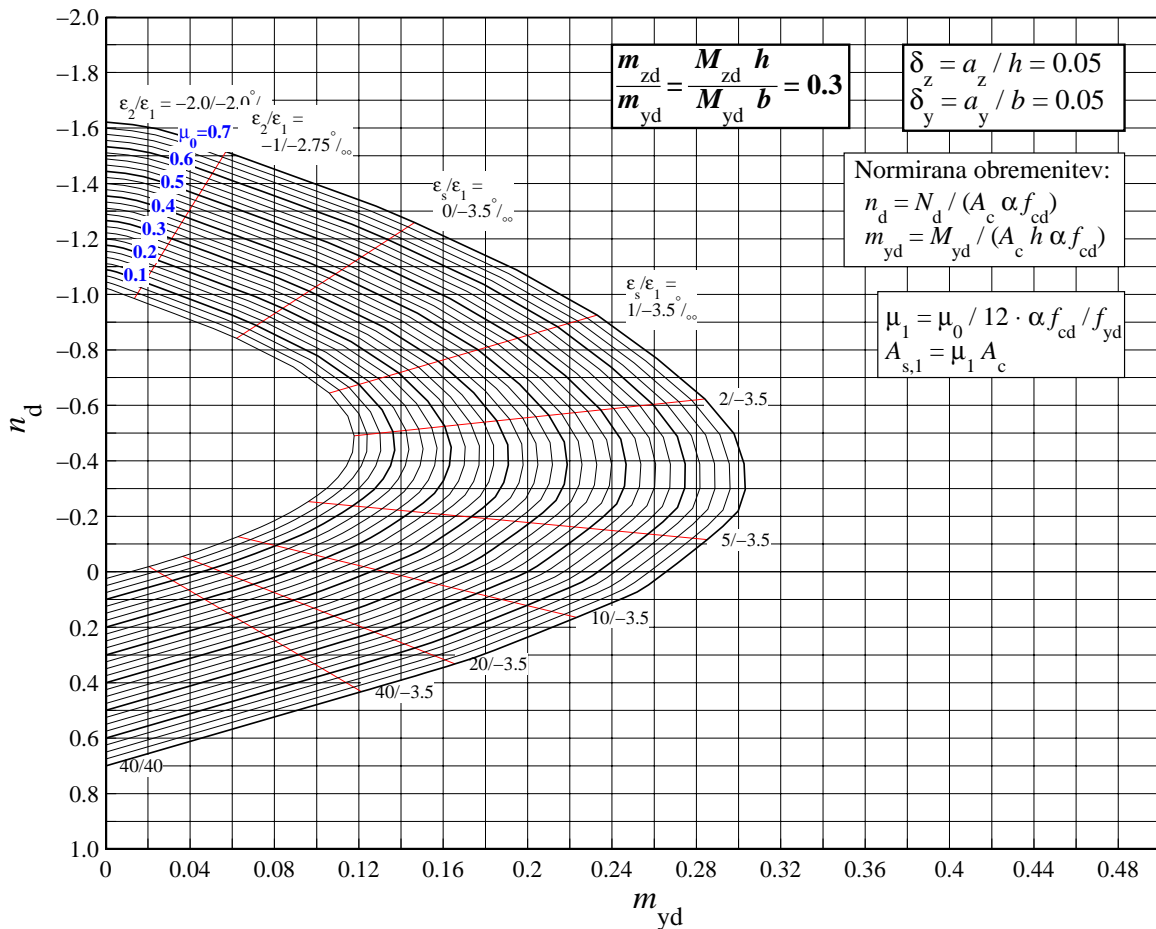
2.15 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.05, \delta_y = 0.05$), S500



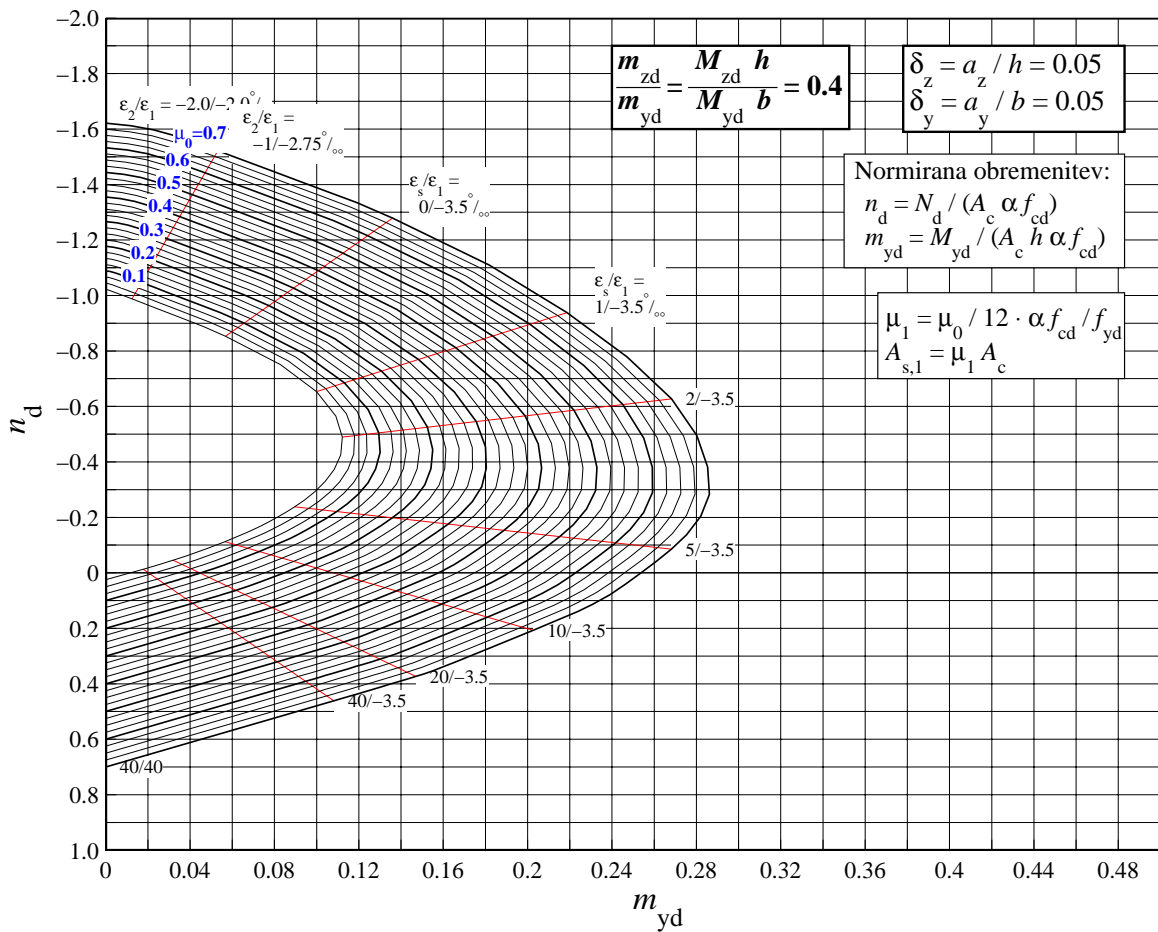
Slika 141: Pravokotni prerez: $\delta_z = 0.05, \delta_y = 0.05$, 12 palic.



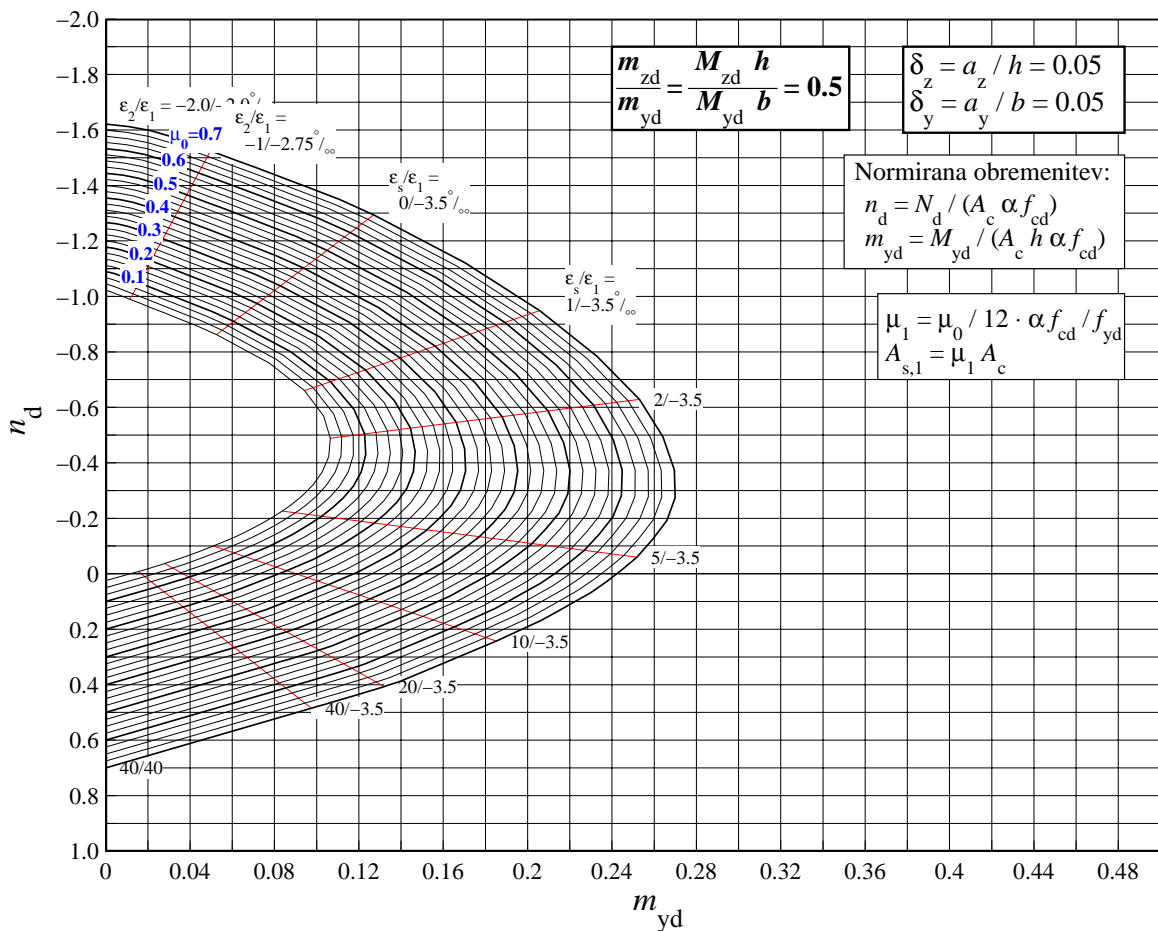
Slika 142: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



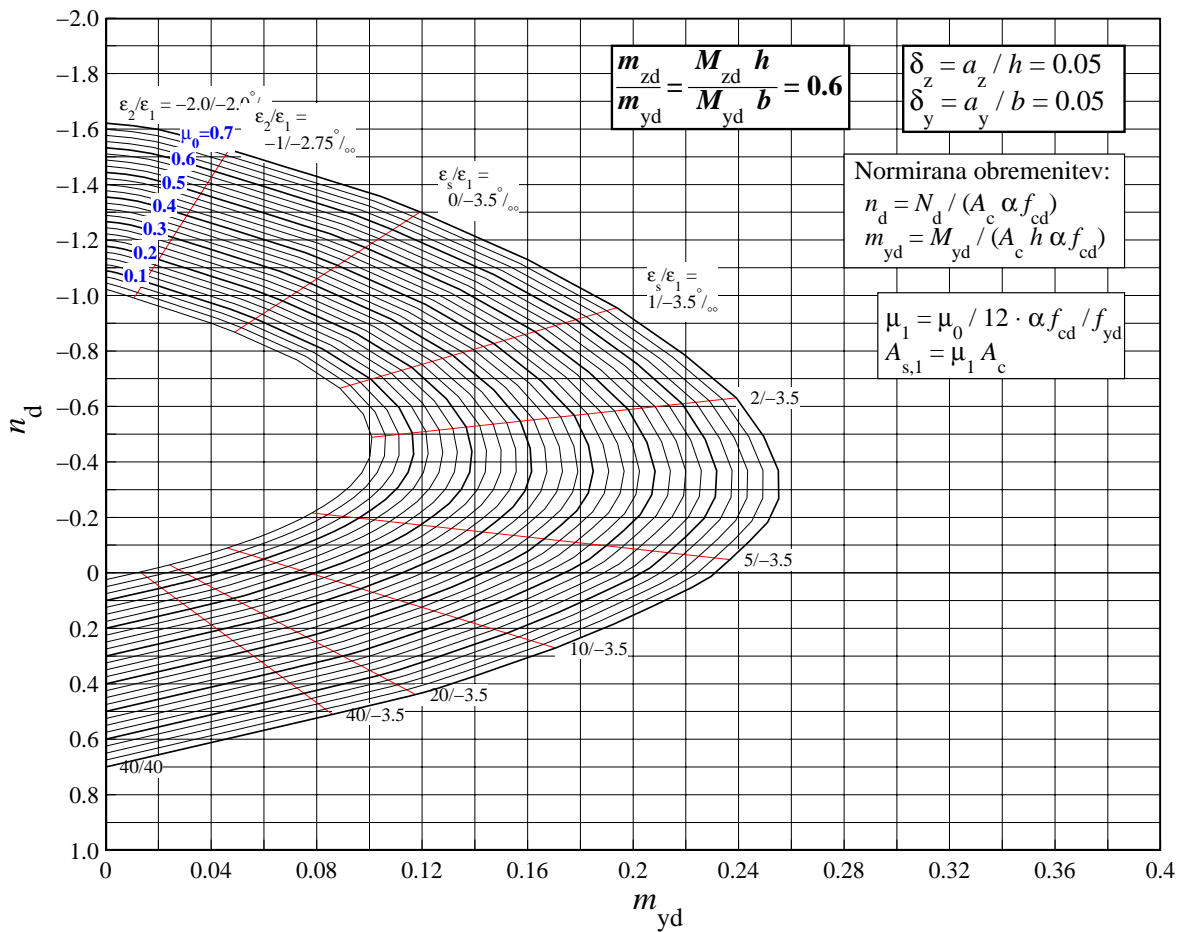
Slika 143: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



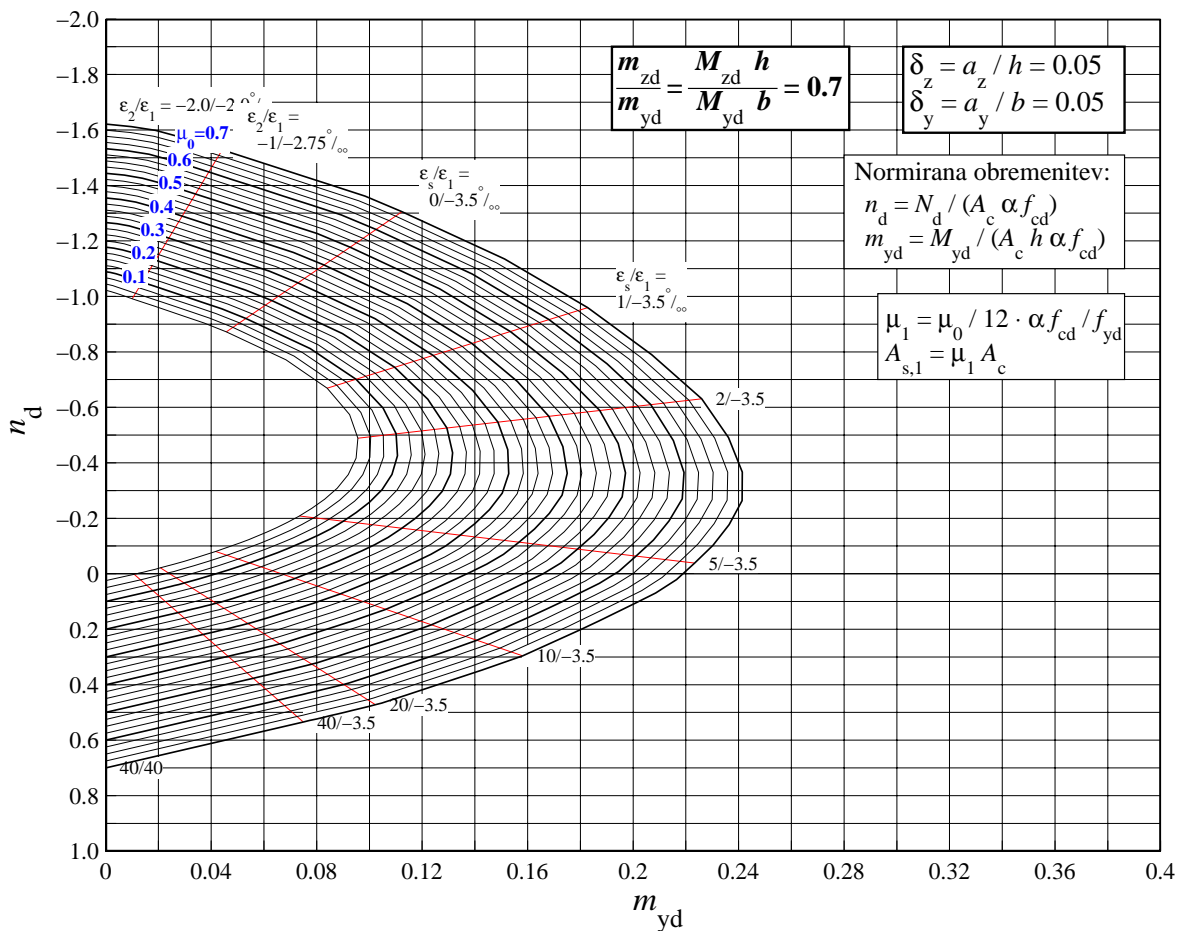
Slika 144: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



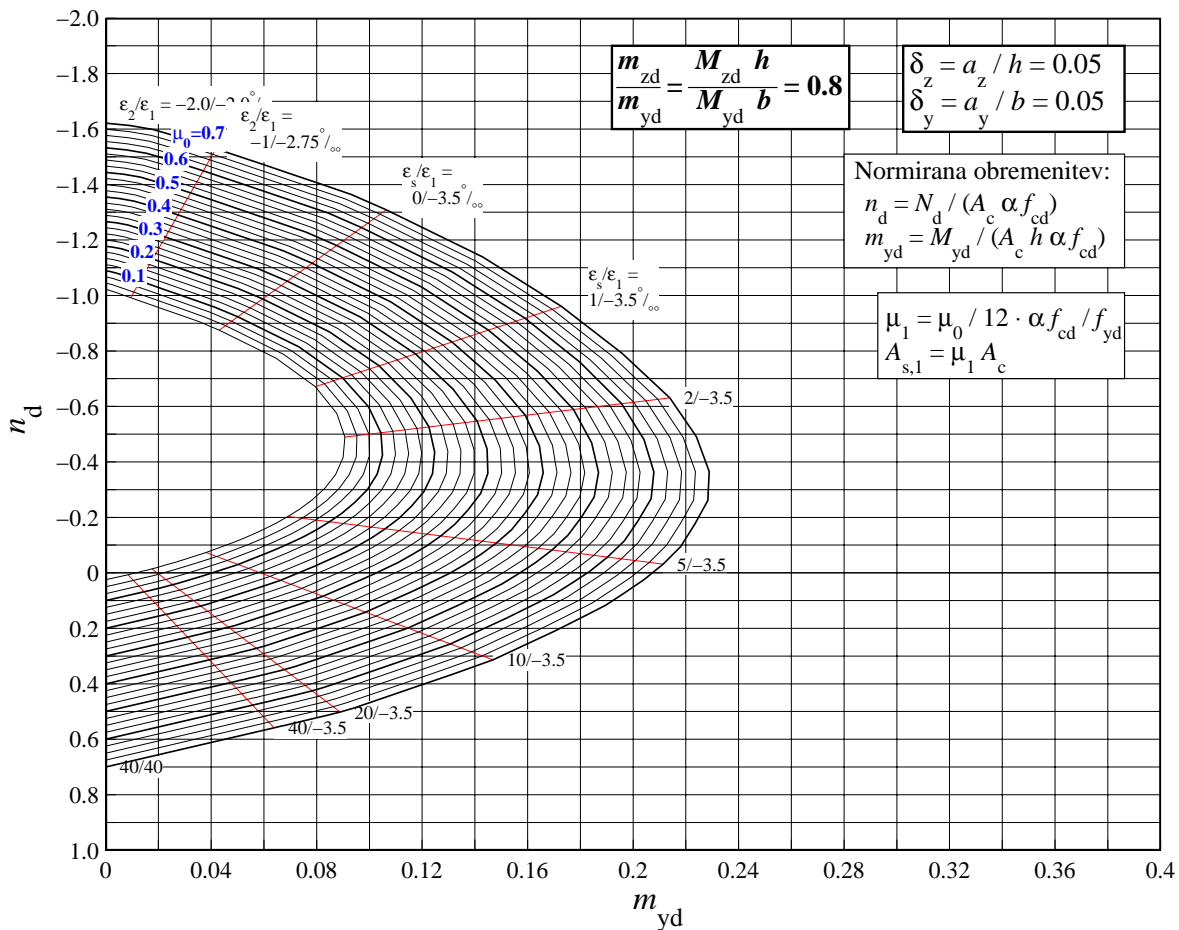
Slika 145: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



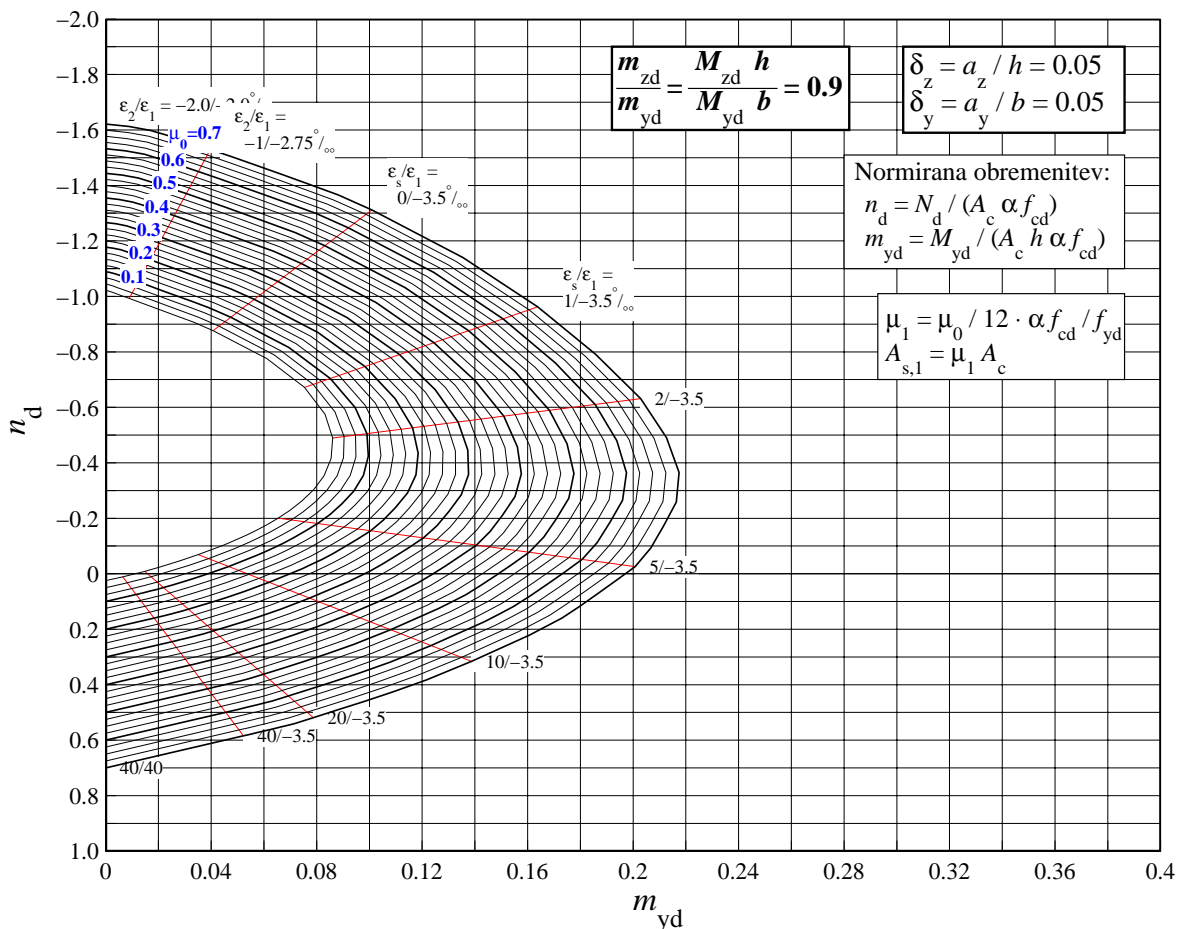
Slika 146: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



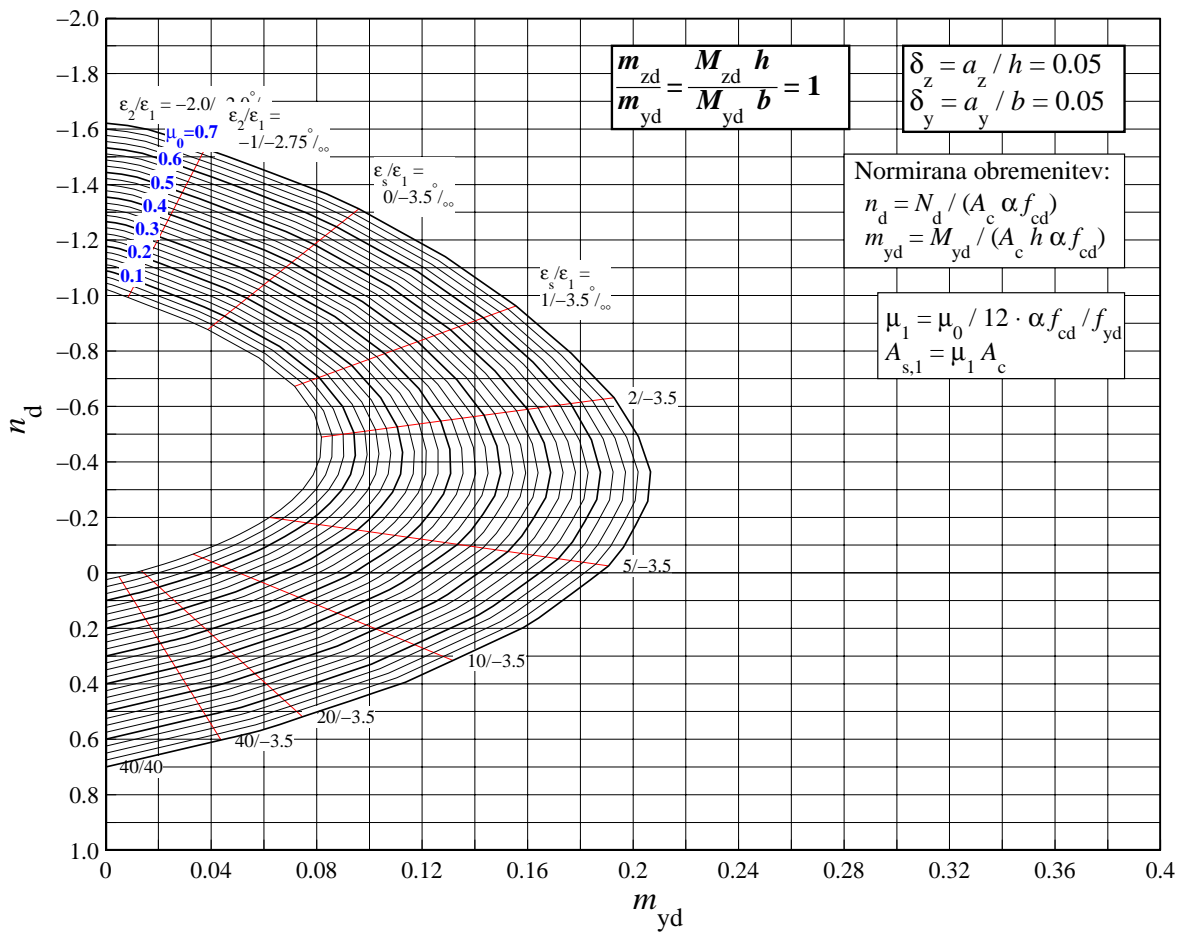
Slika 147: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.



Slika 148: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.

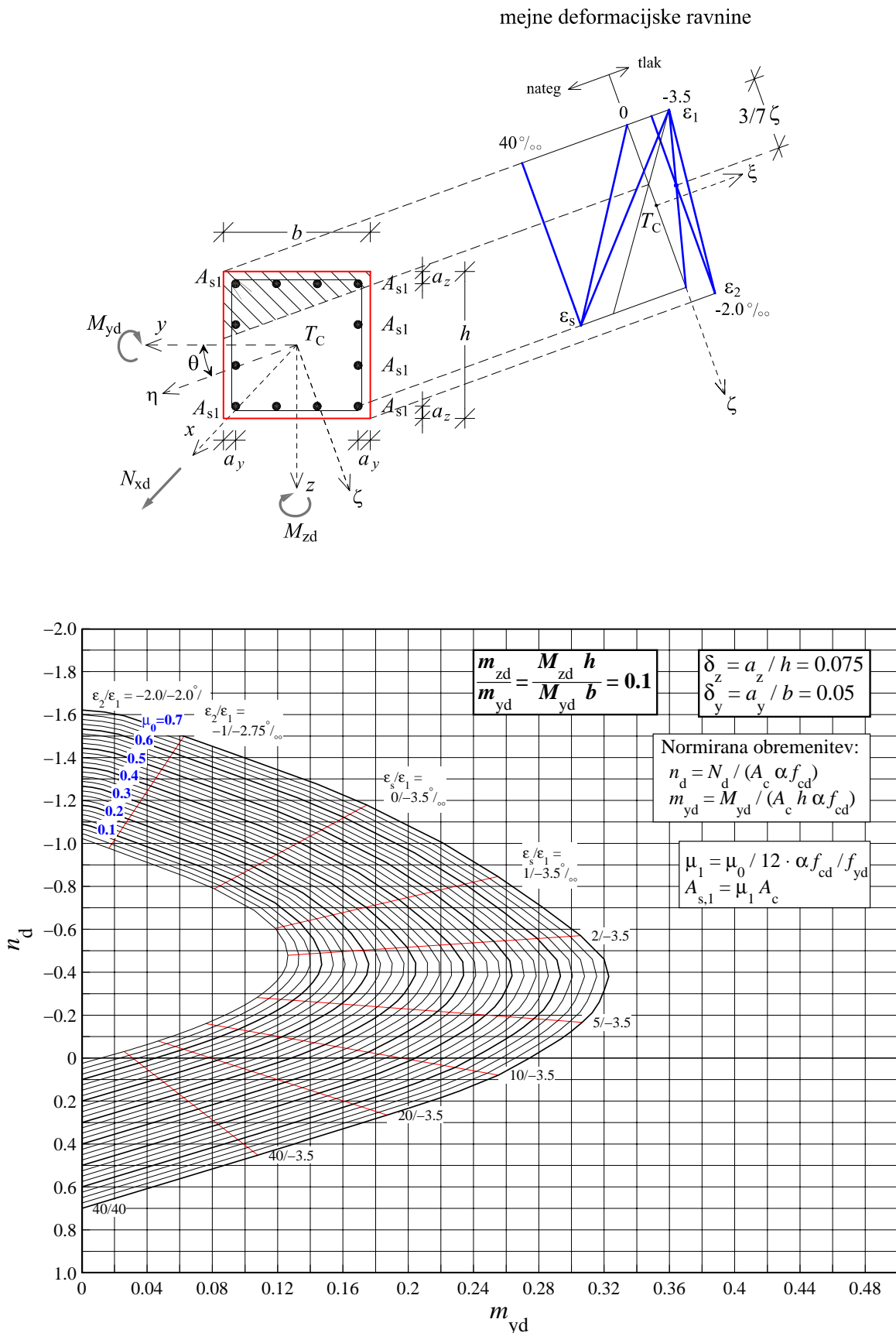


Slika 149: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.

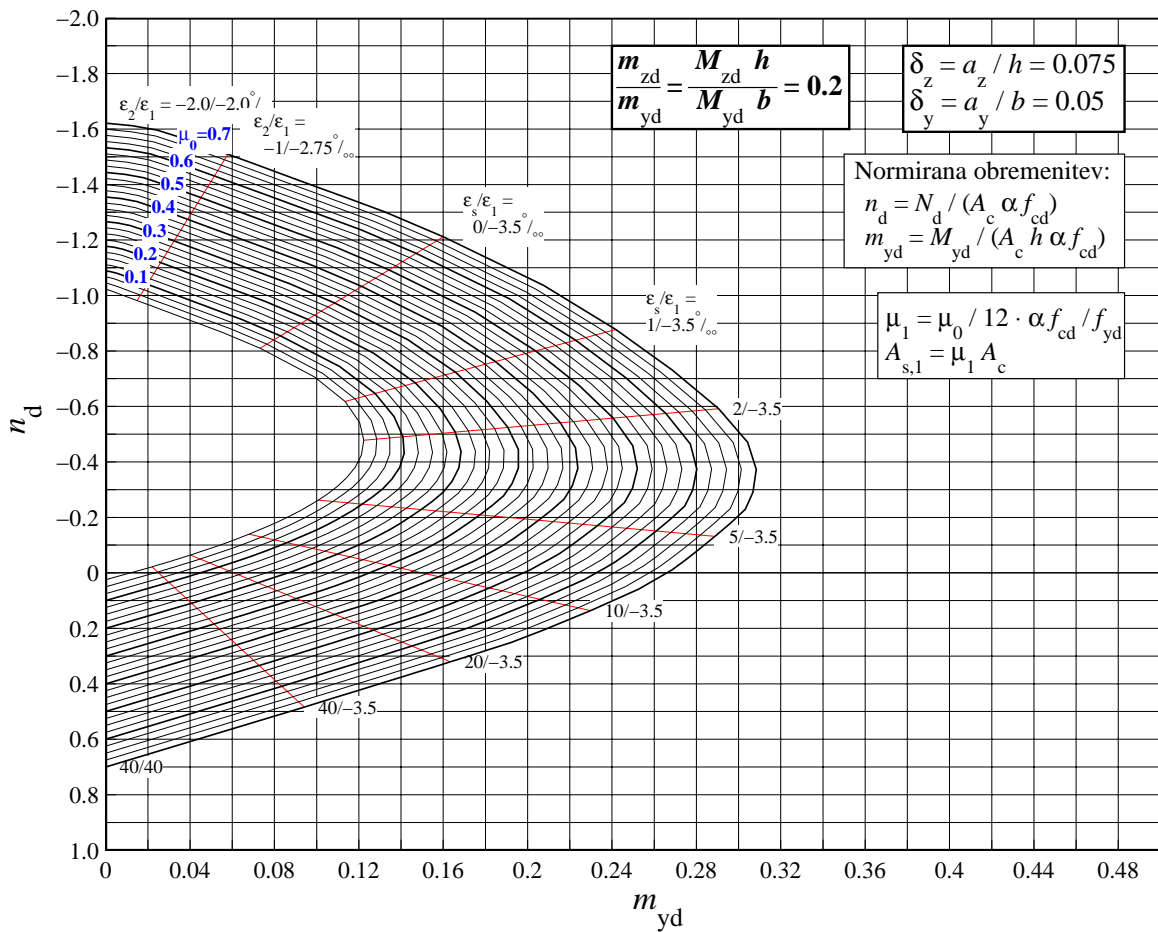


Slika 150: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.05$, 12 palic.

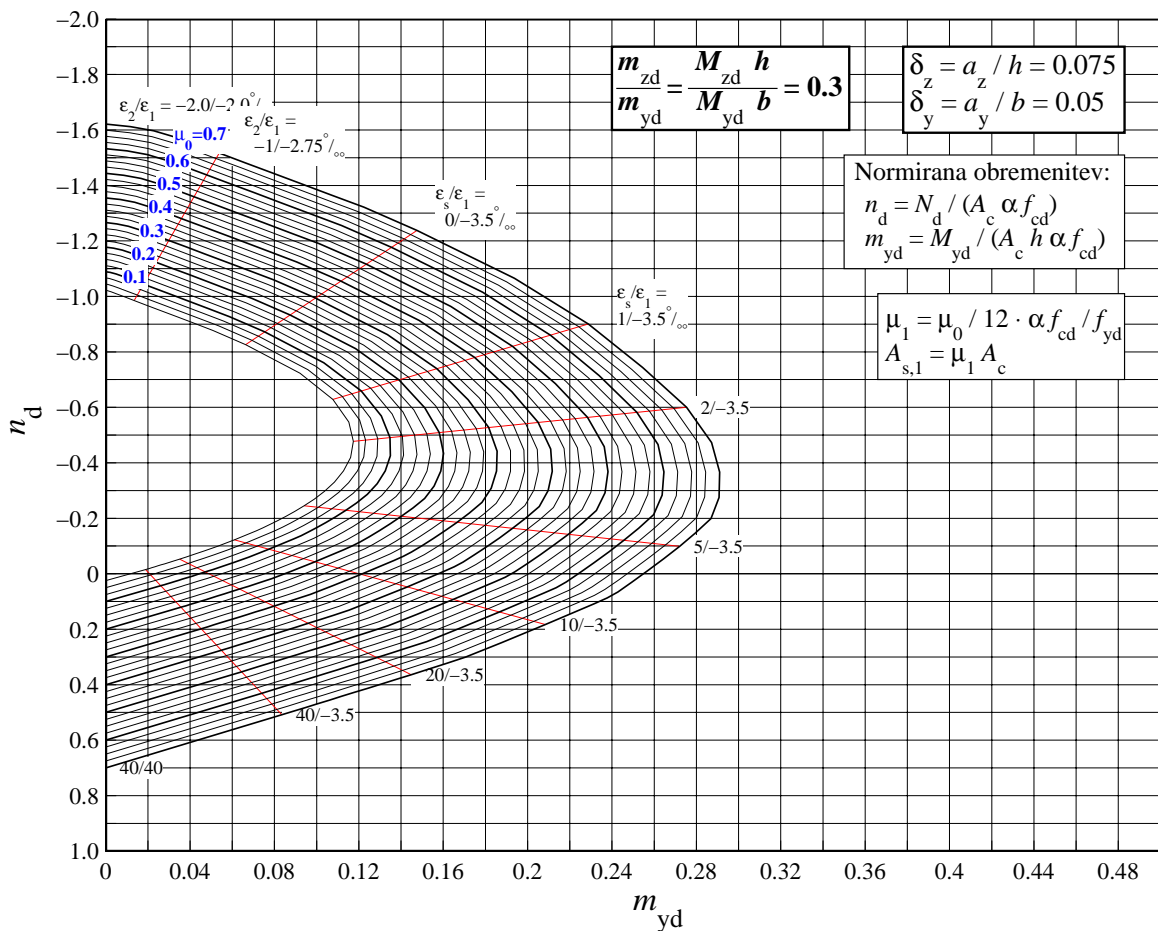
2.16 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.075, \delta_y = 0.05$), S500



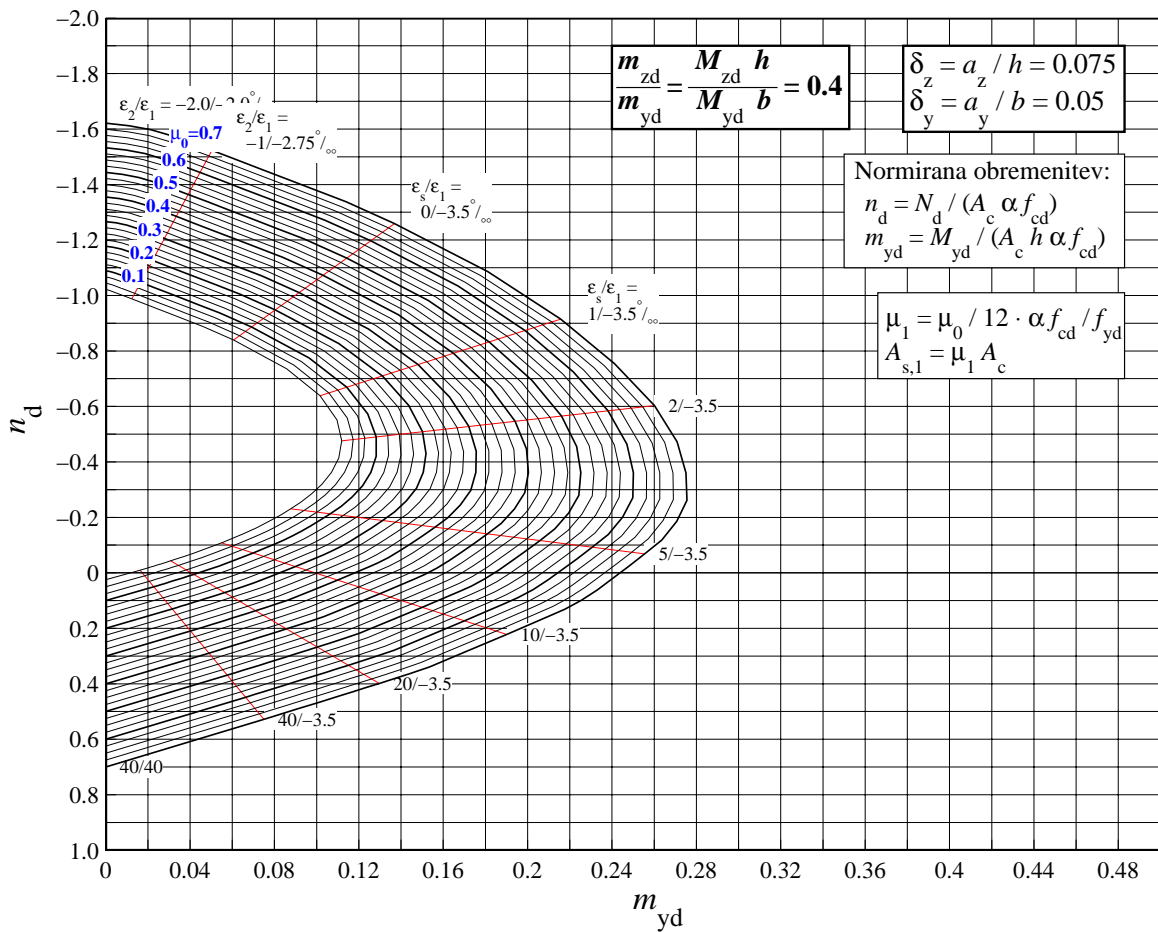
Slika 151: Pravokotni prerez: $\delta_z = 0.075, \delta_y = 0.05$, 12 palic.



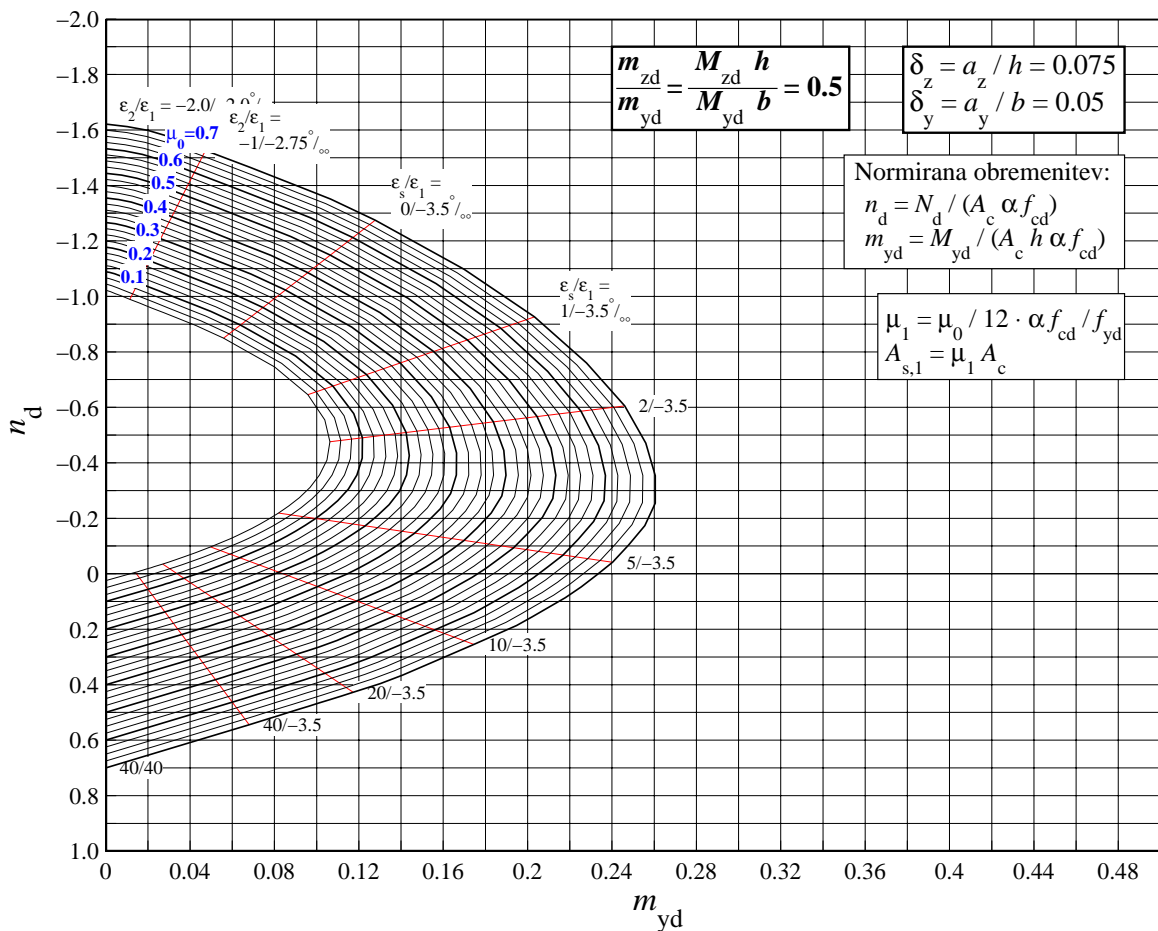
Slika 152: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



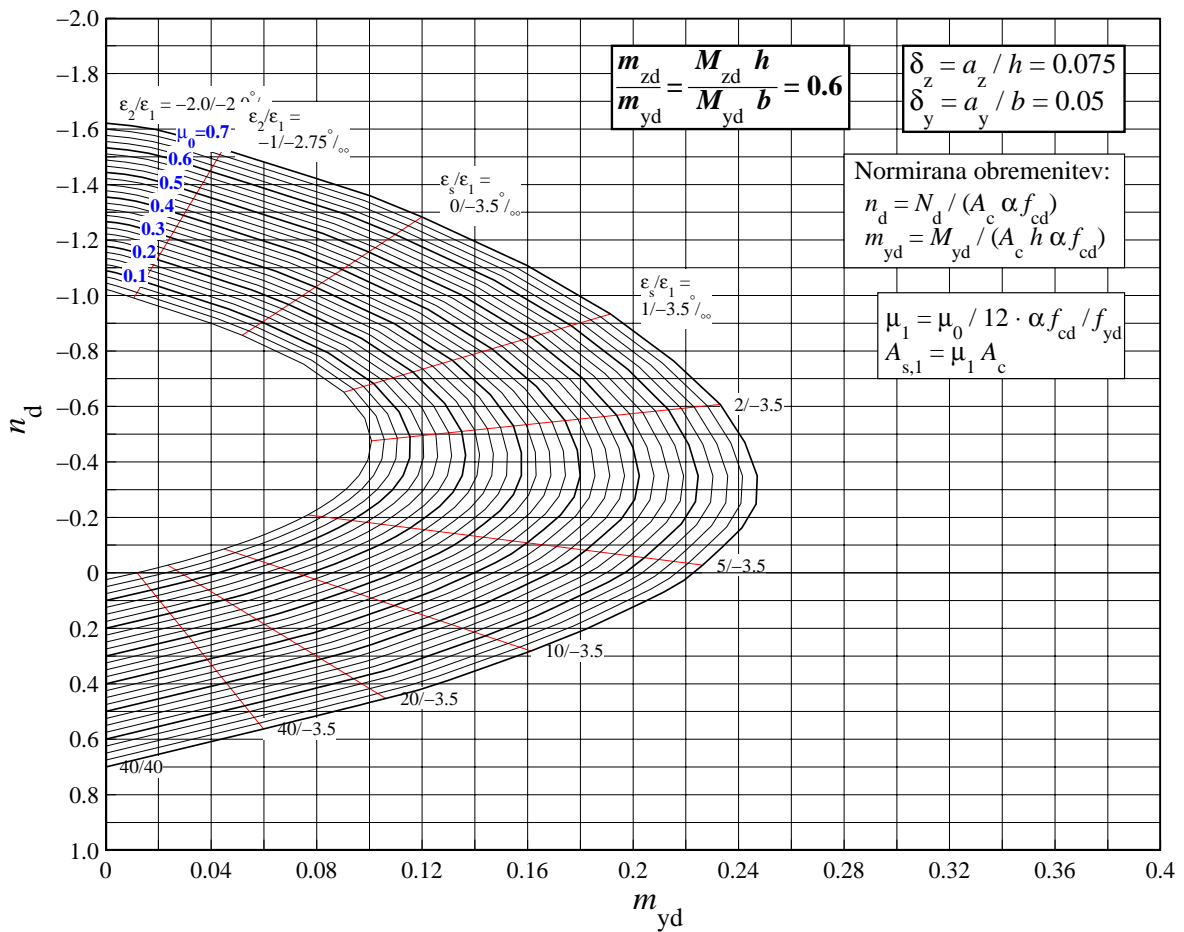
Slika 153: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



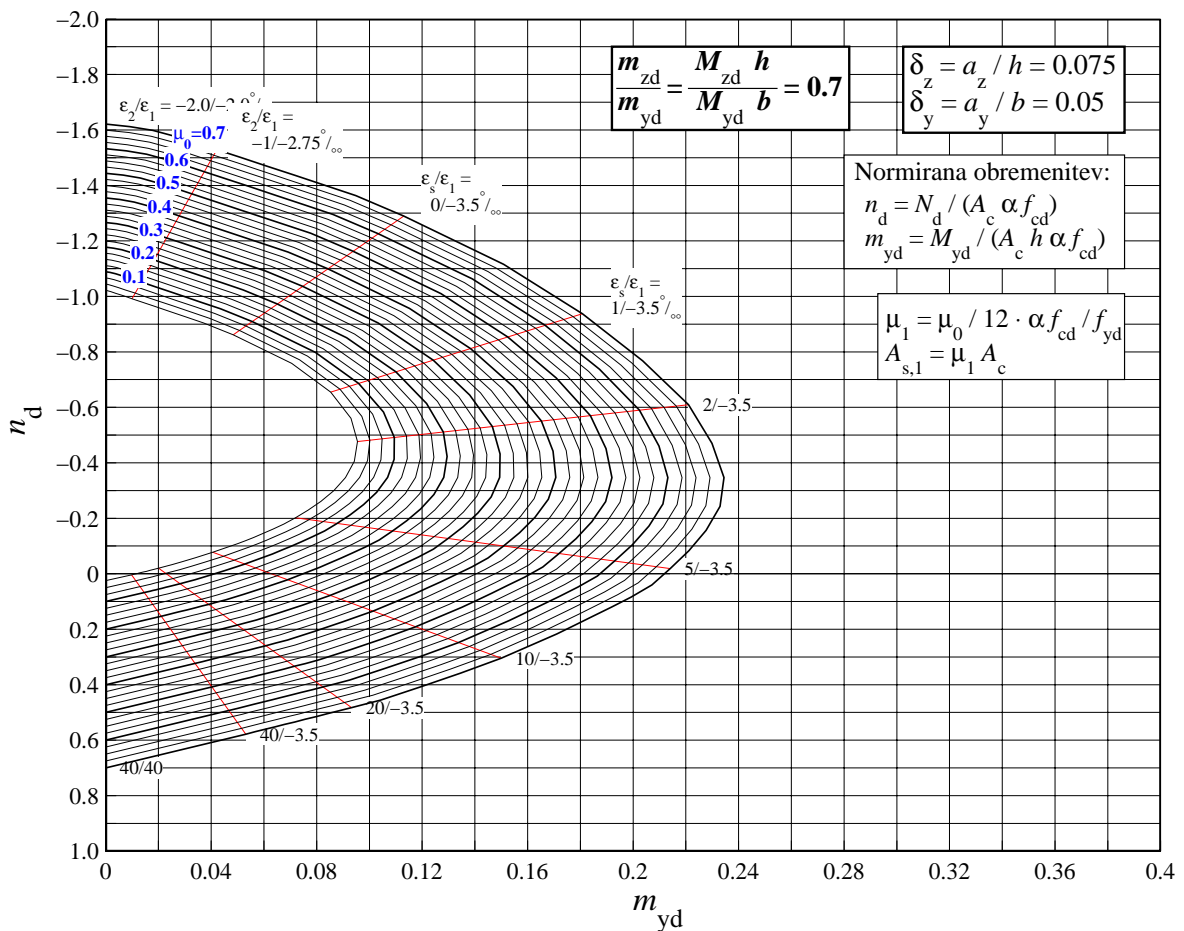
Slika 154: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



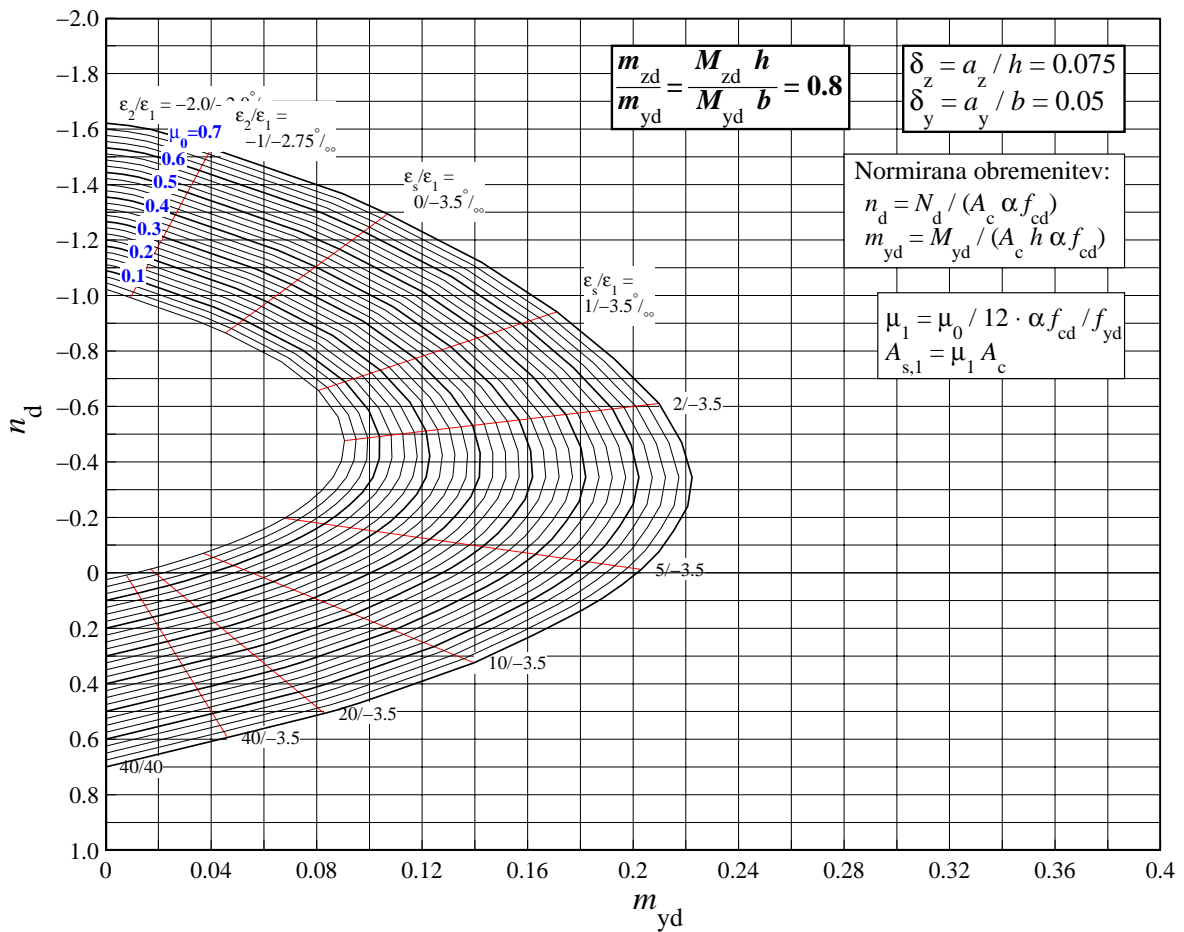
Slika 155: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



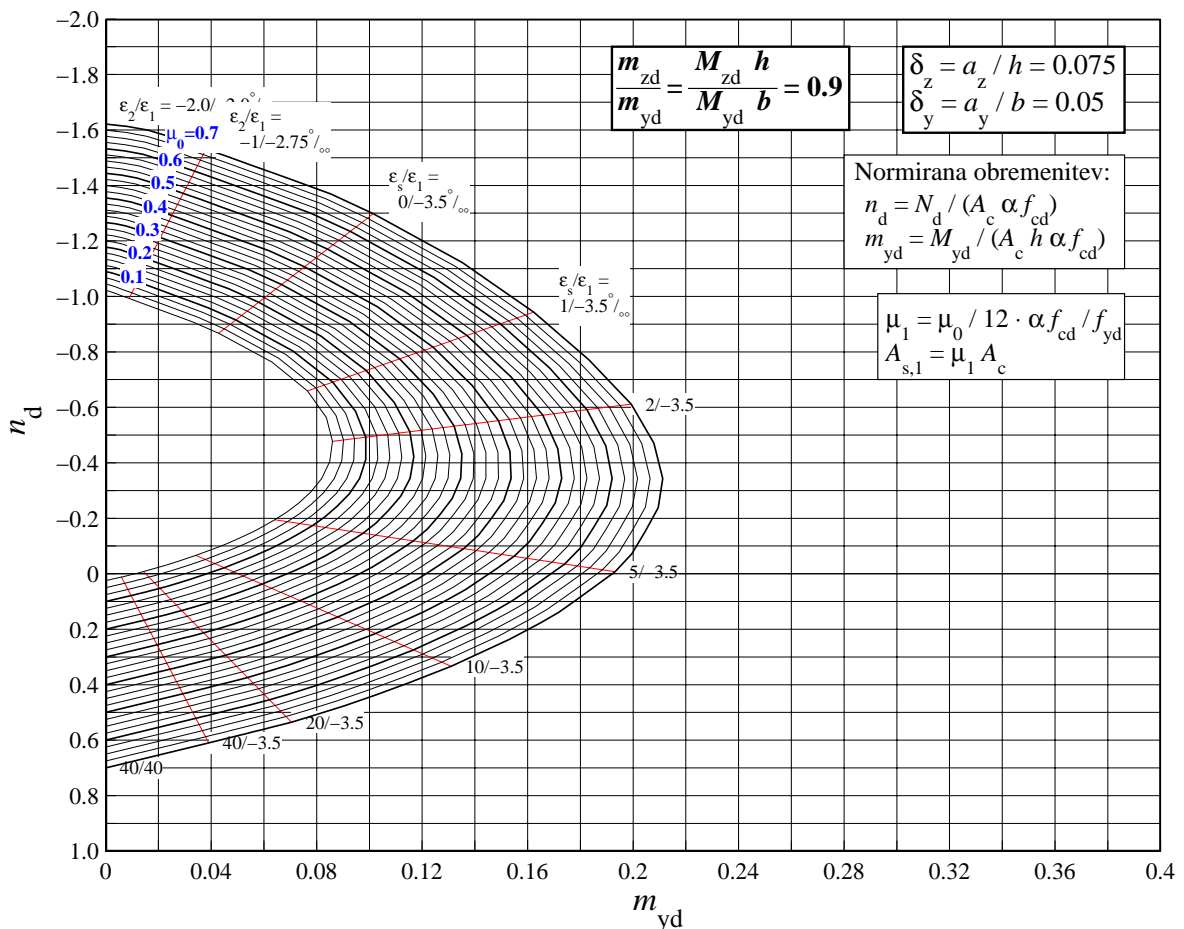
Slika 156: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



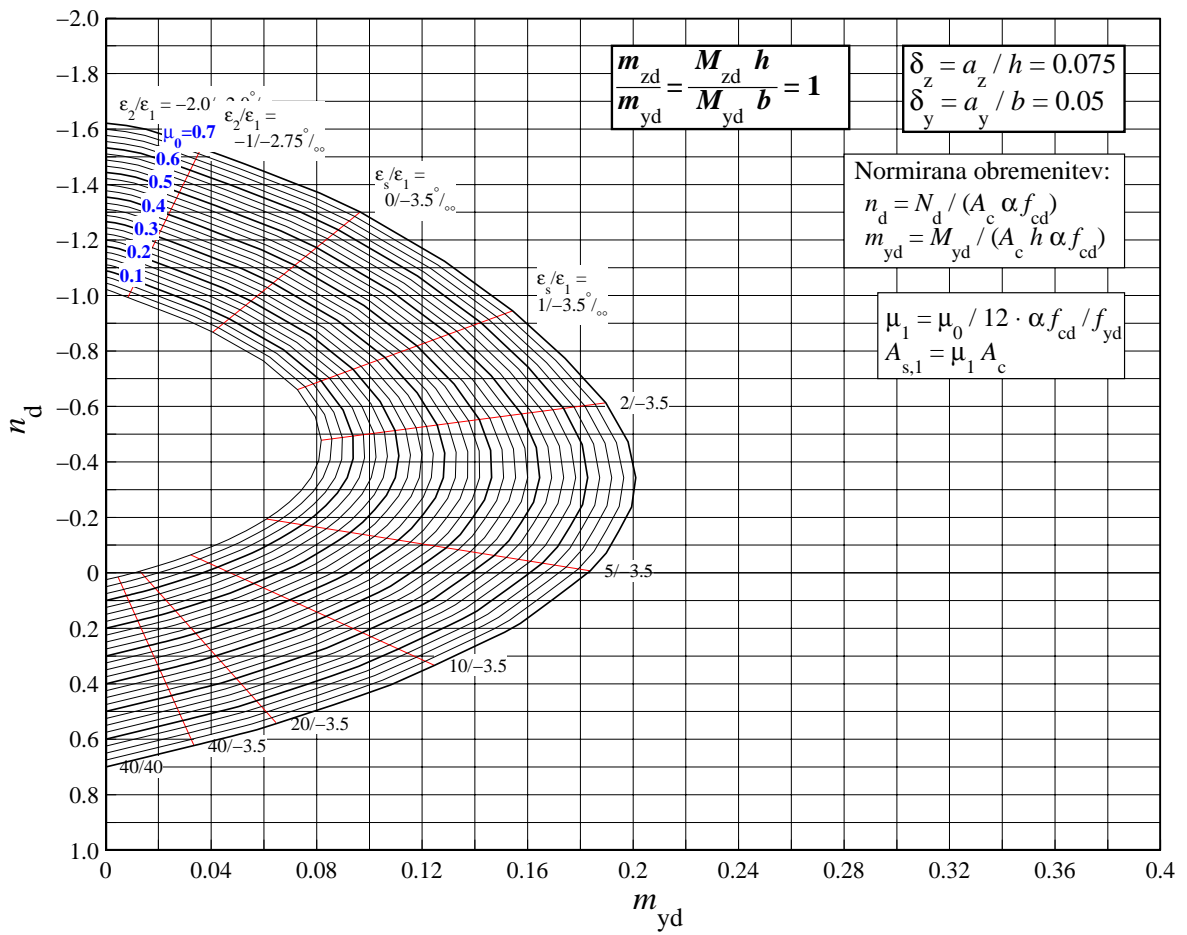
Slika 157: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.



Slika 158: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.

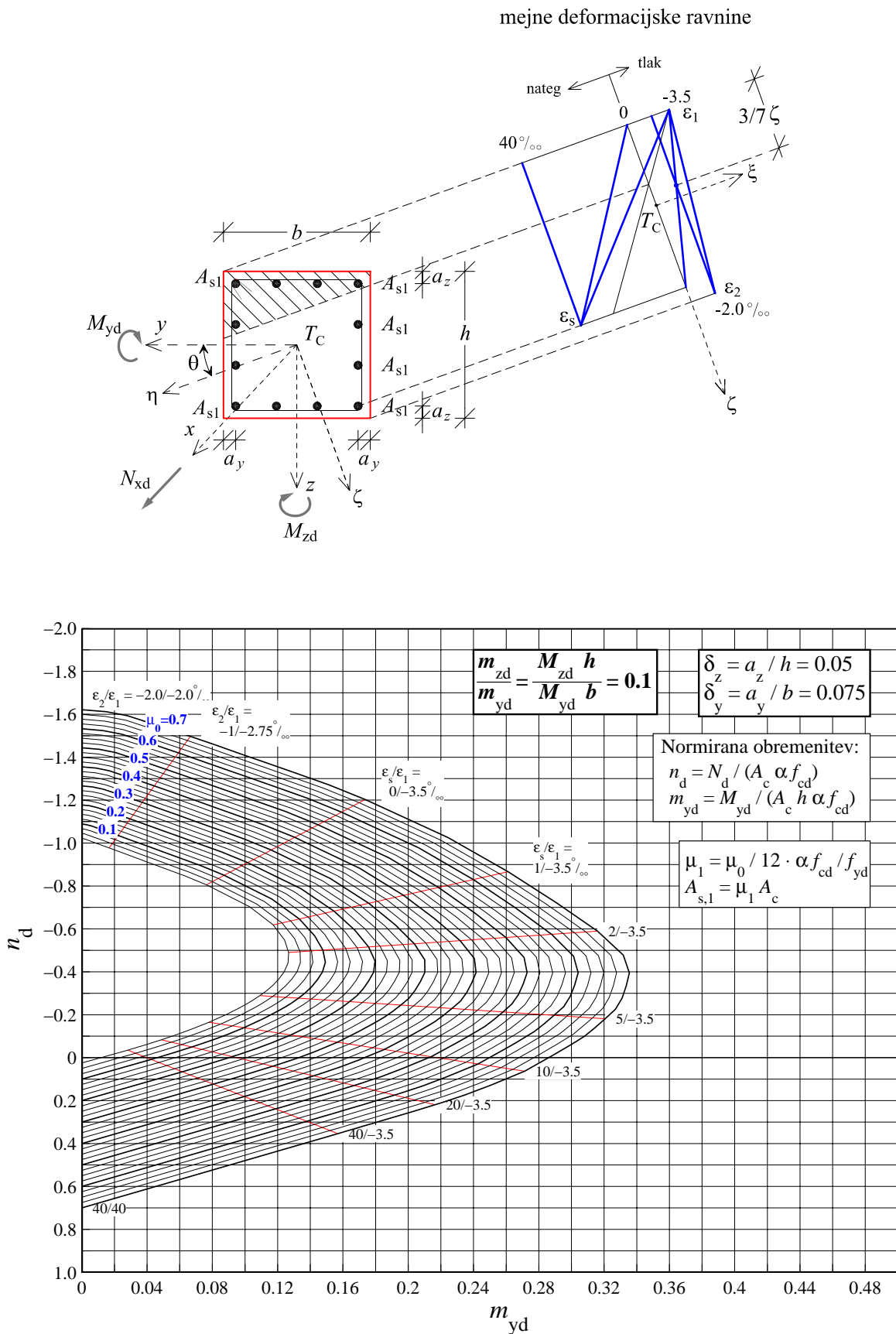


Slika 159: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.

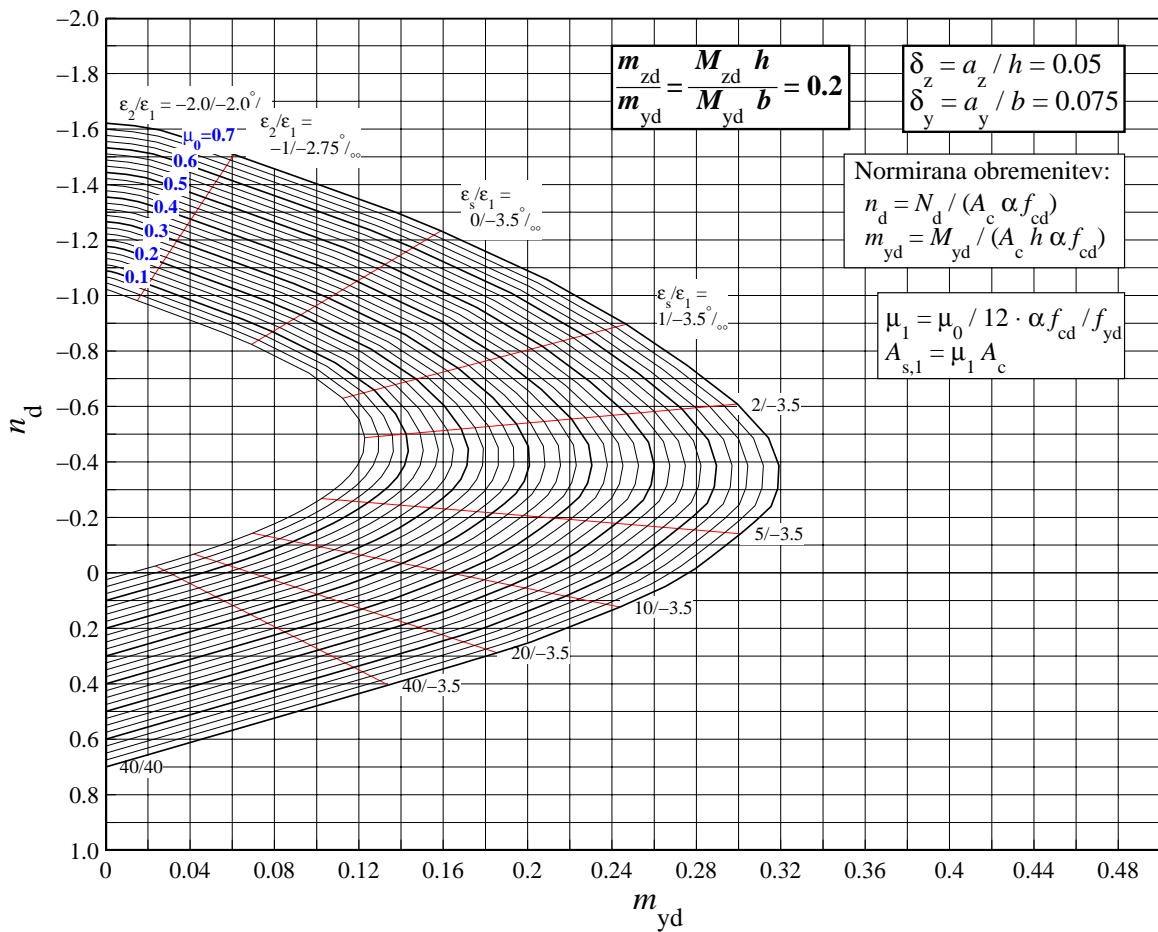


Slika 160: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.05$, 12 palic.

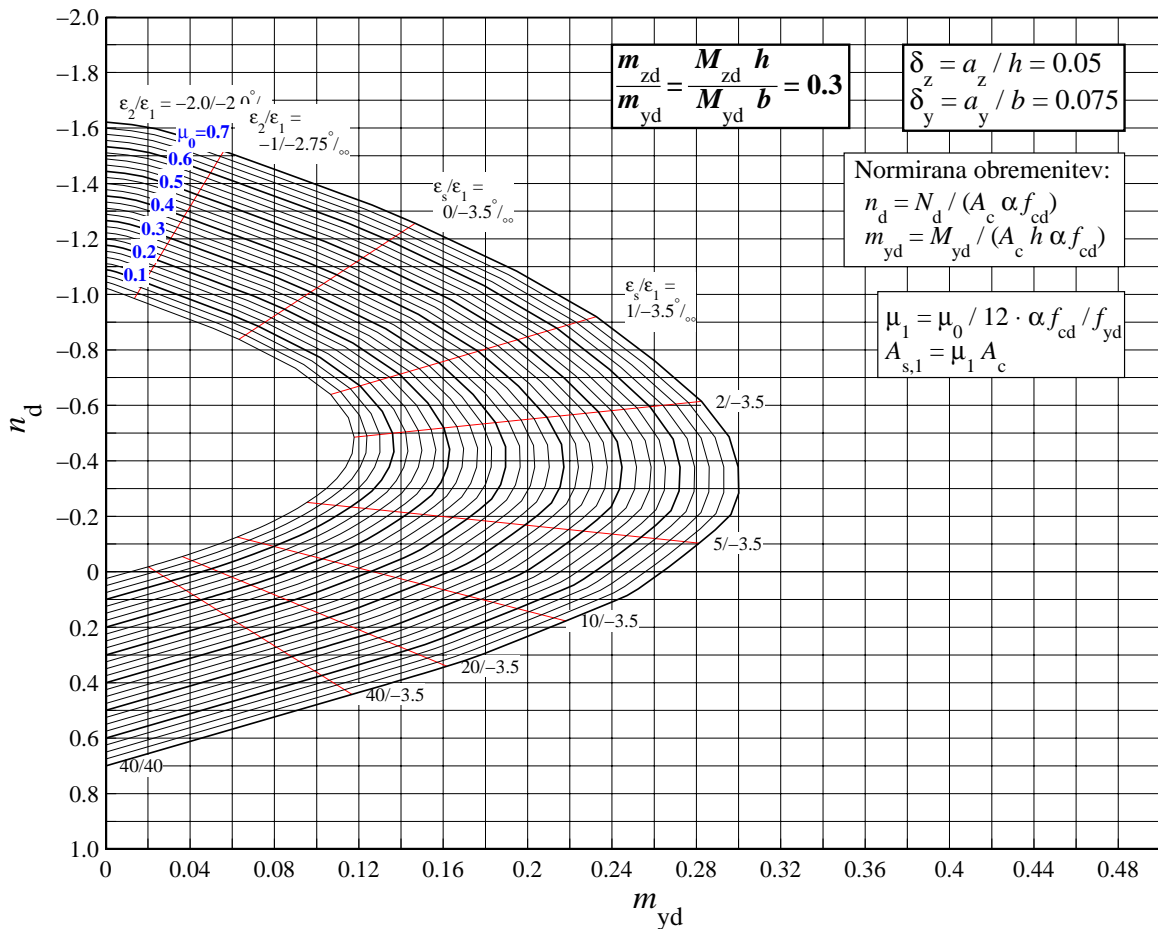
2.17 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.05, \delta_y = 0.075$), S500



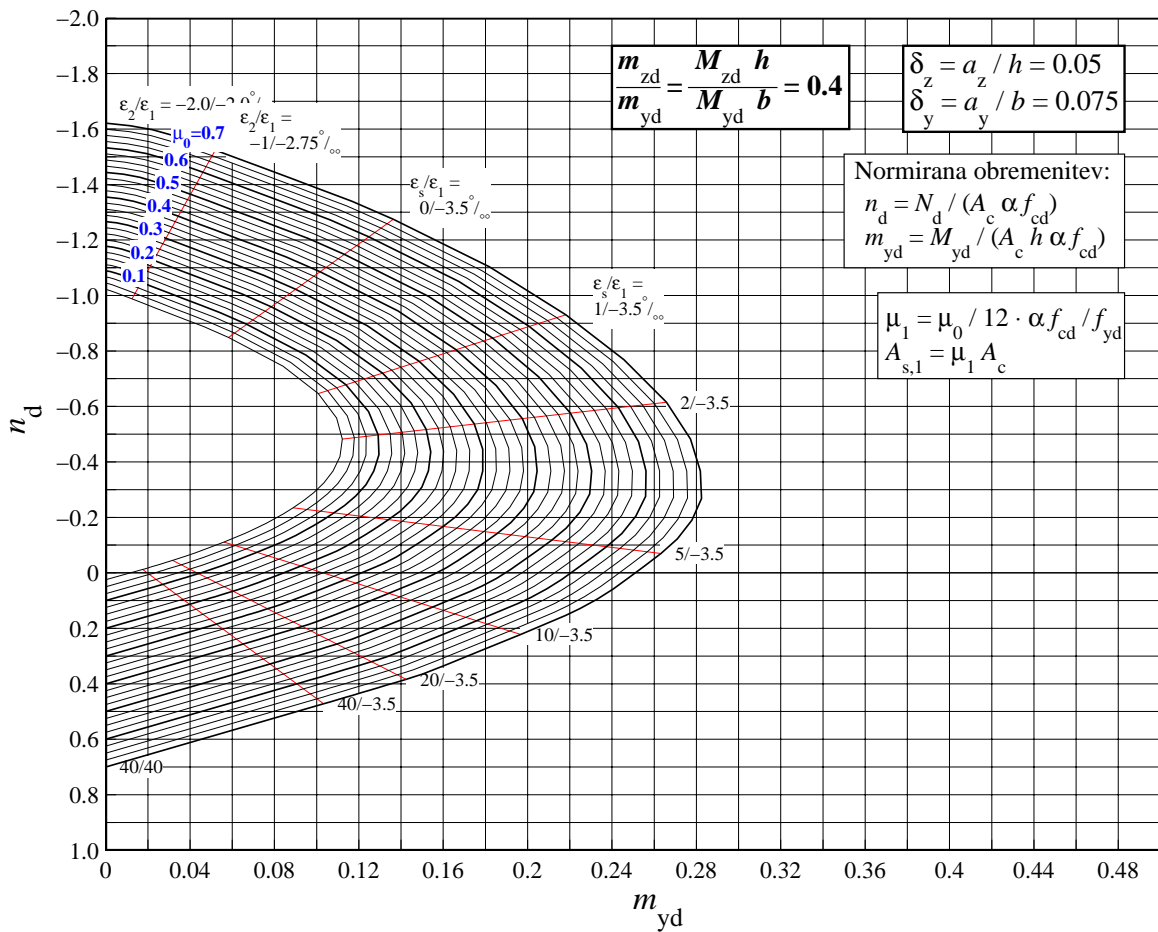
Slika 161: Pravokotni prerez: $\delta_z = 0.05, \delta_y = 0.075$, 12 palic.



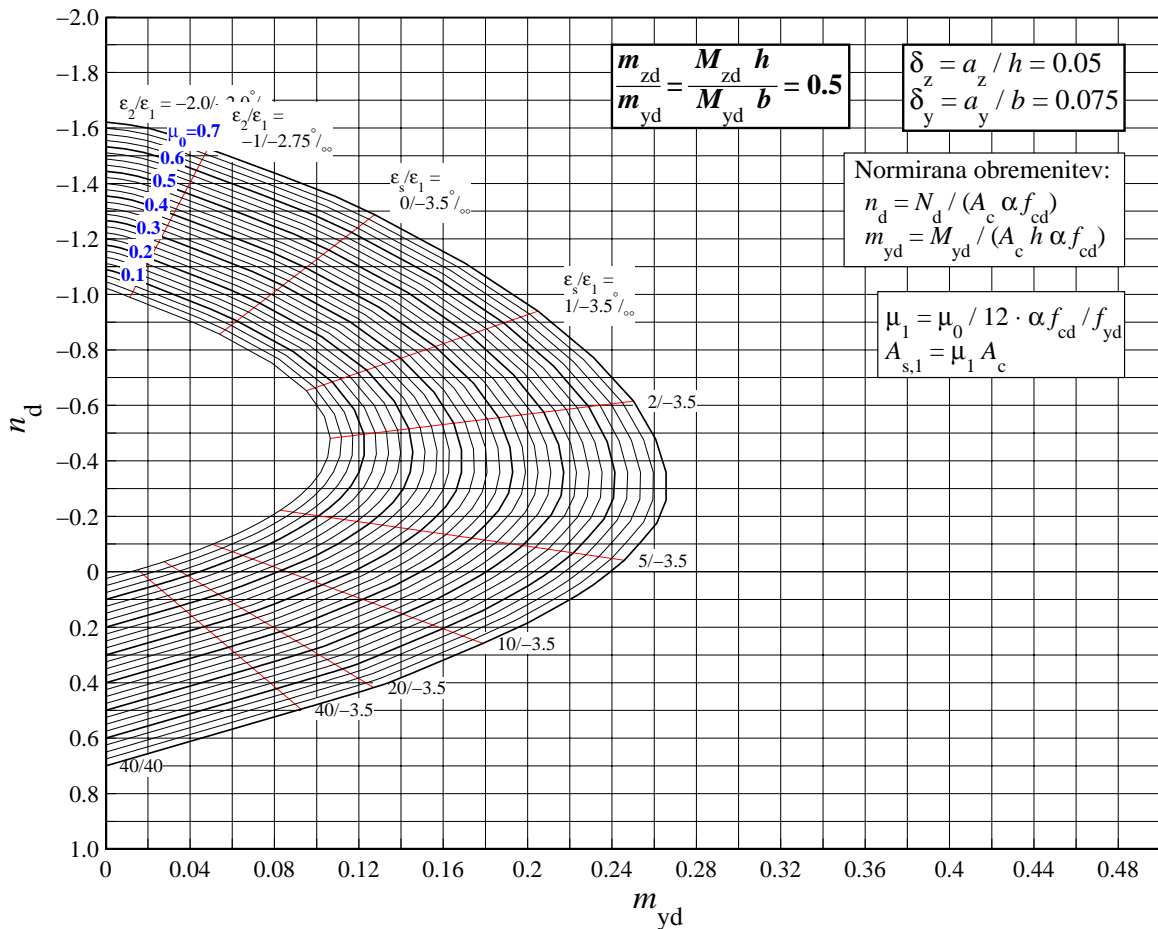
Slika 162: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



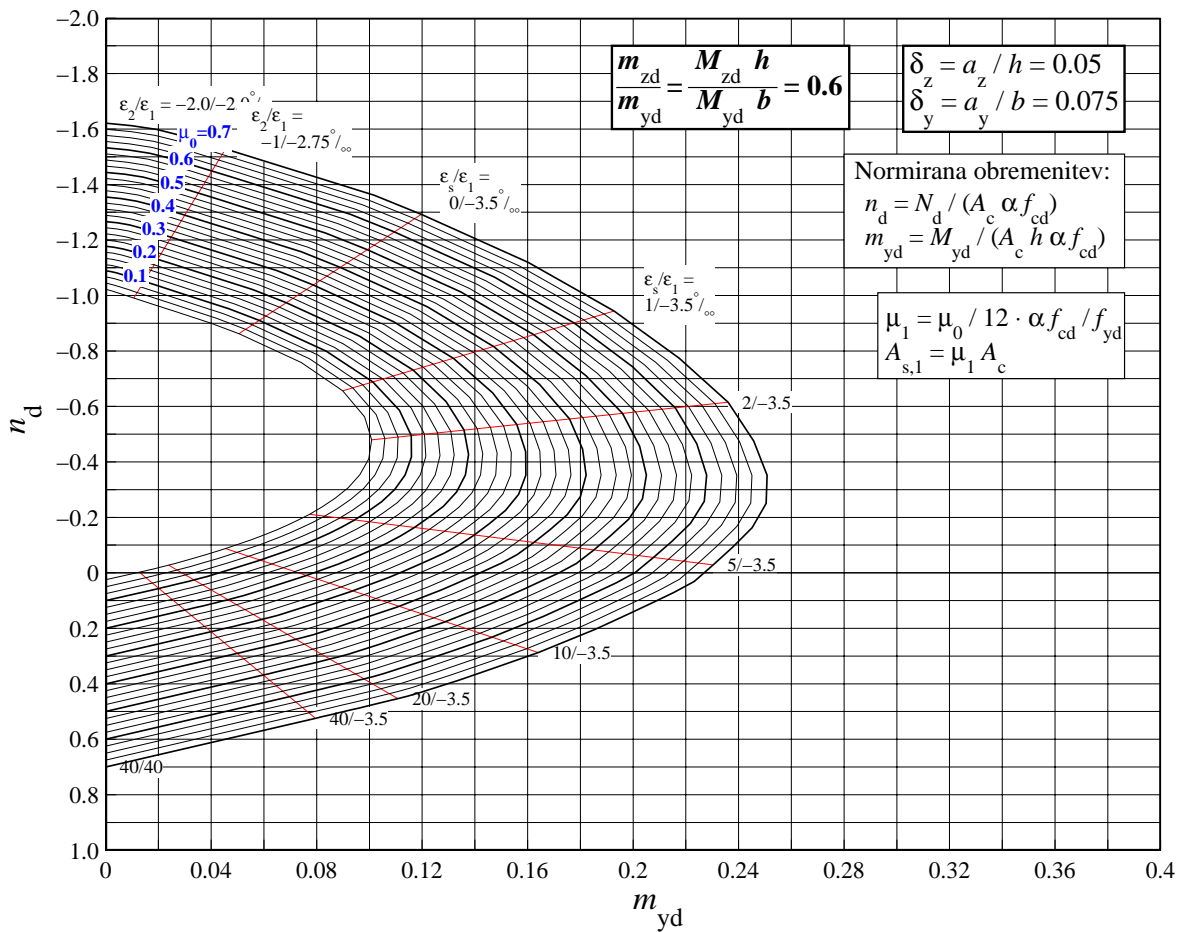
Slika 163: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



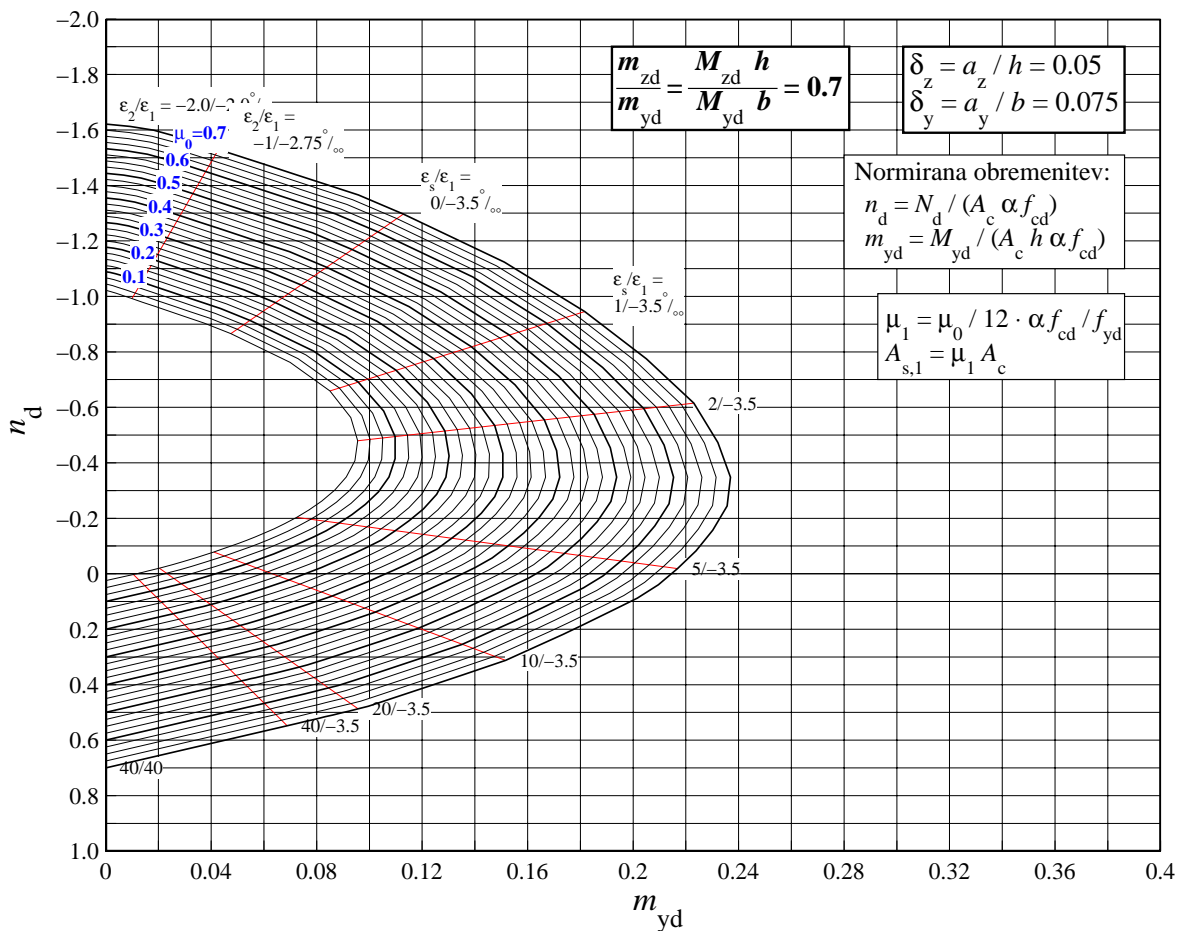
Slika 164: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



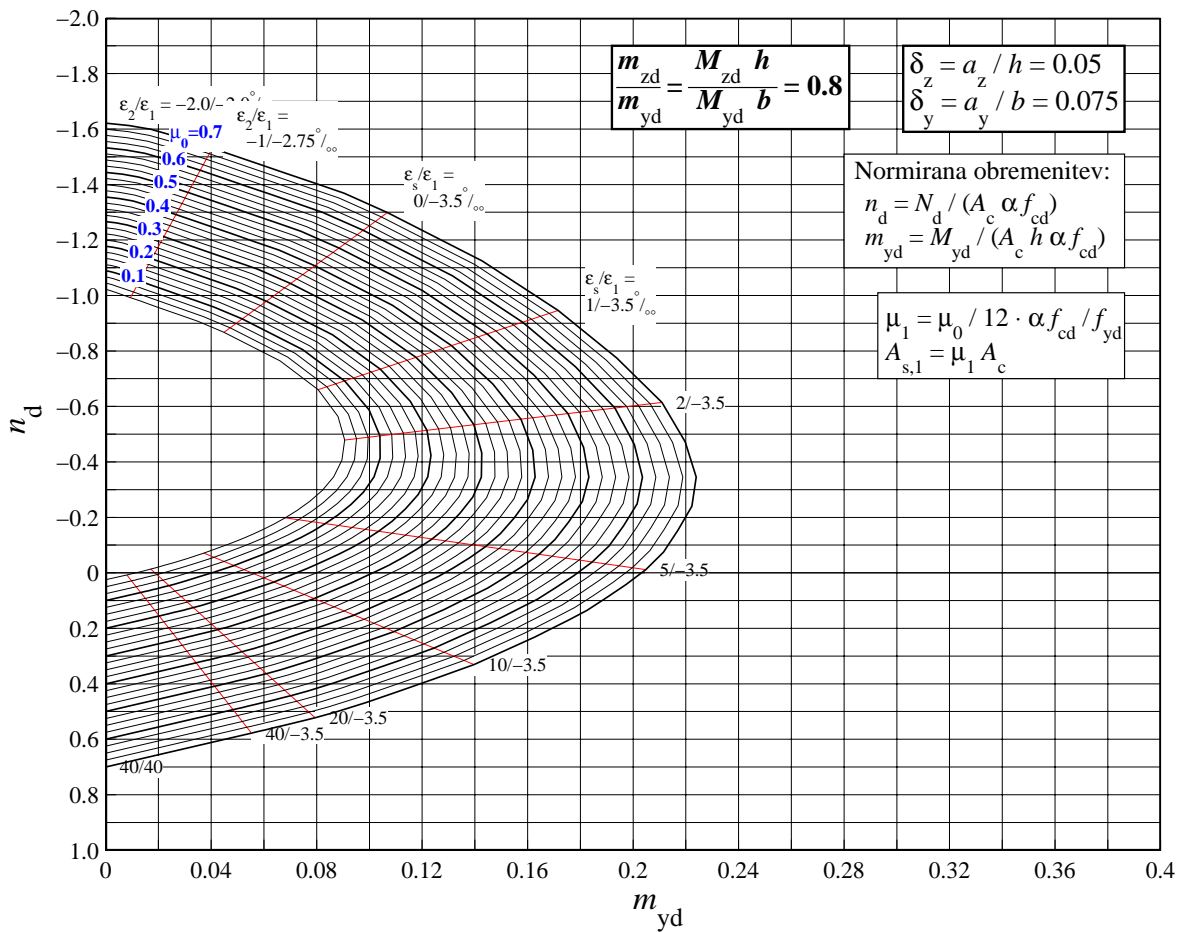
Slika 165: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



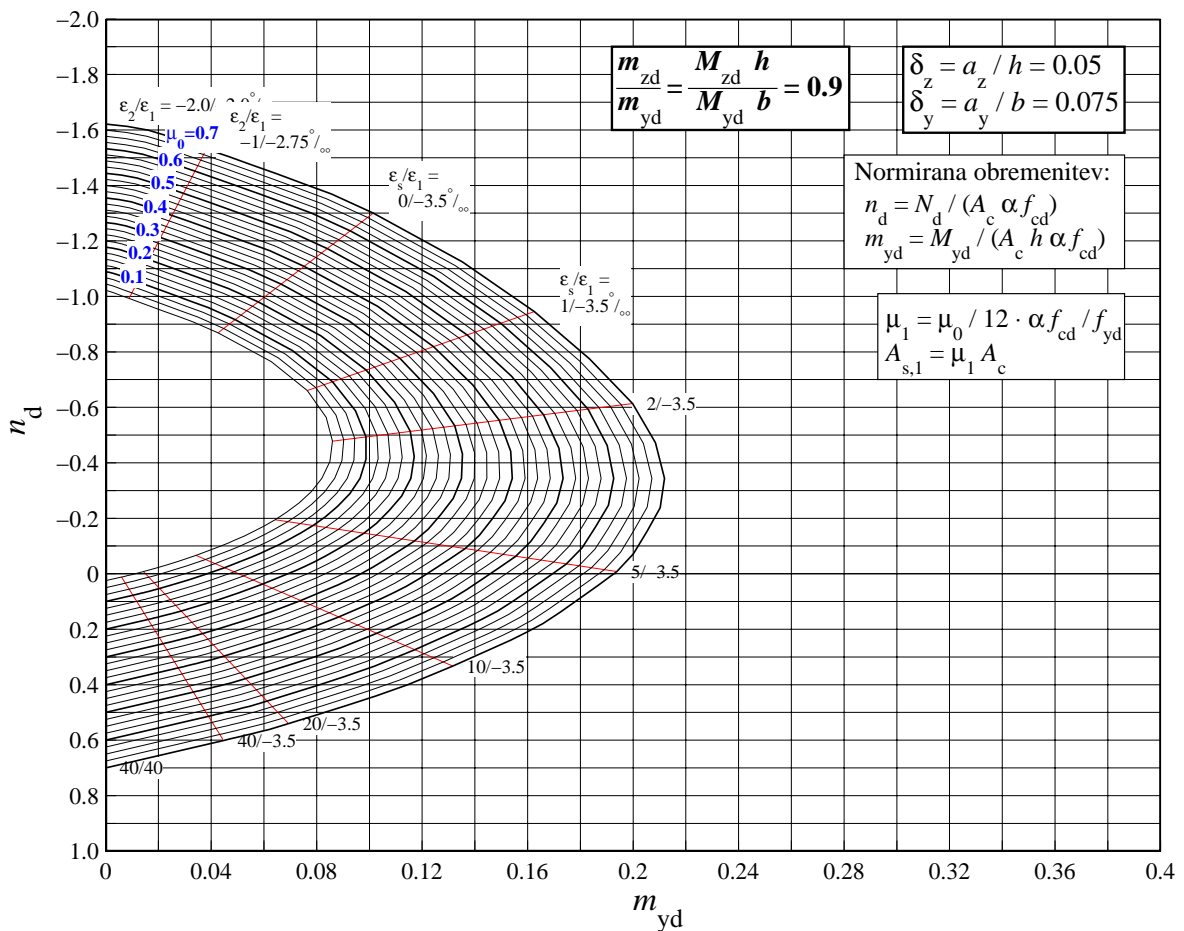
Slika 166: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



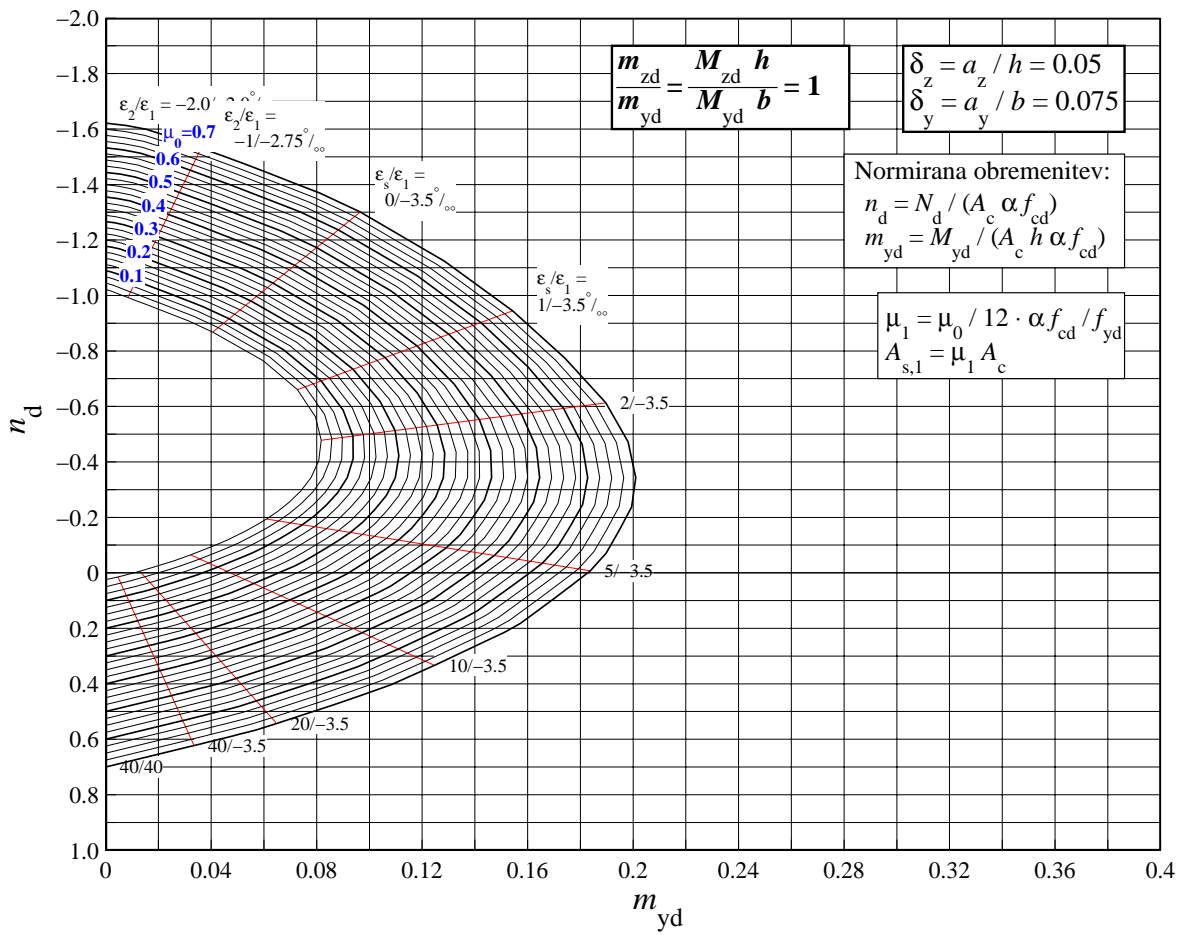
Slika 167: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.



Slika 168: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.

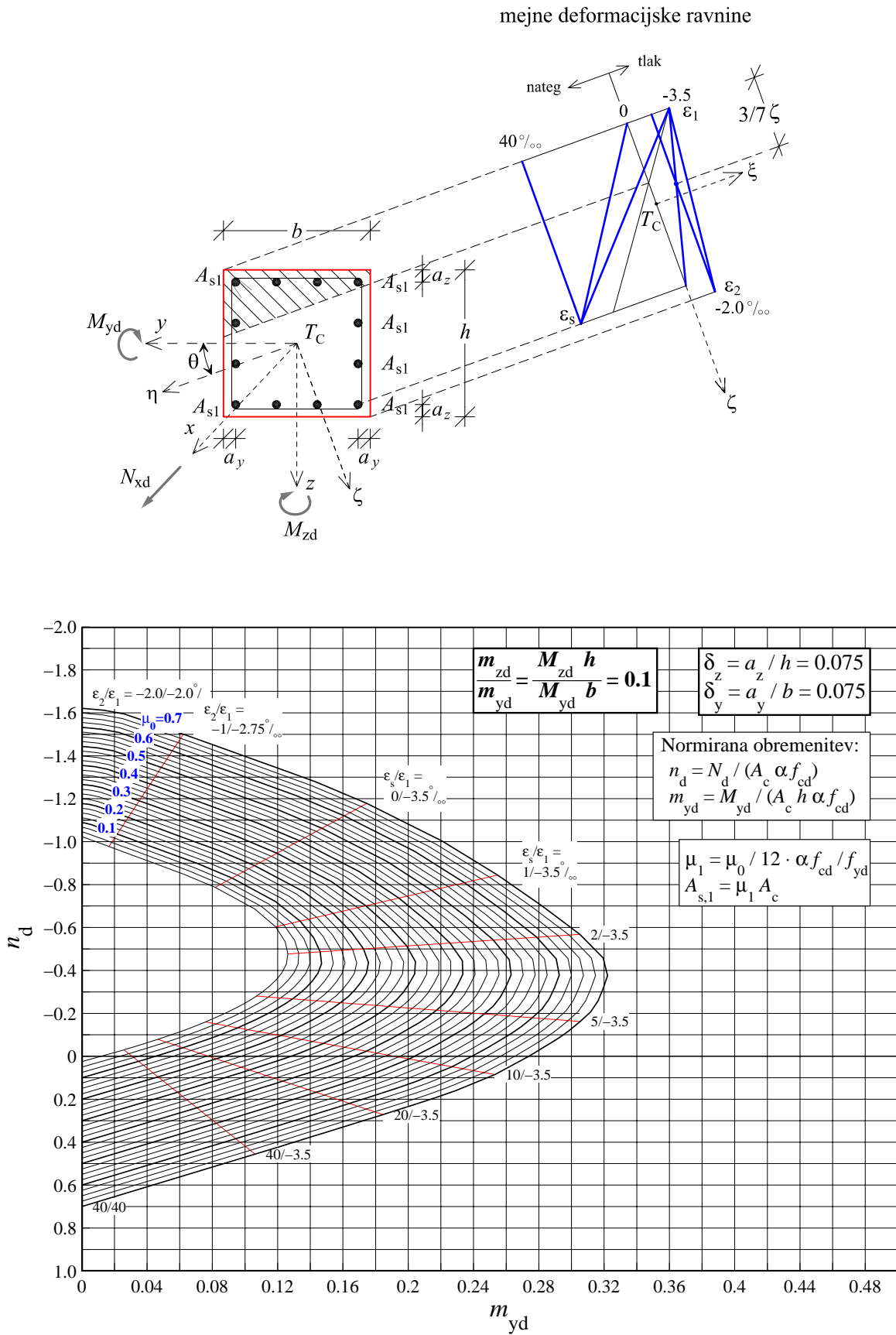


Slika 169: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.

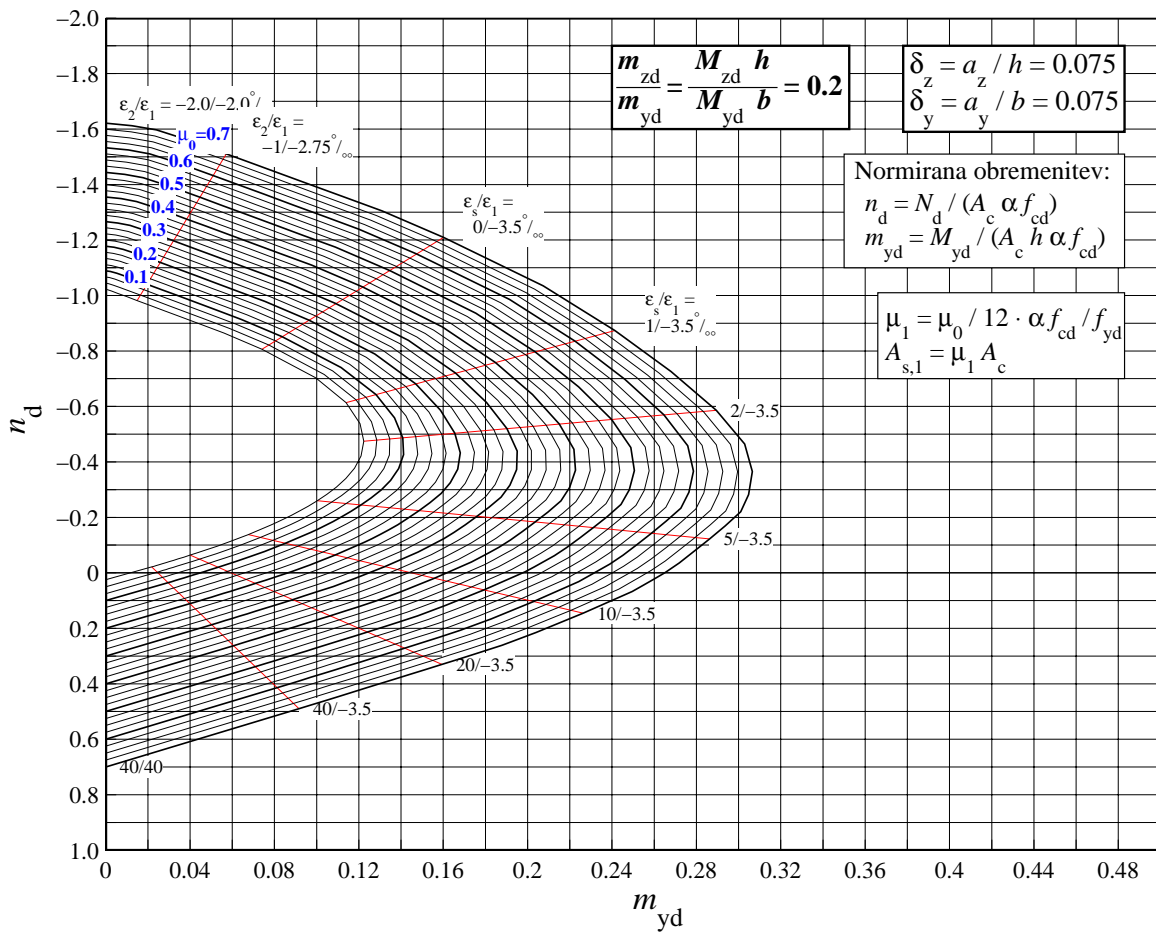


Slika 170: Pravokotni prerez: $\delta_z = 0.05$, $\delta_y = 0.075$, 12 palic.

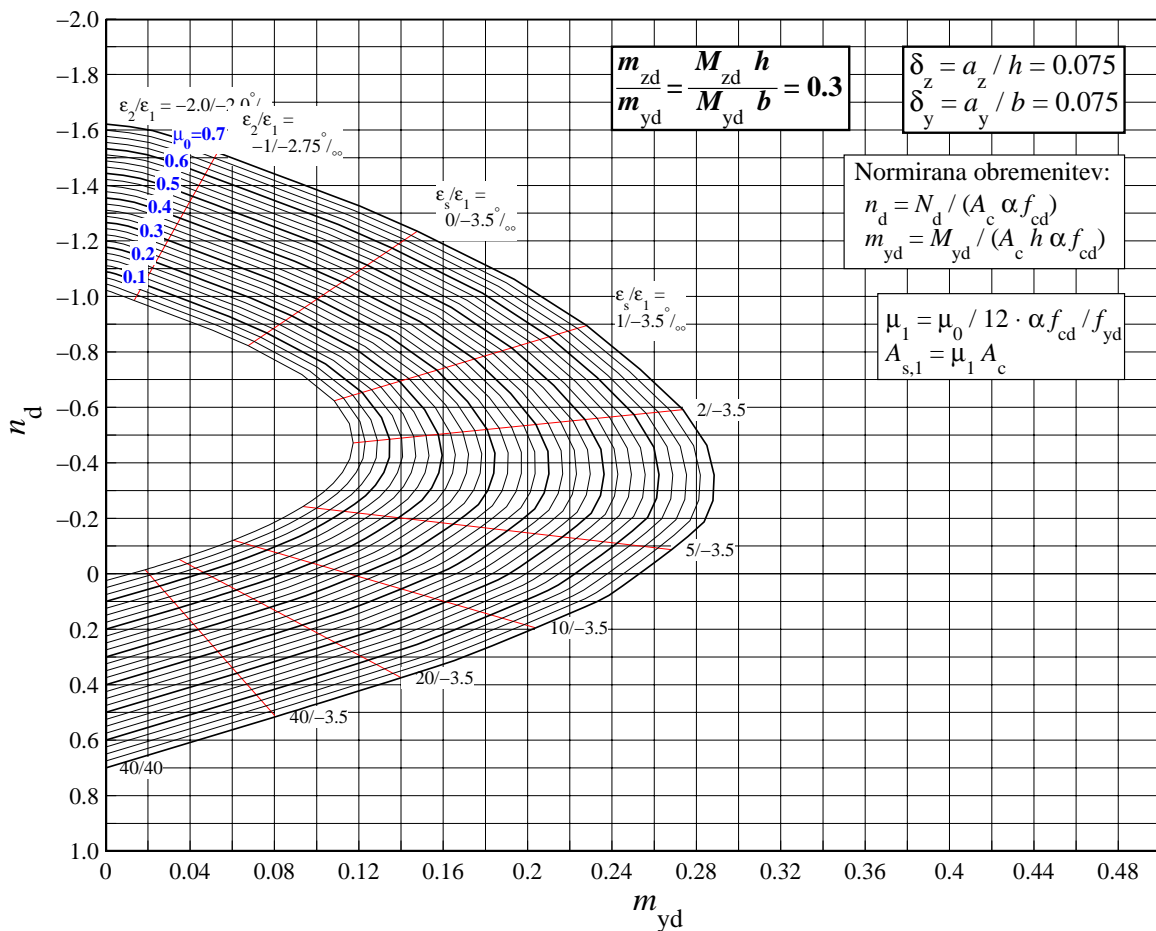
2.18 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.075, \delta_y = 0.075$), S500



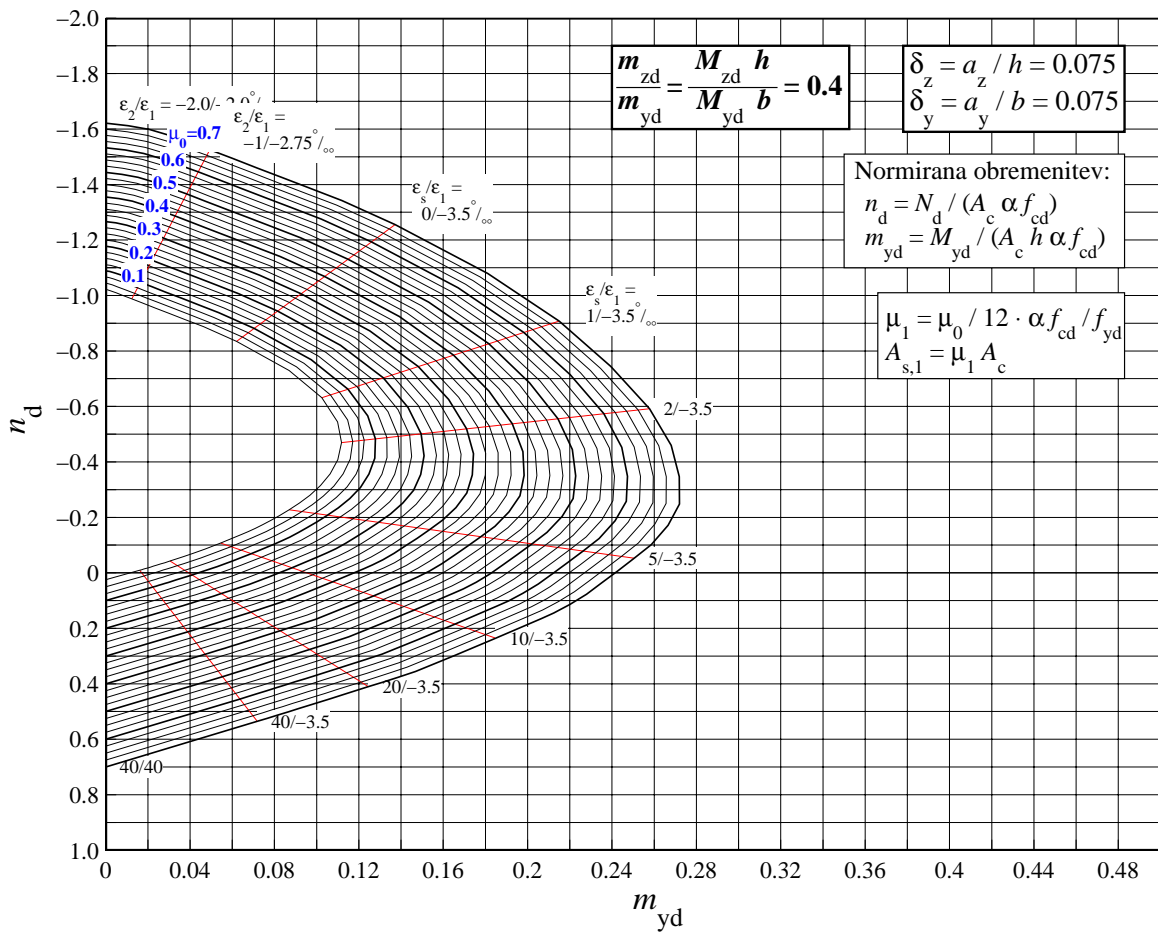
Slika 171: Pravokotni prerez: $\delta_z = 0.075, \delta_y = 0.075$, 12 palic.



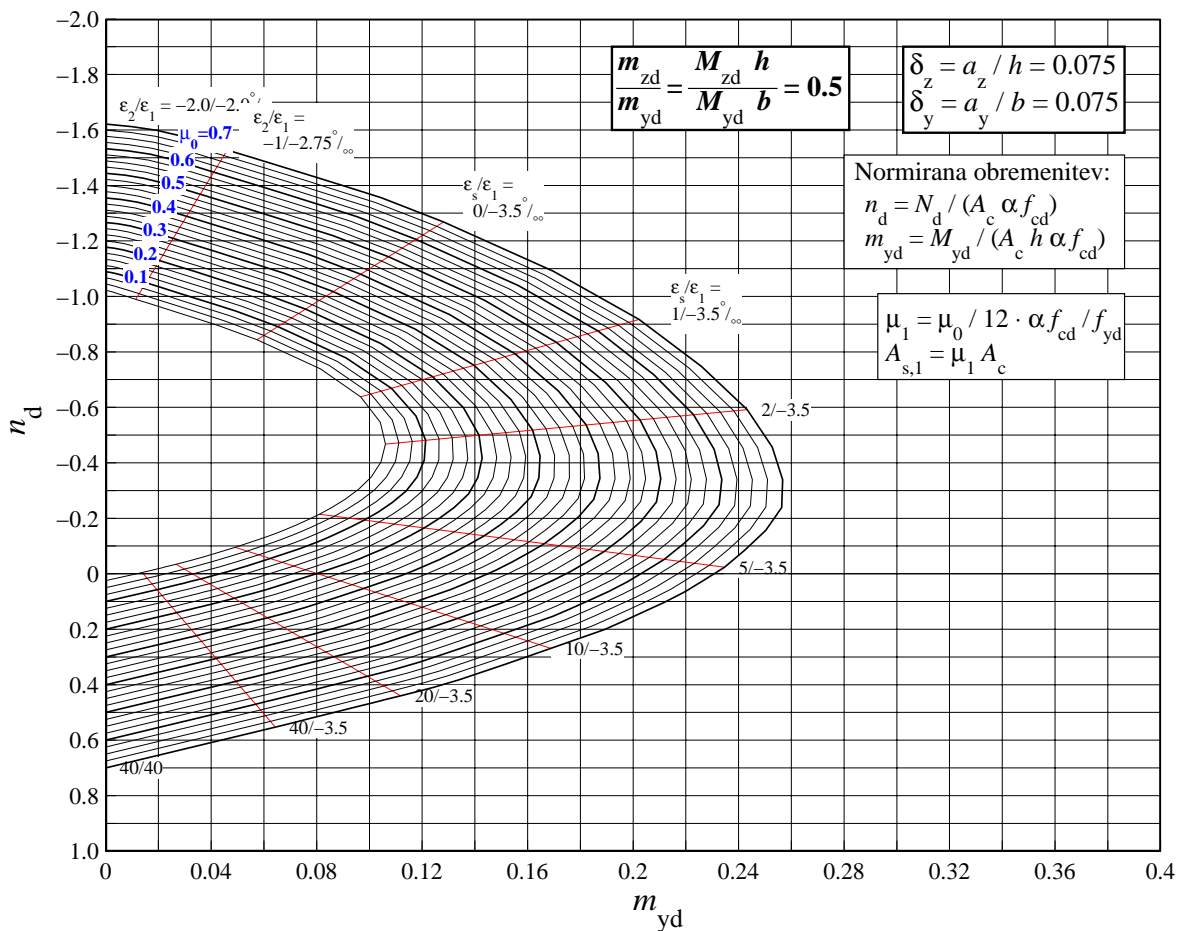
Slika 172: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



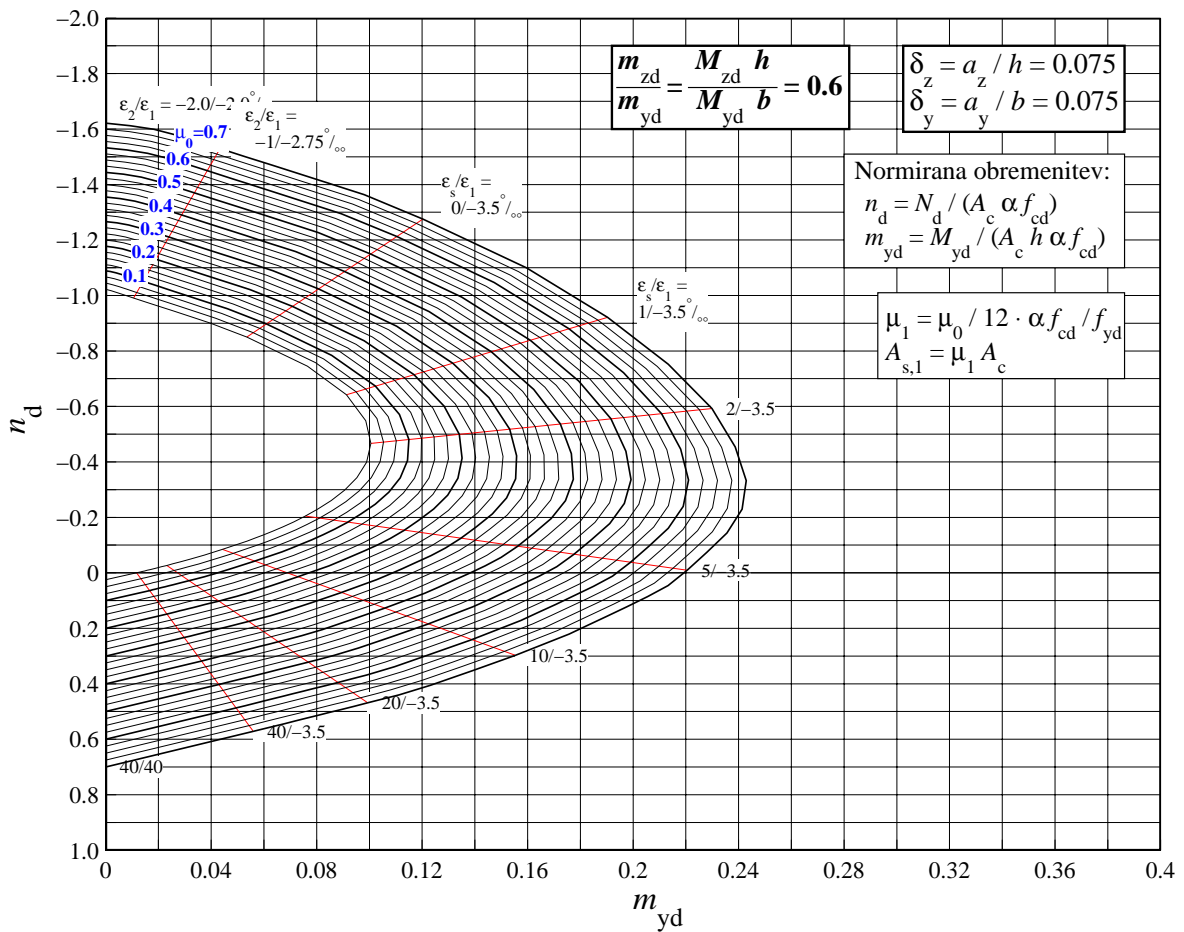
Slika 173: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



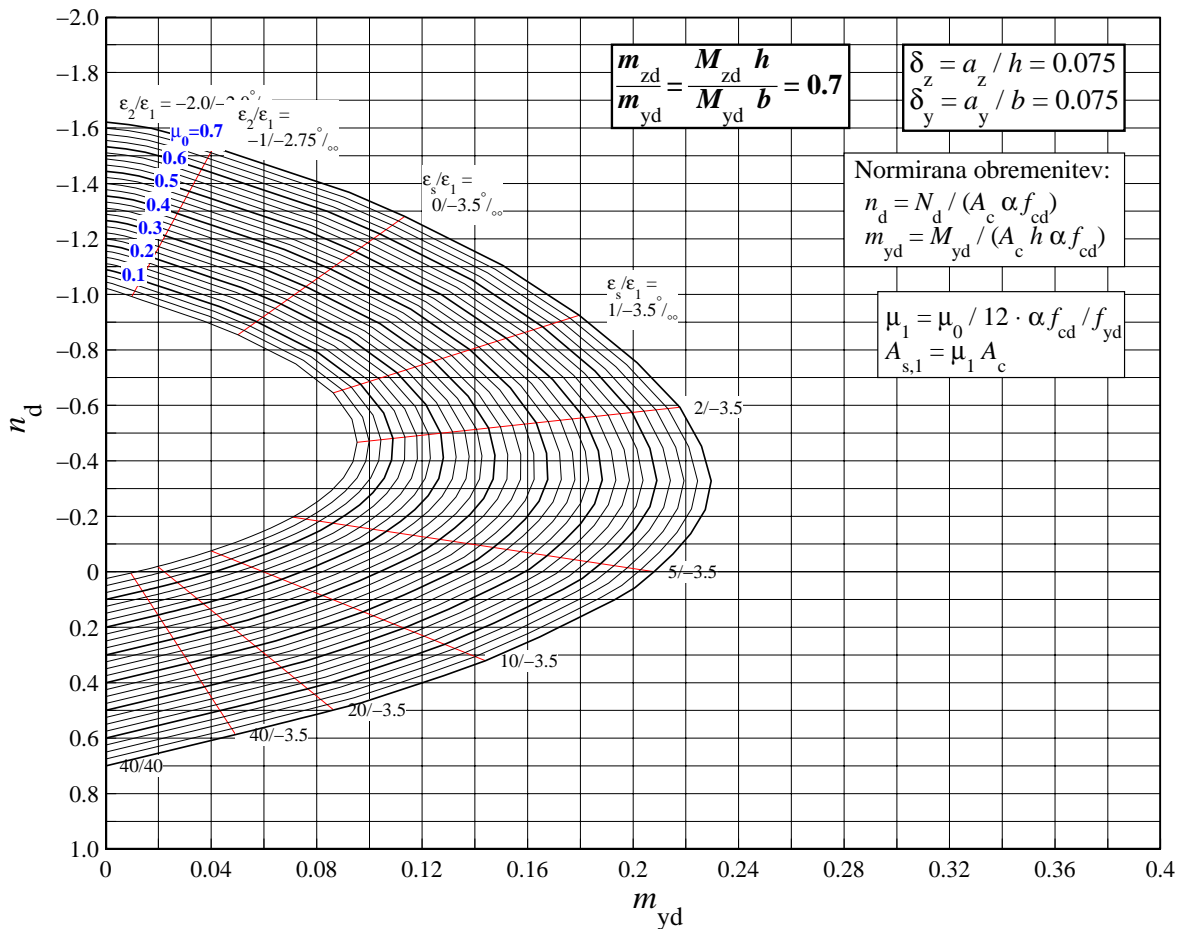
Slika 174: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



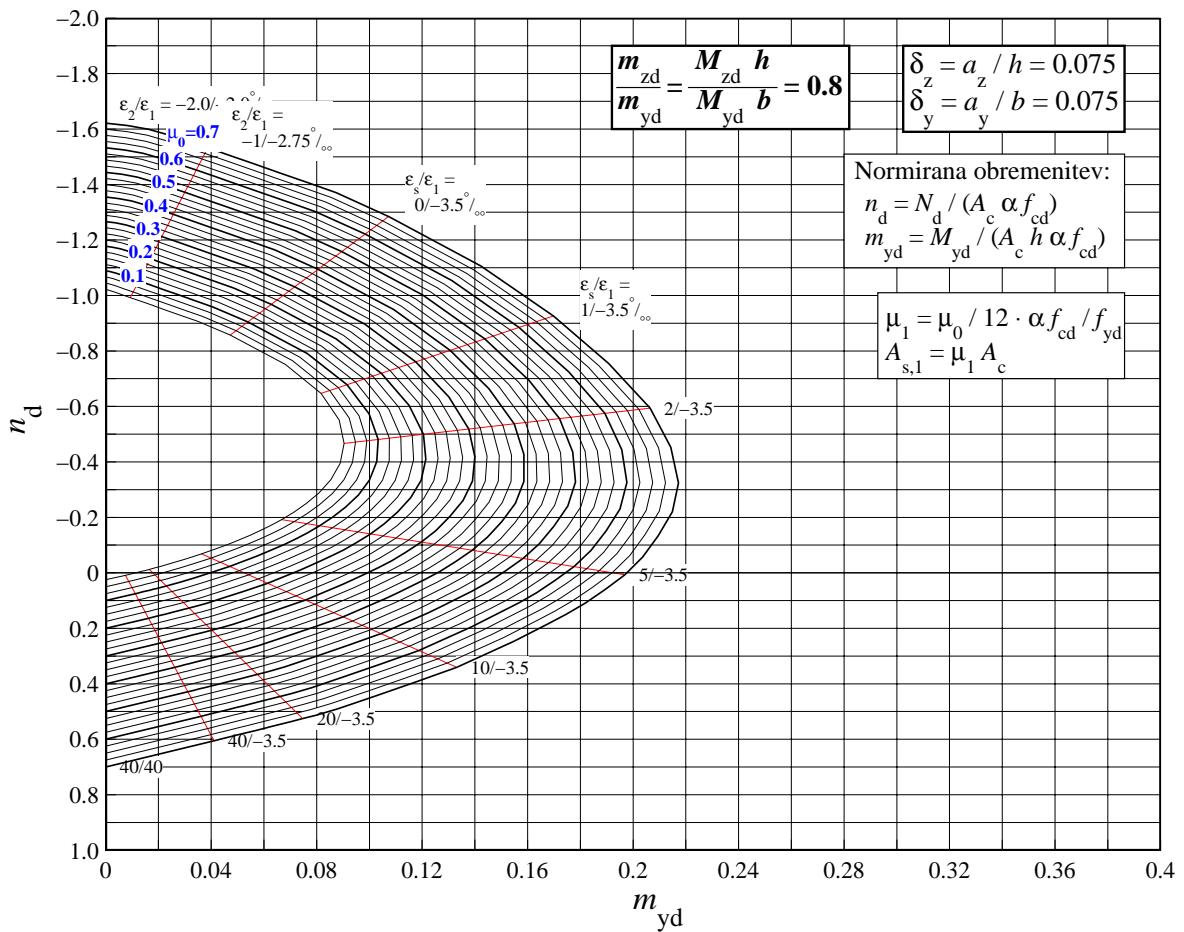
Slika 175: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



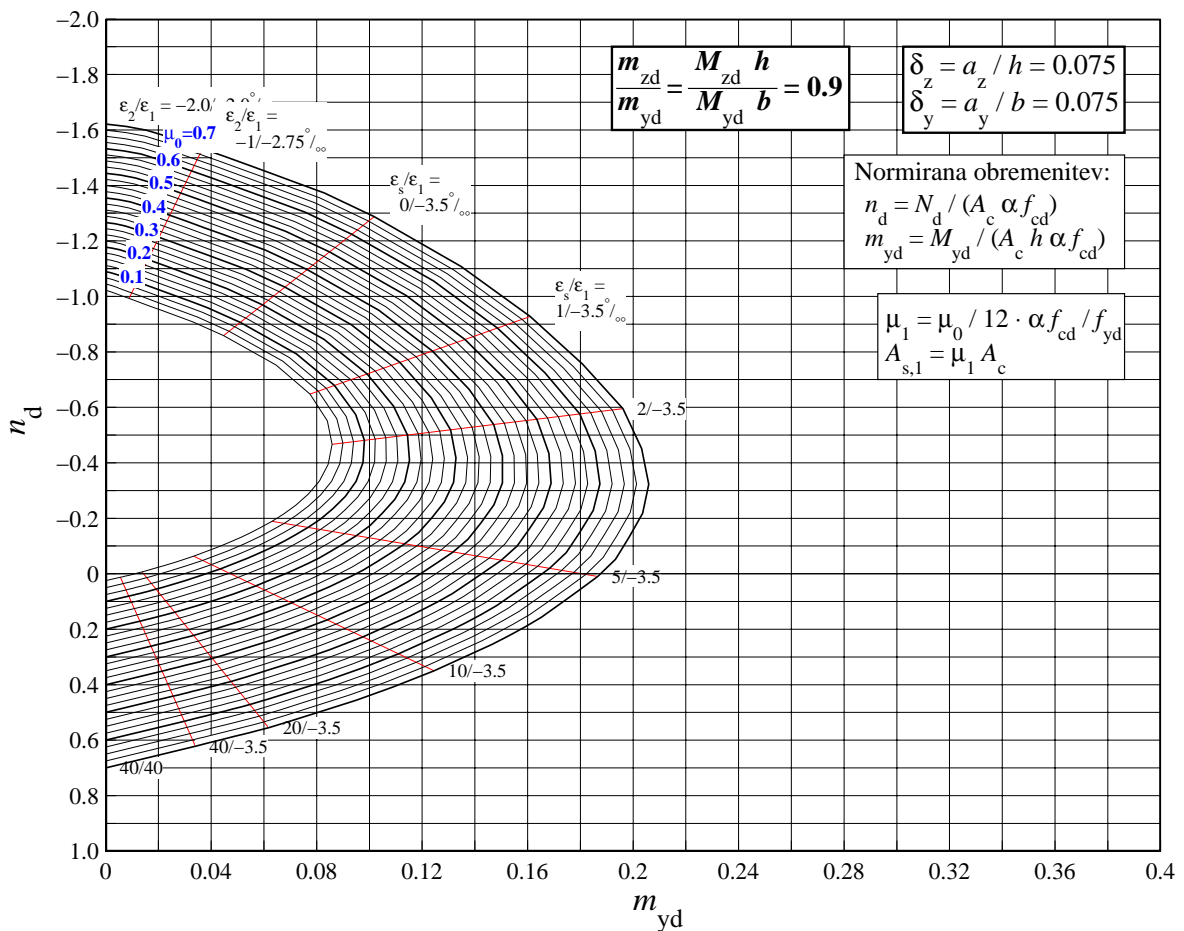
Slika 176: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



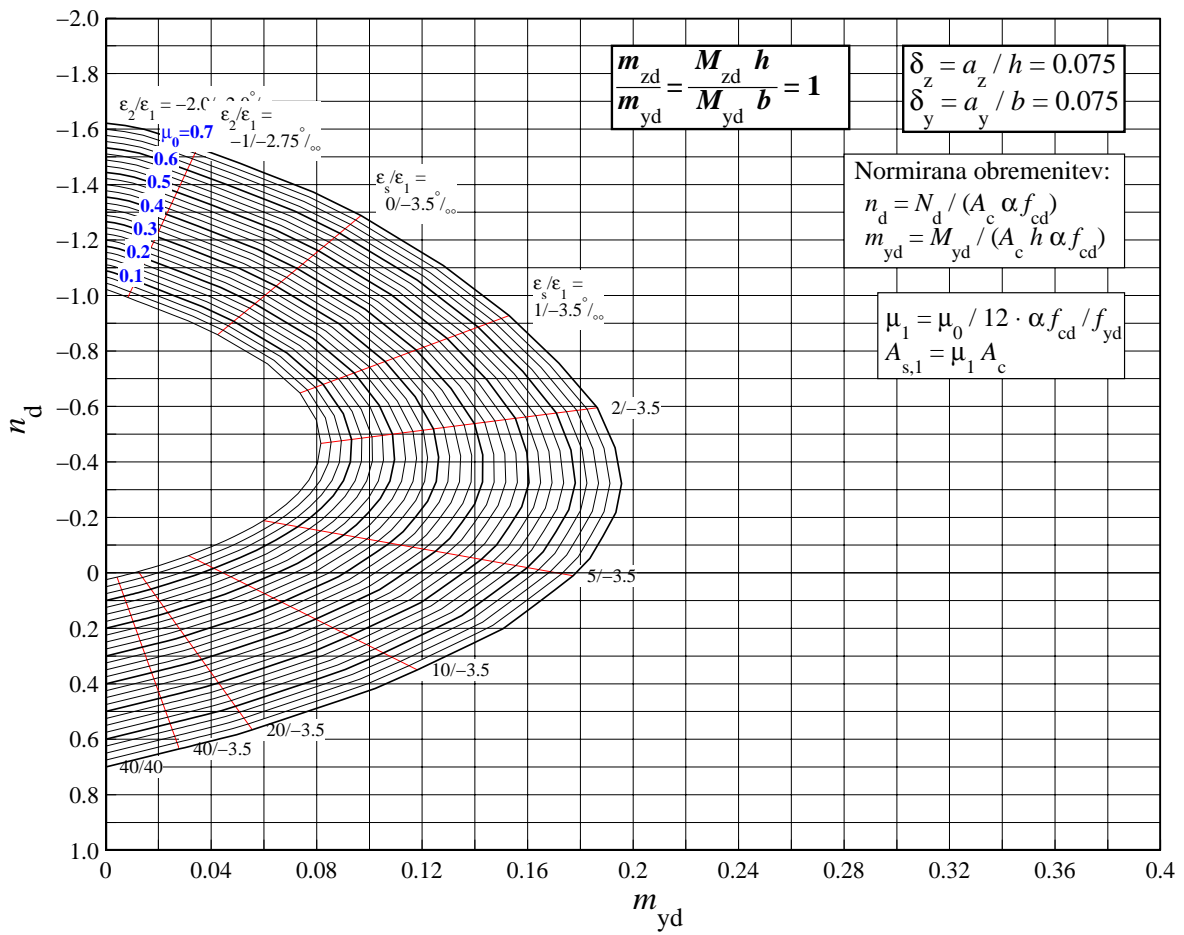
Slika 177: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.



Slika 178: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.

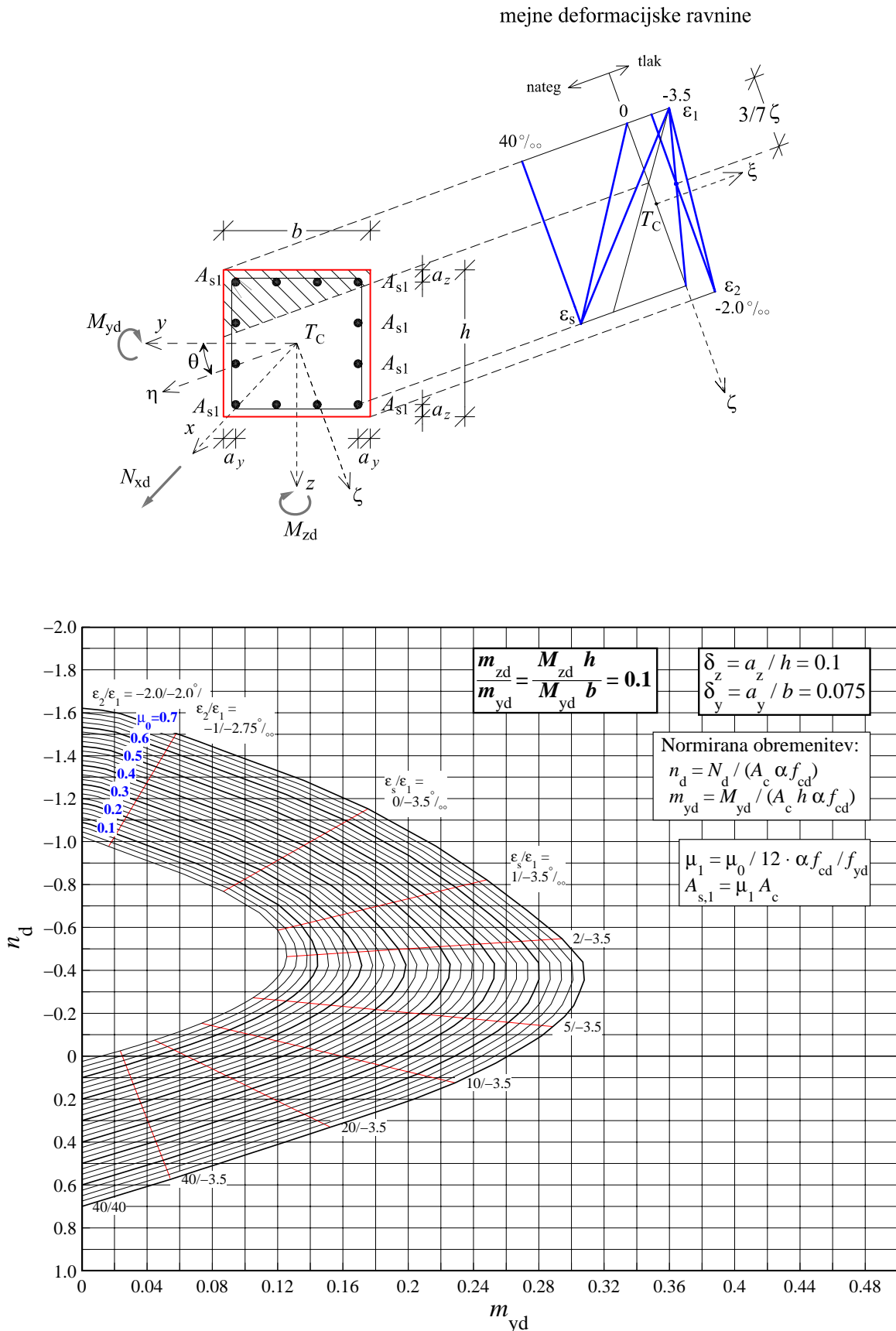


Slika 179: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.

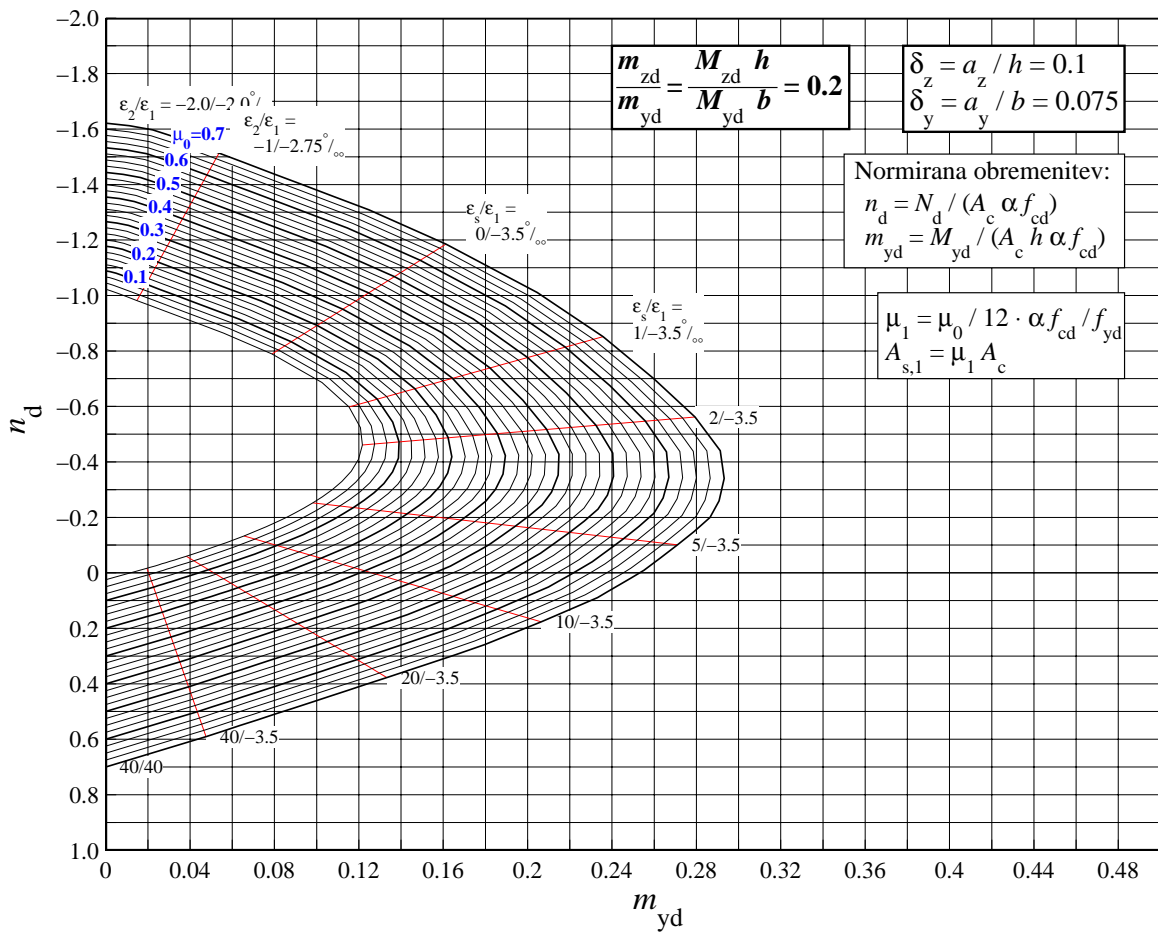


Slika 180: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.075$, 12 palic.

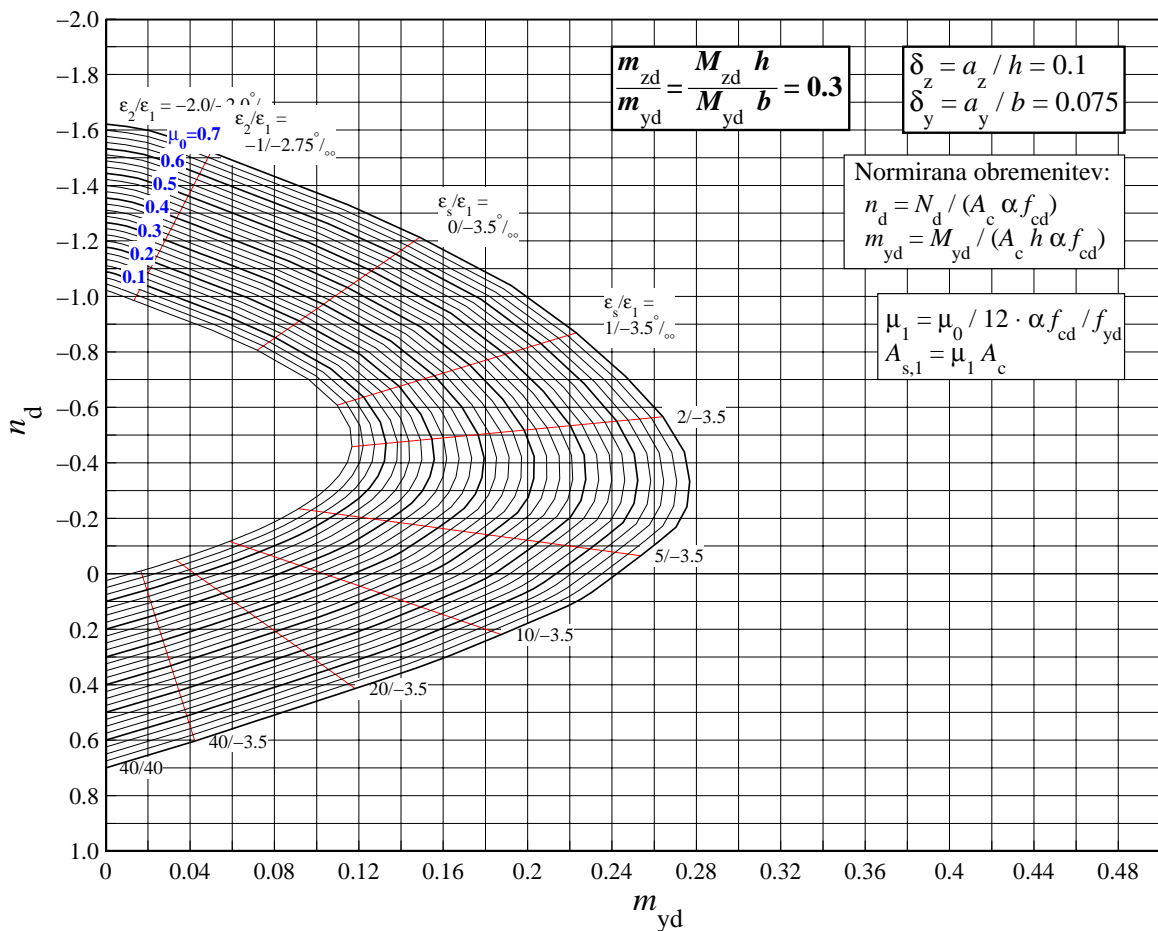
2.19 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.1, \delta_y = 0.075$), S500



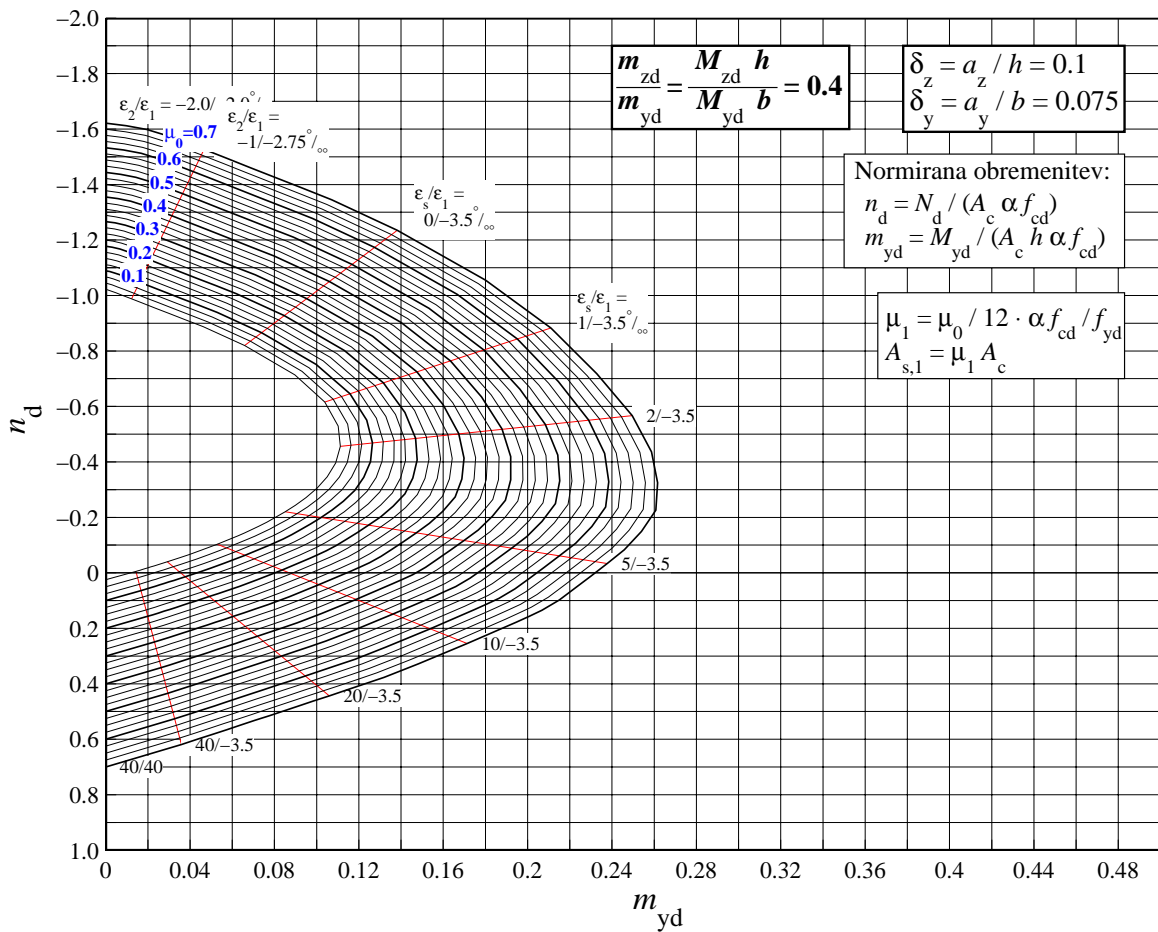
Slika 181: Pravokotni prerez: $\delta_z = 0.1, \delta_y = 0.075$, 12 palic.



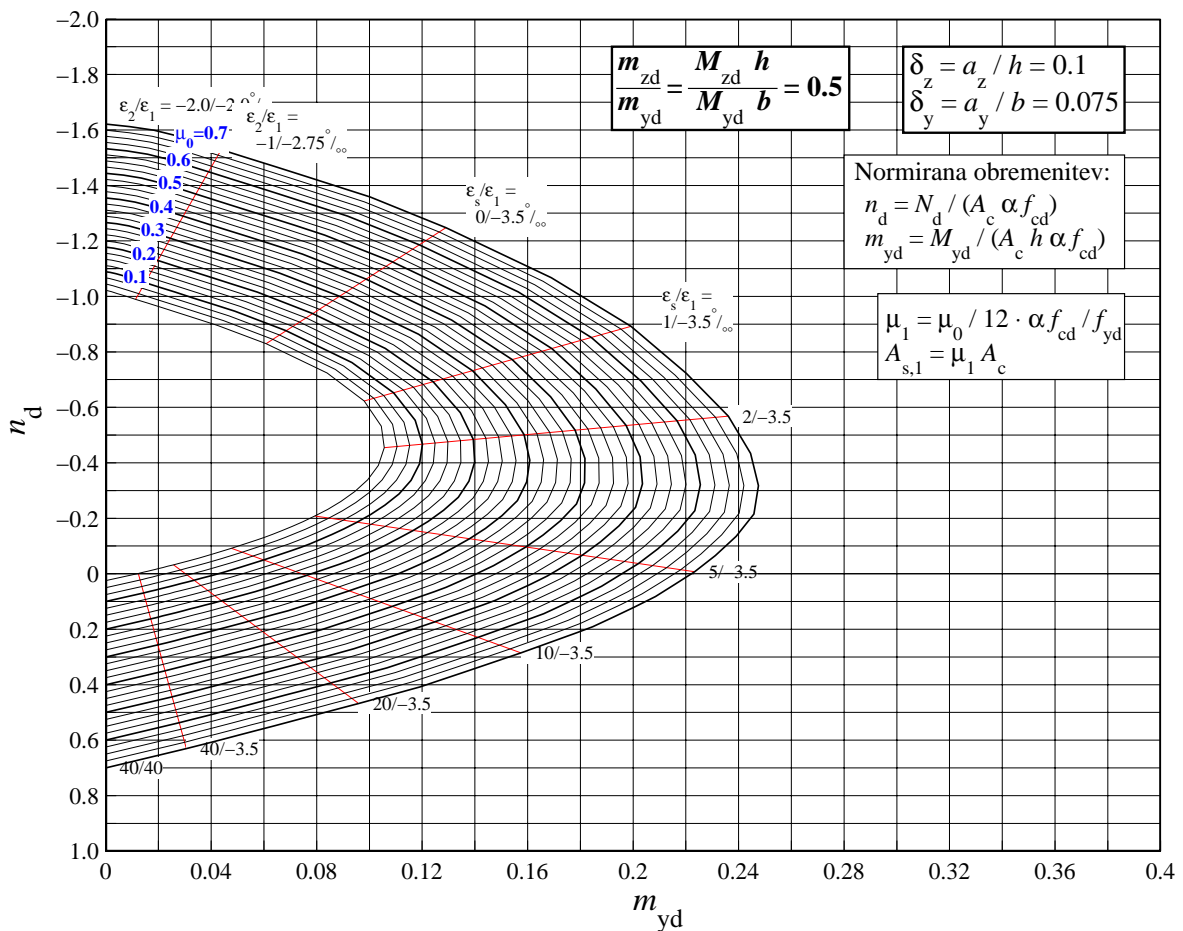
Slika 182: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



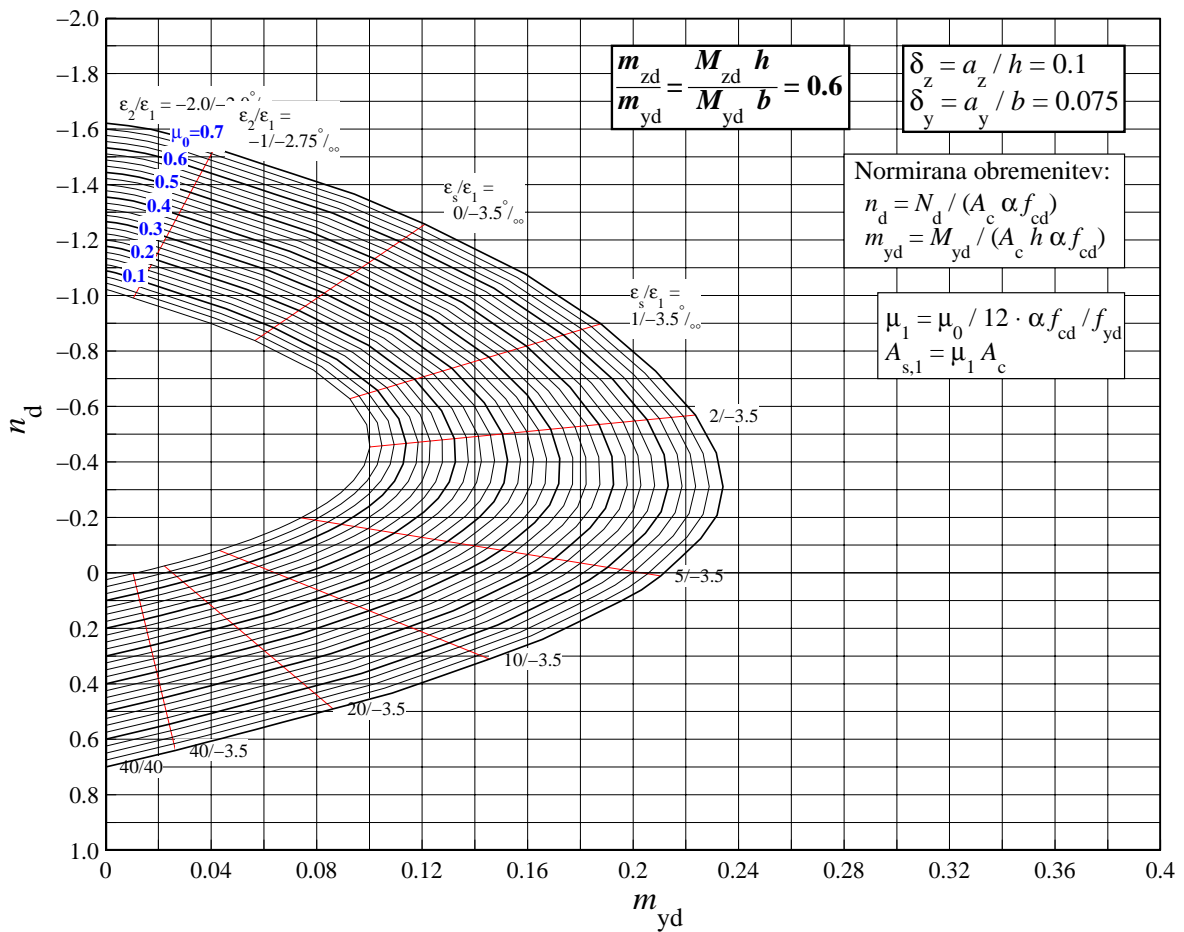
Slika 183: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



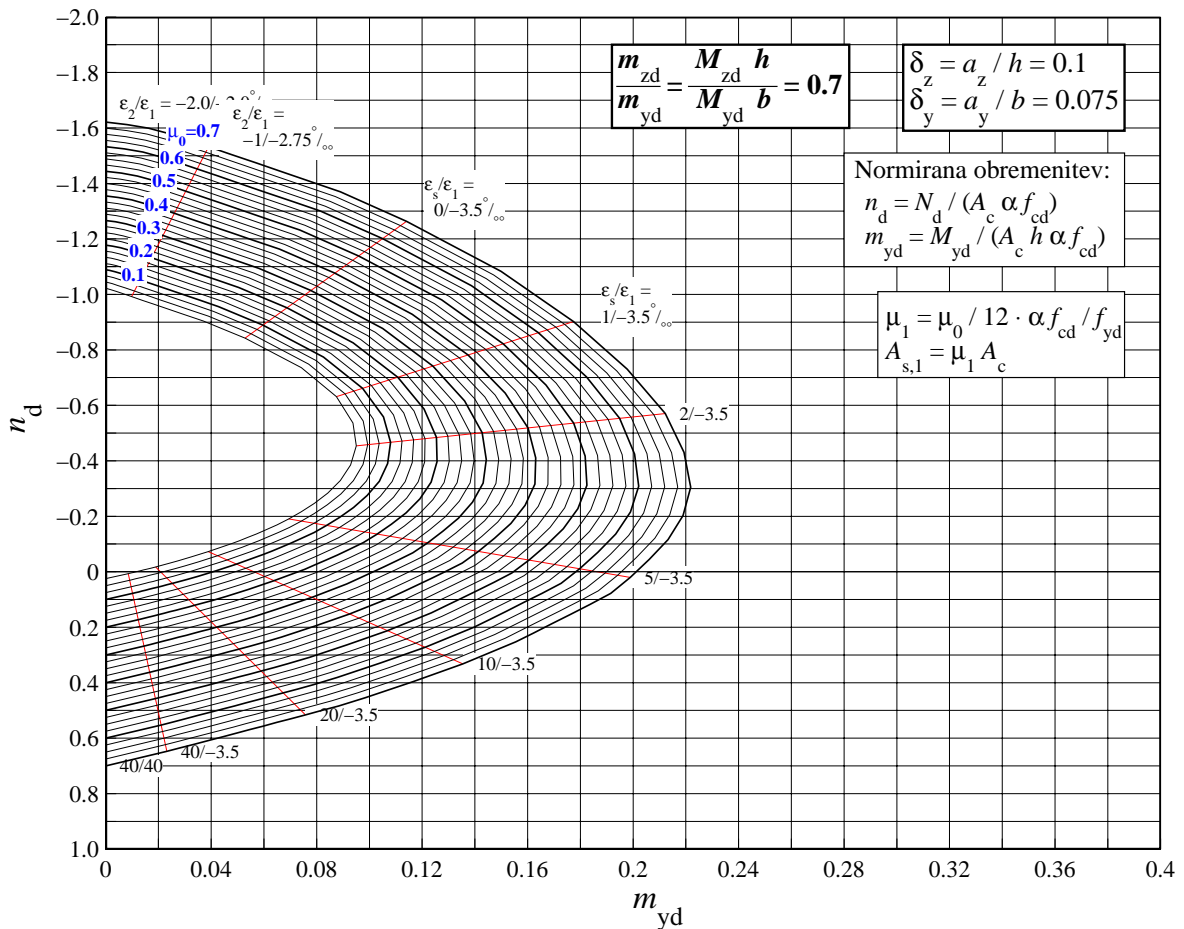
Slika 184: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



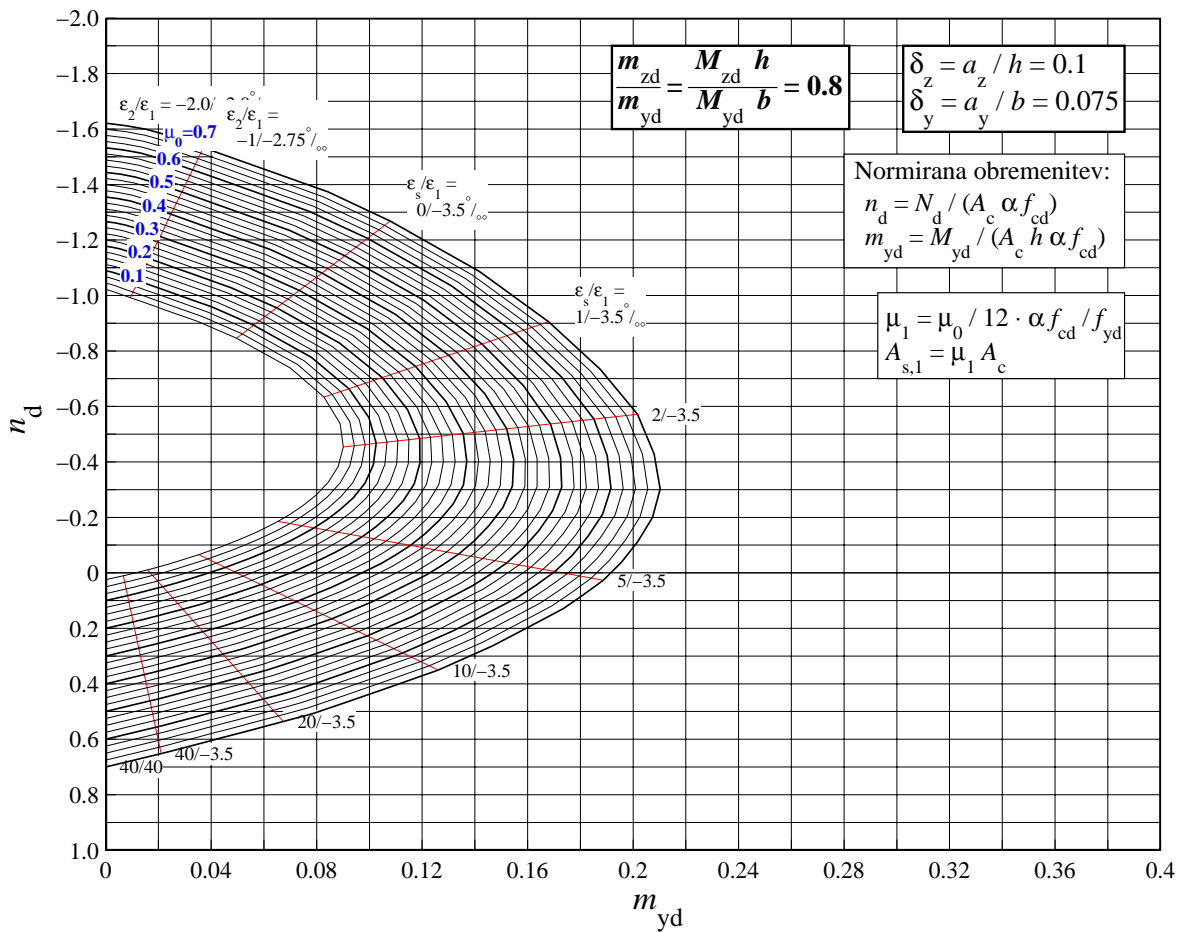
Slika 185: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



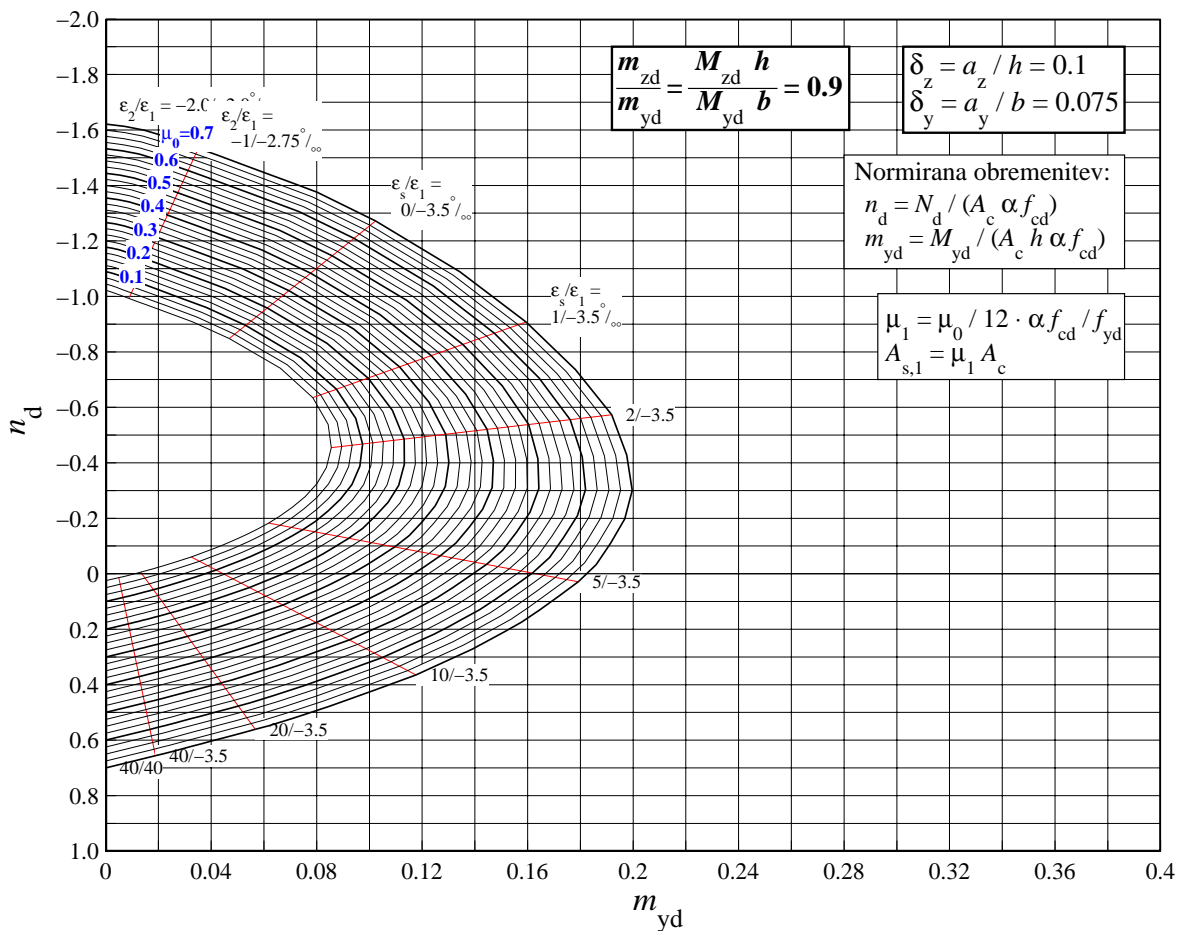
Slika 186: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



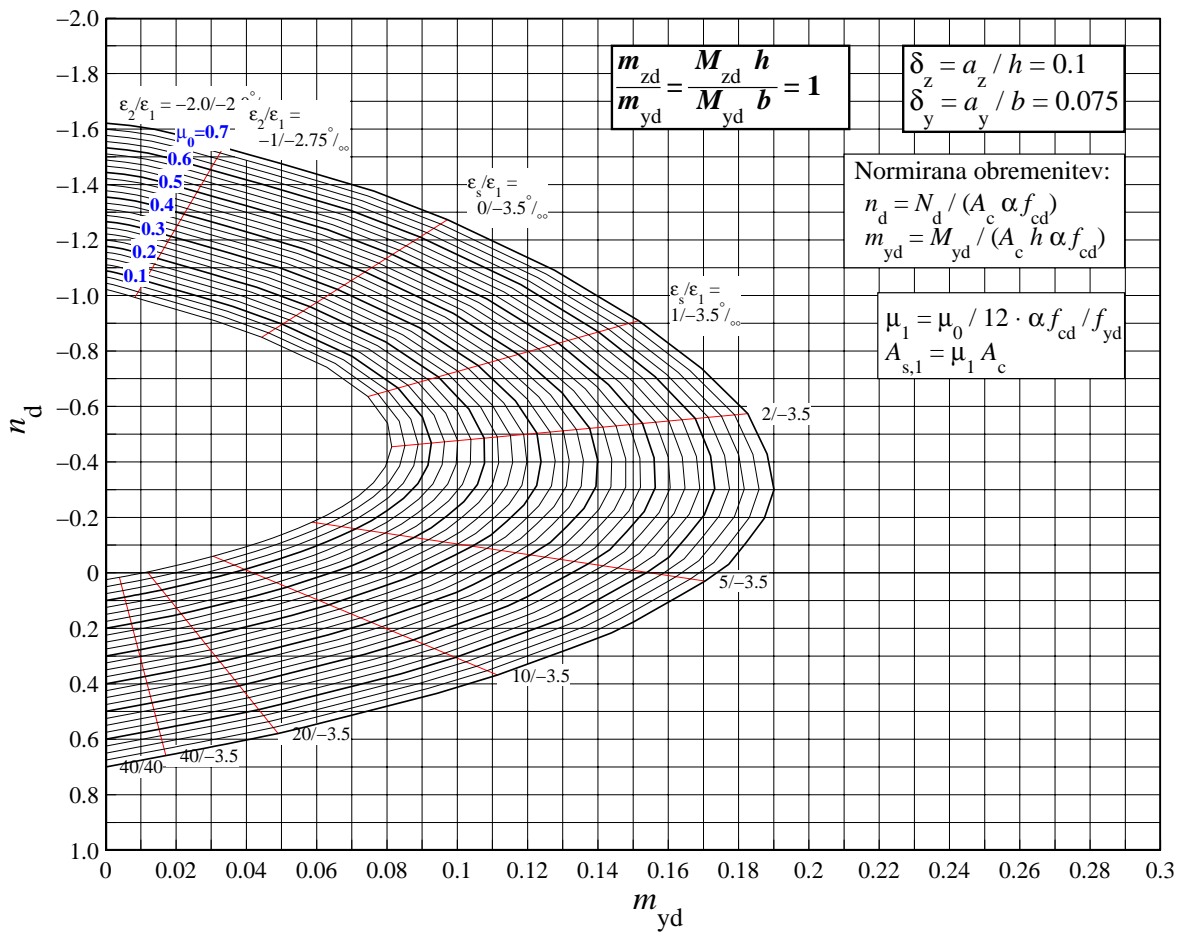
Slika 187: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.



Slika 188: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.

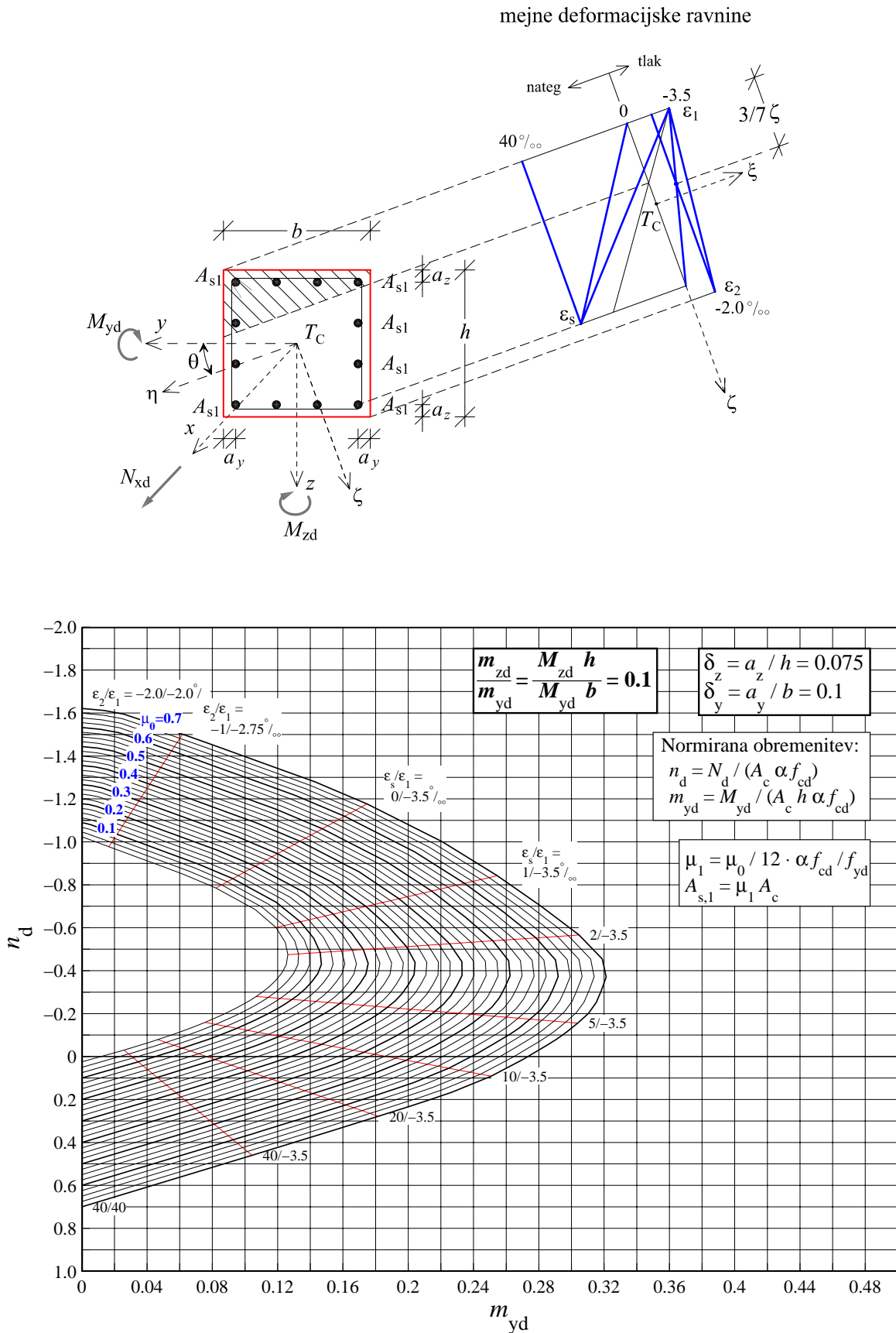


Slika 189: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.

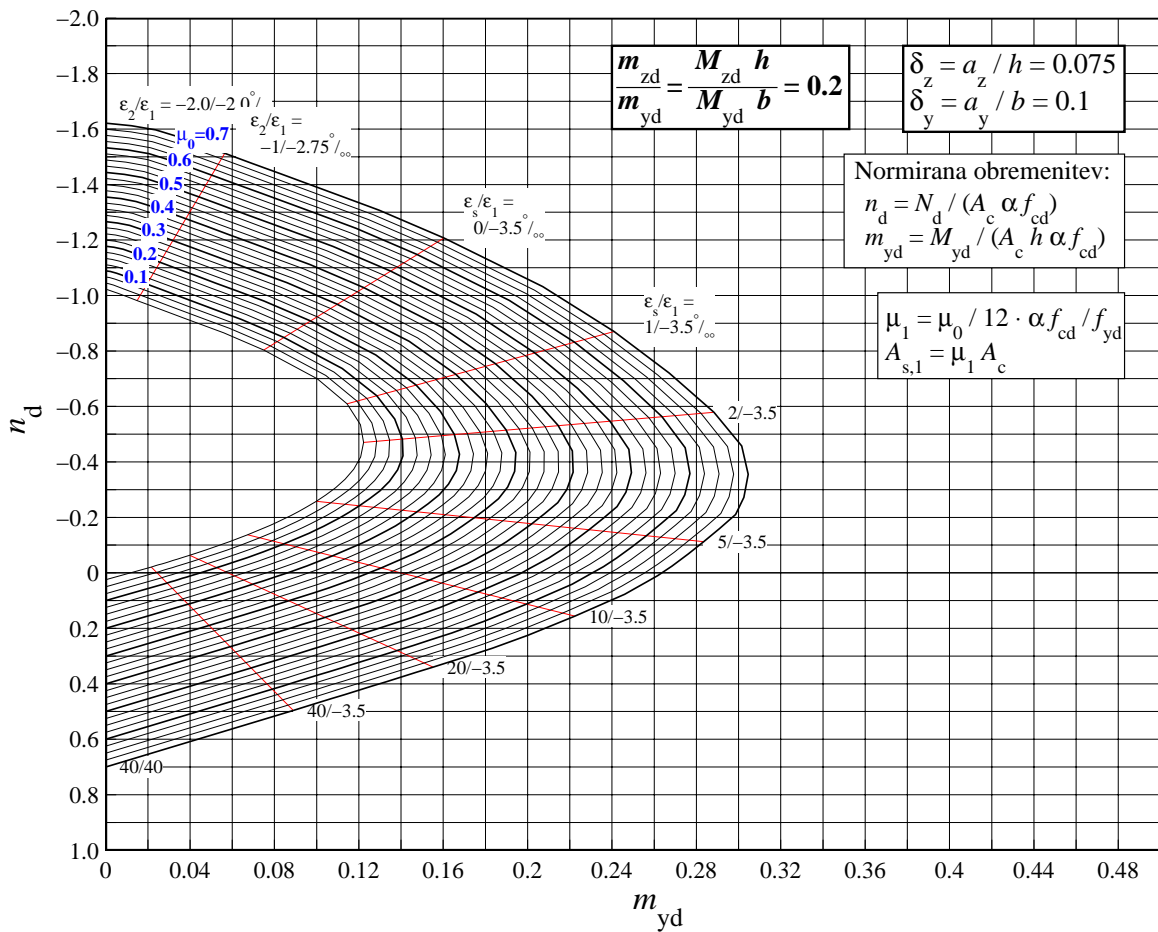


Slika 190: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.075$, 12 palic.

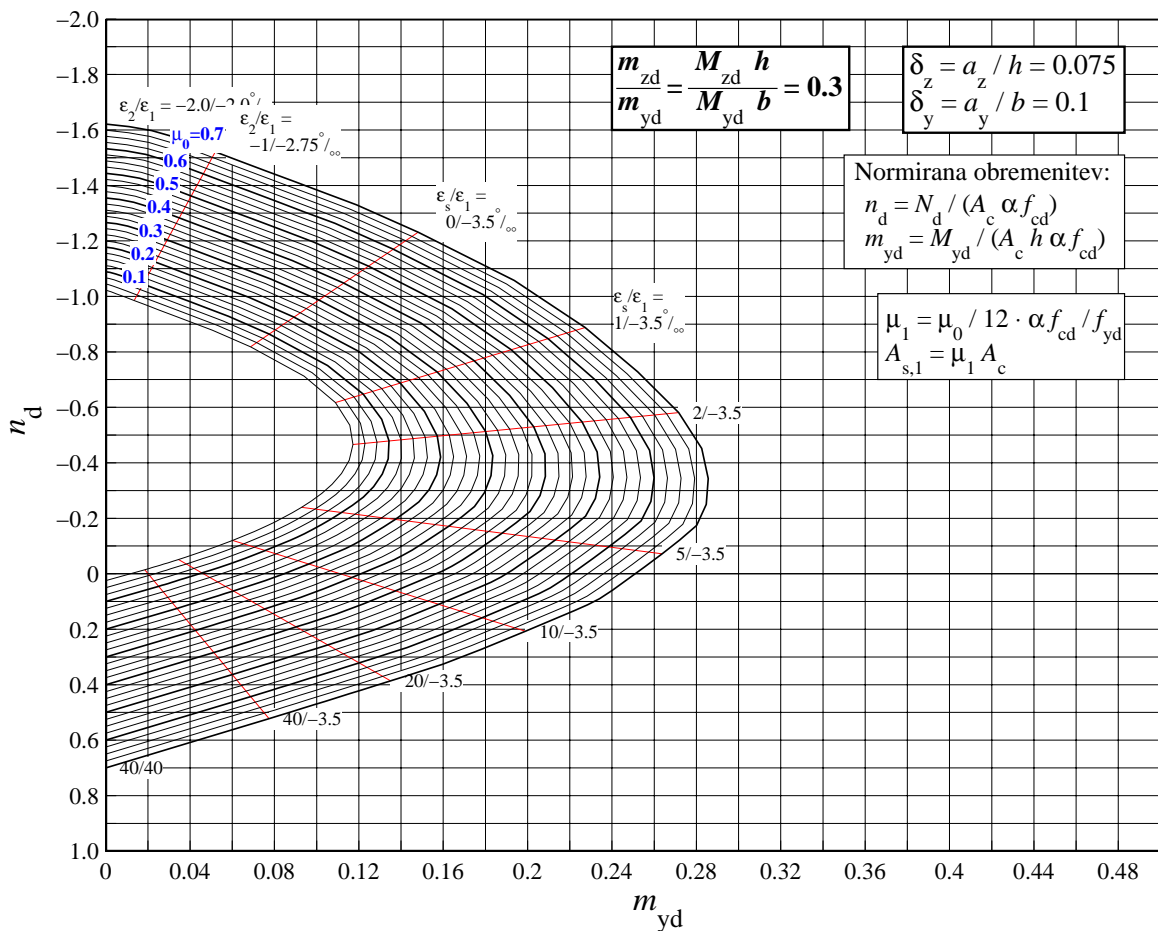
2.20 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.075, \delta_y = 0.1$), S500



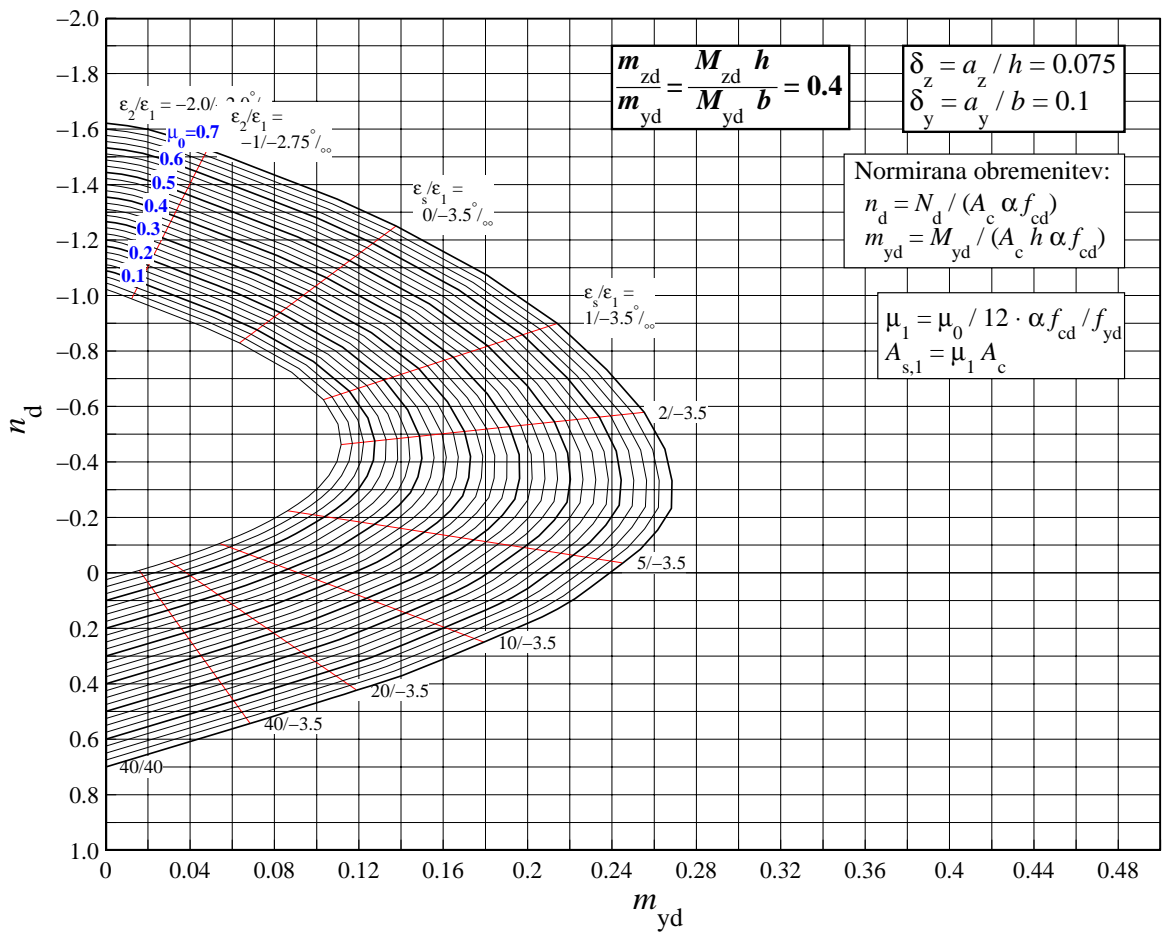
Slika 191: Pravokotni prerez: $\delta_z = 0.075, \delta_y = 0.1$, 12 palic.



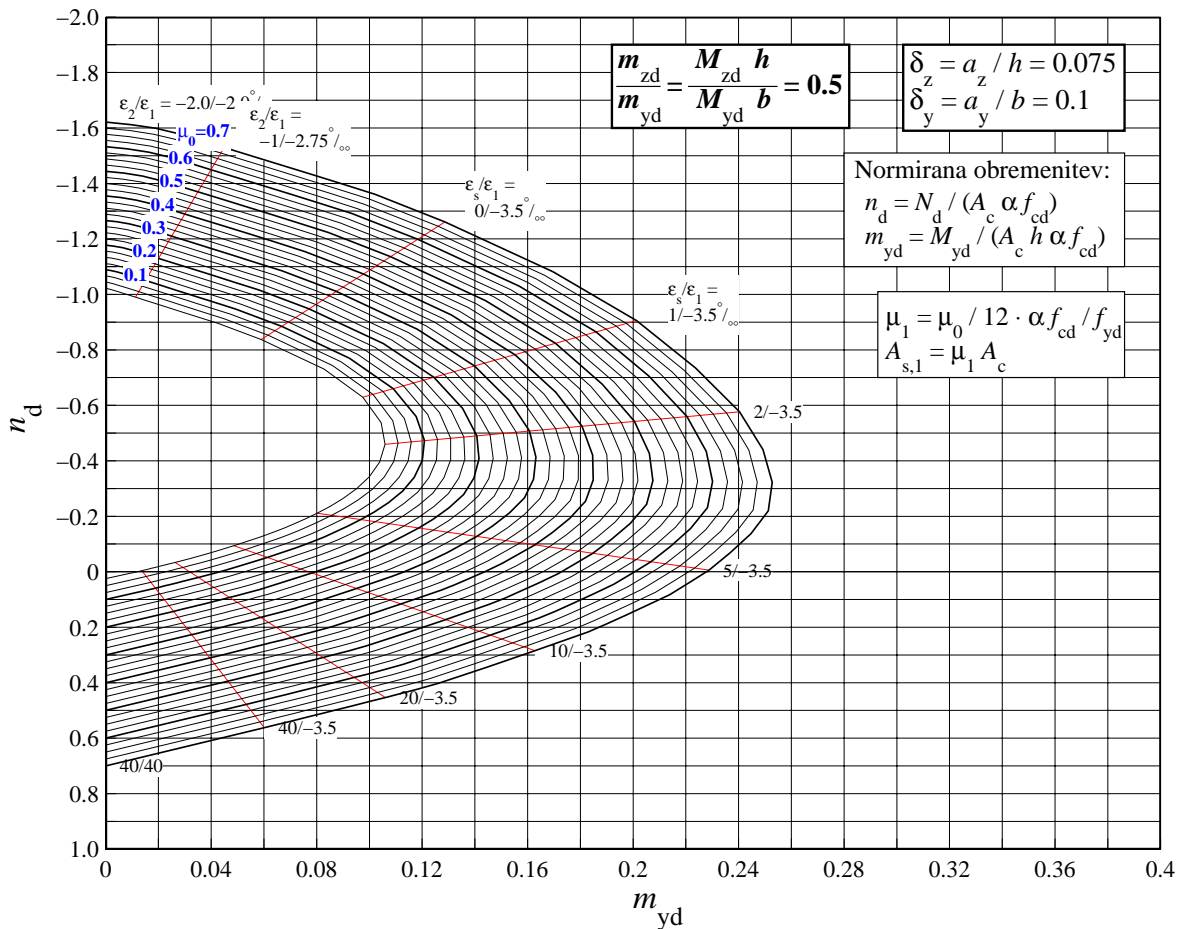
Slika 192: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



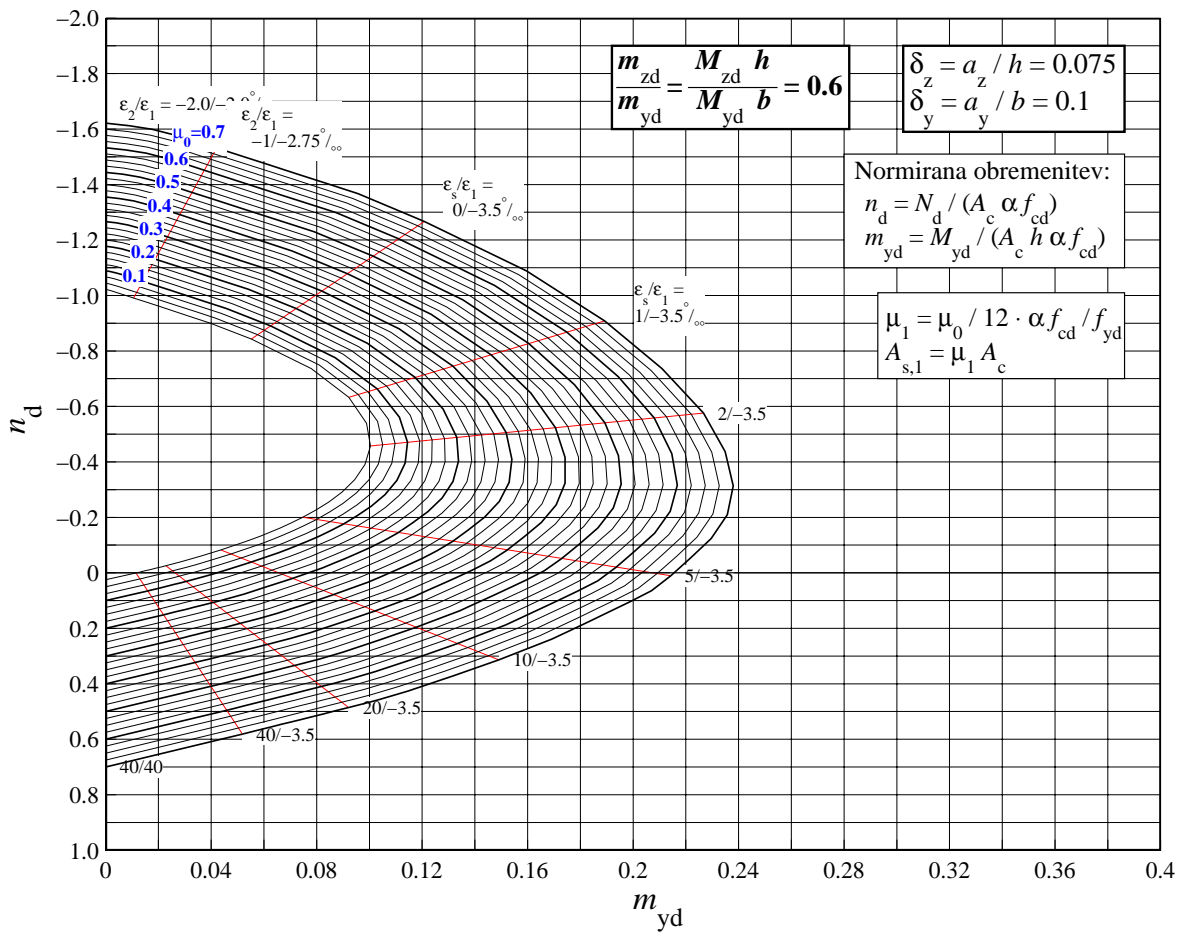
Slika 193: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



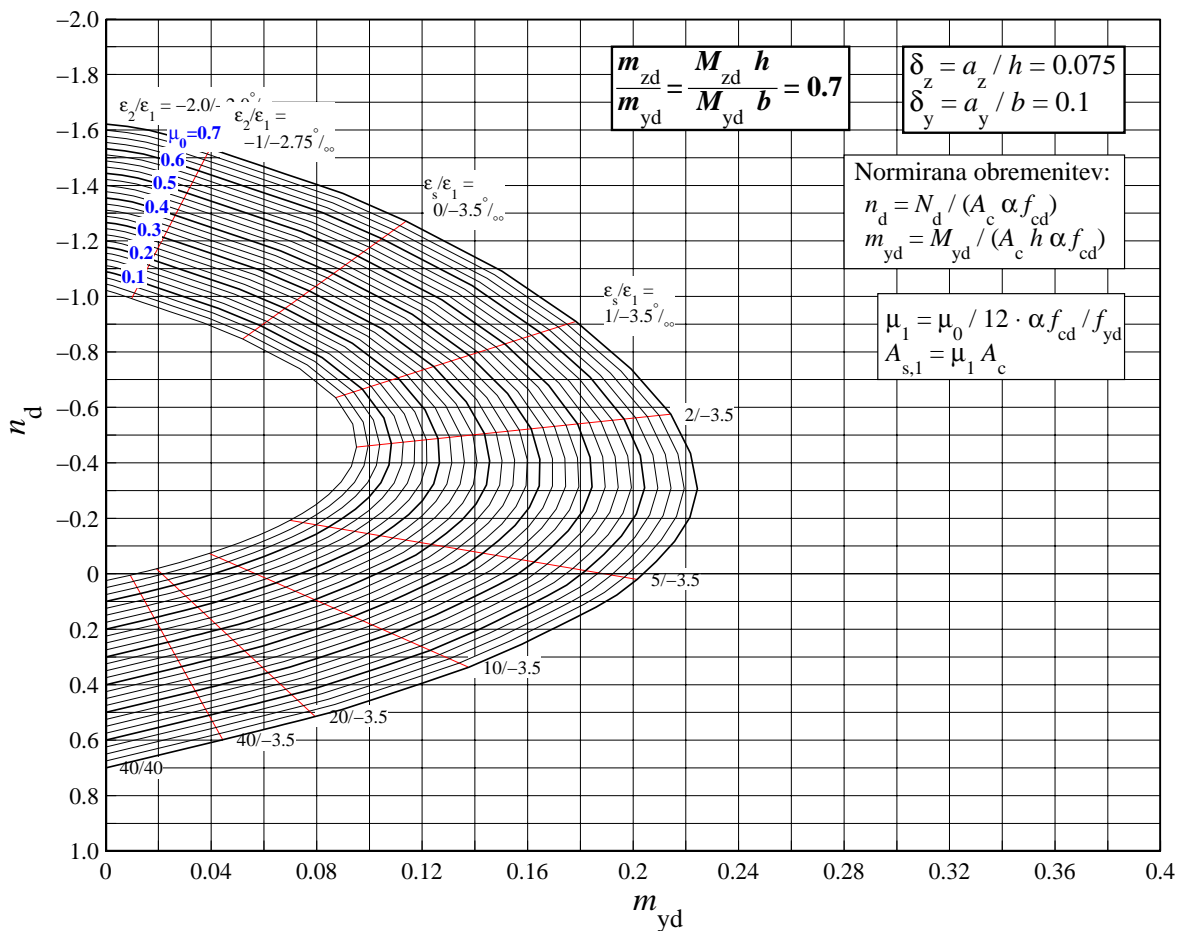
Slika 194: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



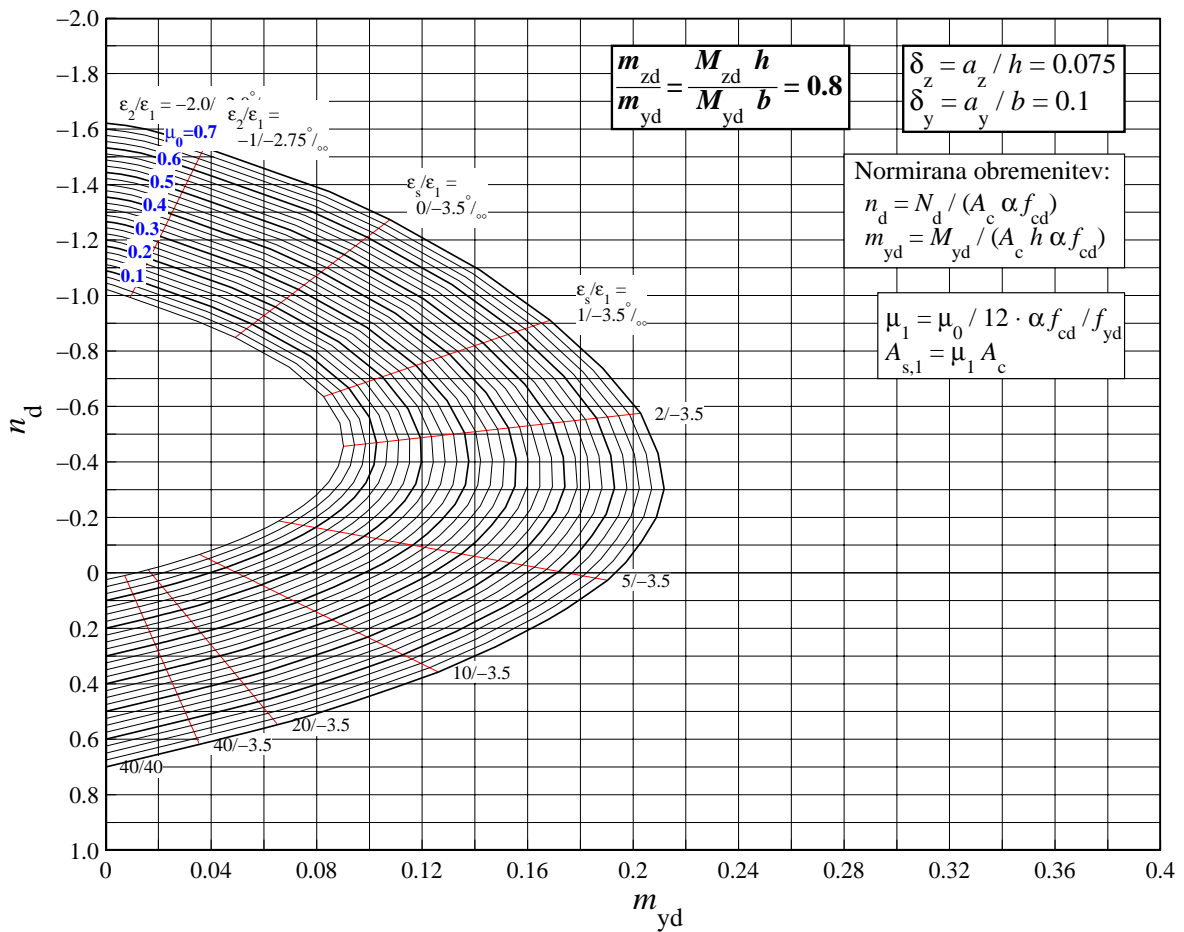
Slika 195: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



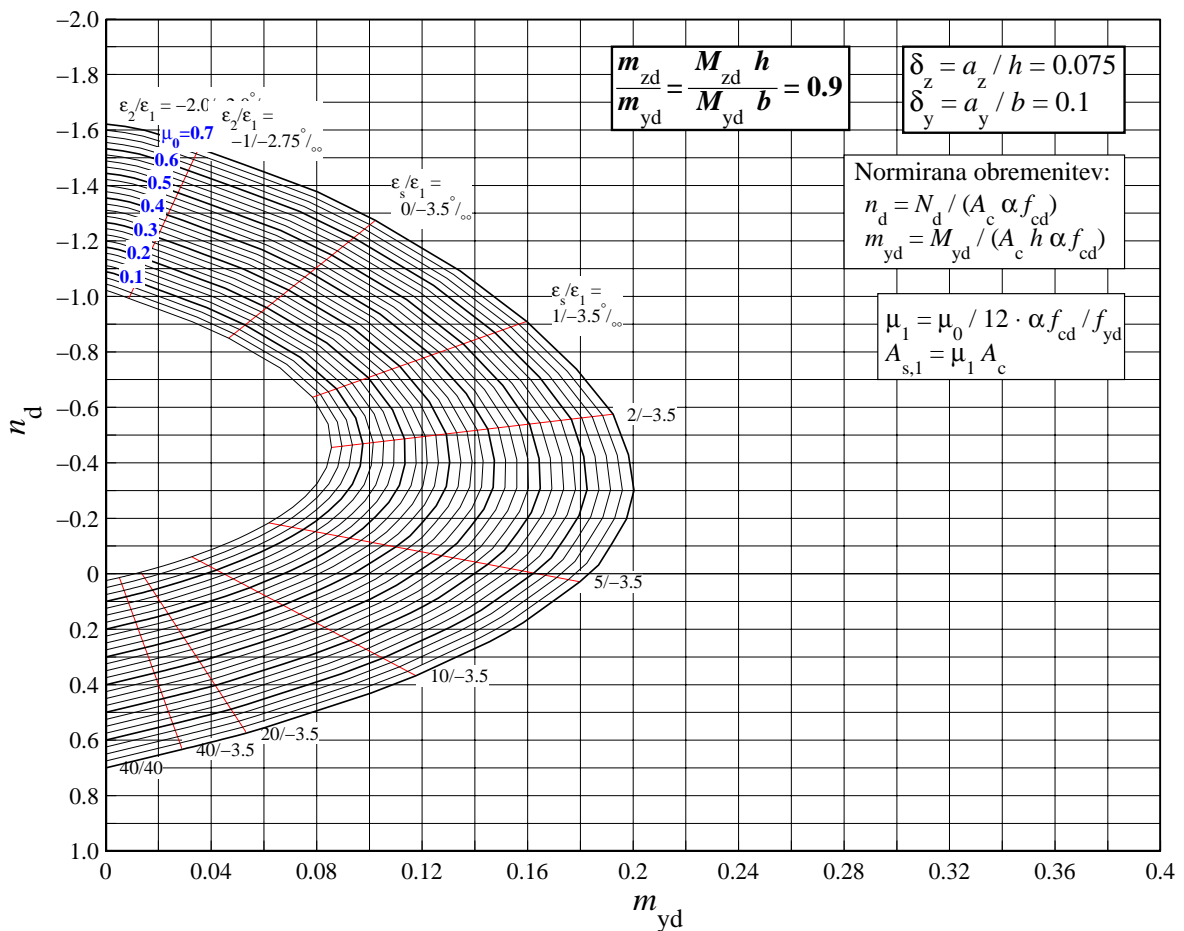
Slika 196: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



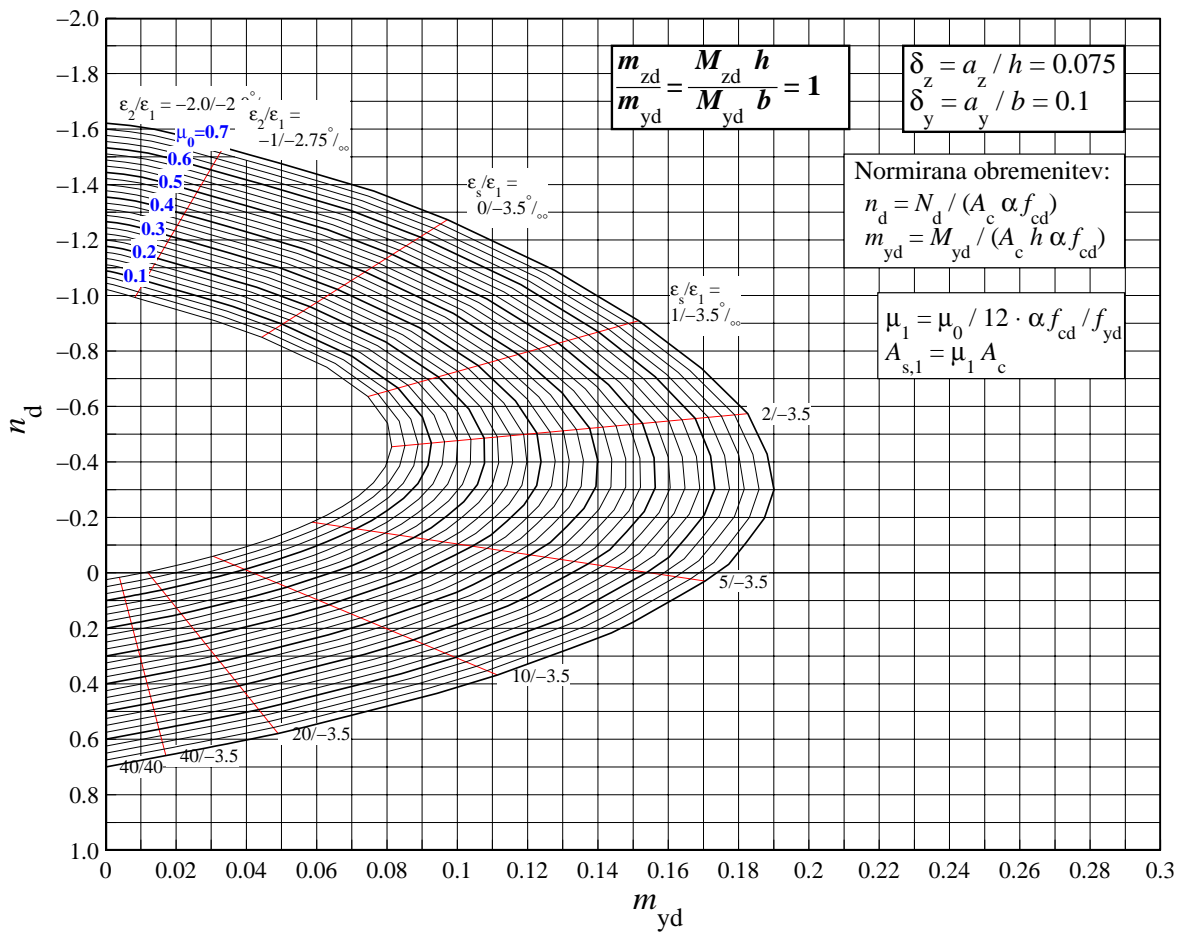
Slika 197: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.



Slika 198: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.

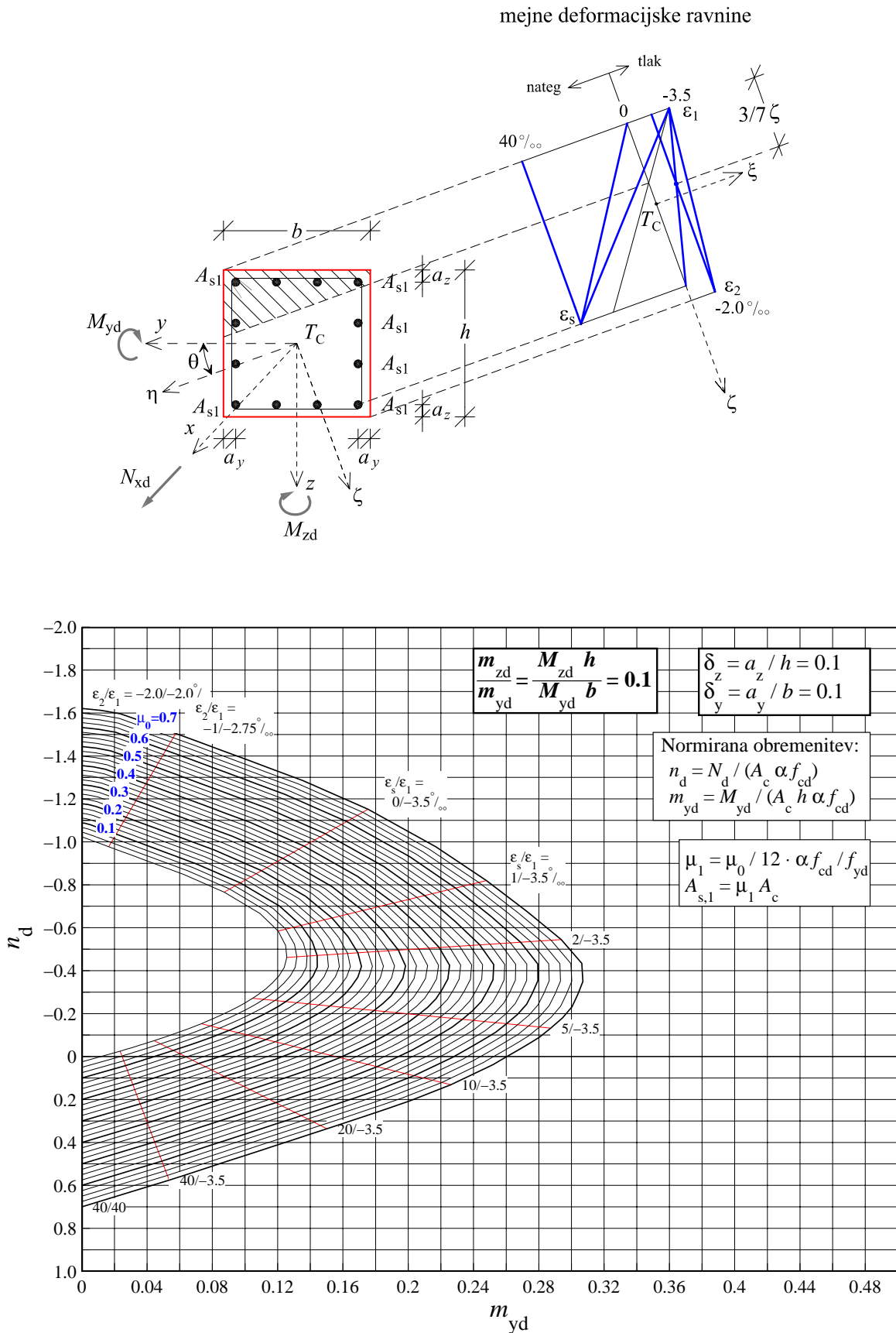


Slika 199: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.

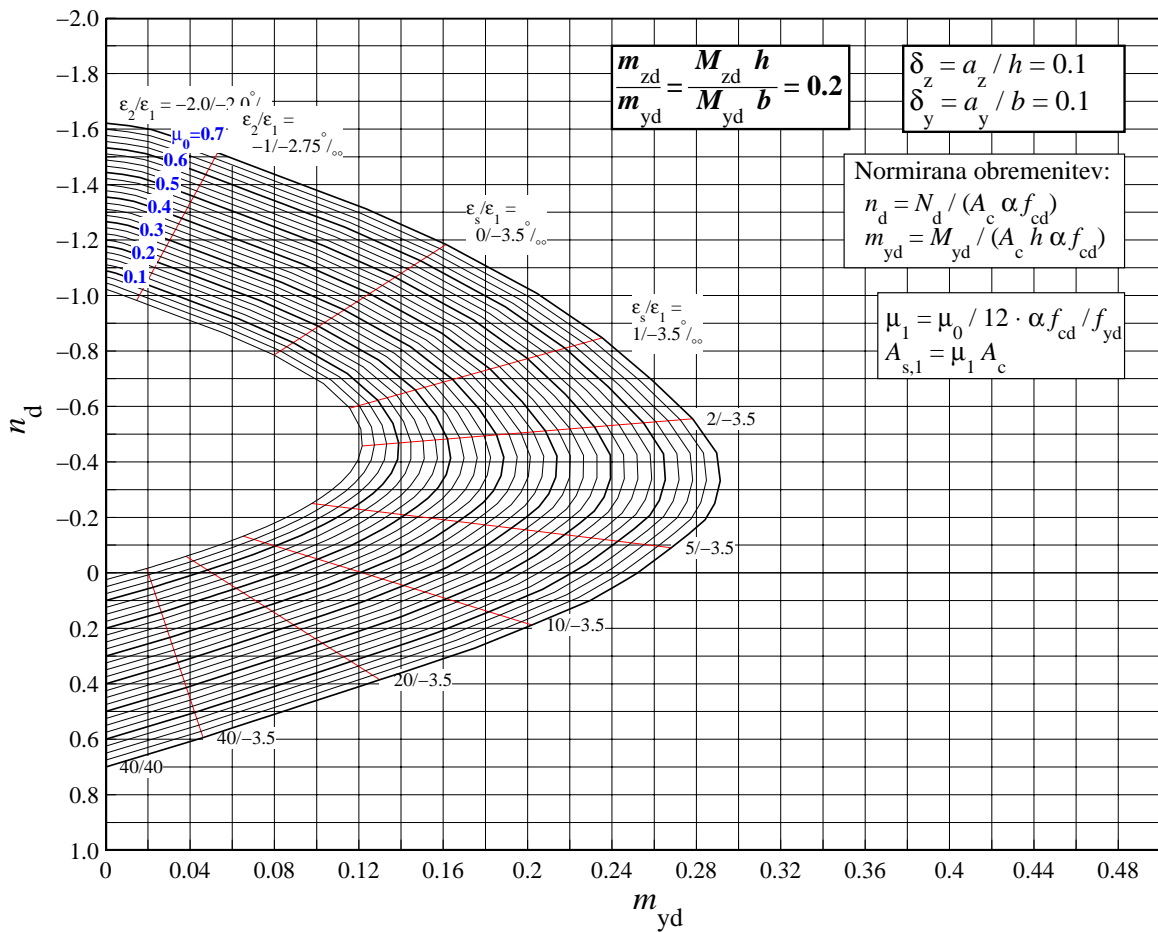


Slika 200: Pravokotni prerez: $\delta_z = 0.075$, $\delta_y = 0.1$, 12 palic.

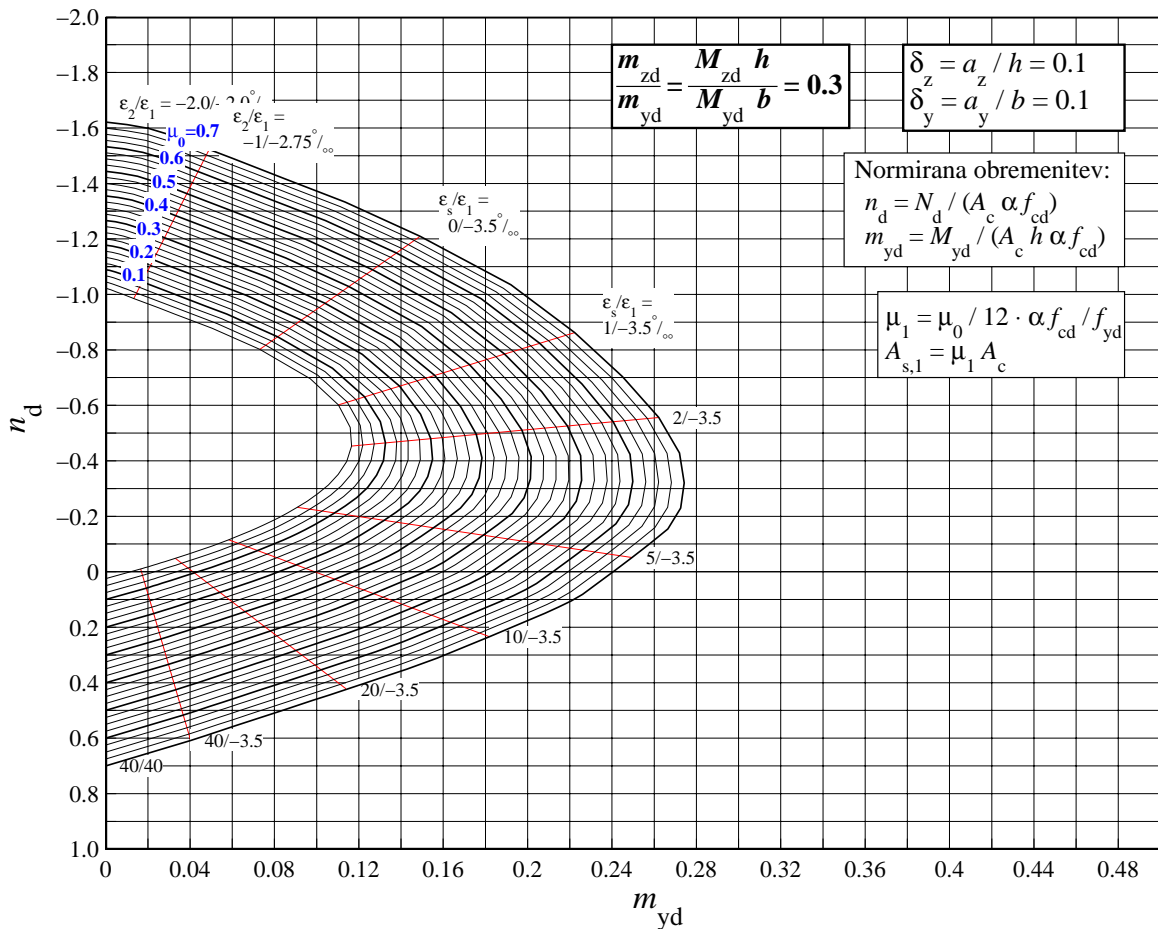
2.21 PRAVOKOTNI PREREZ, 12 palic ($\delta_z = 0.1, \delta_y = 0.1$), S500



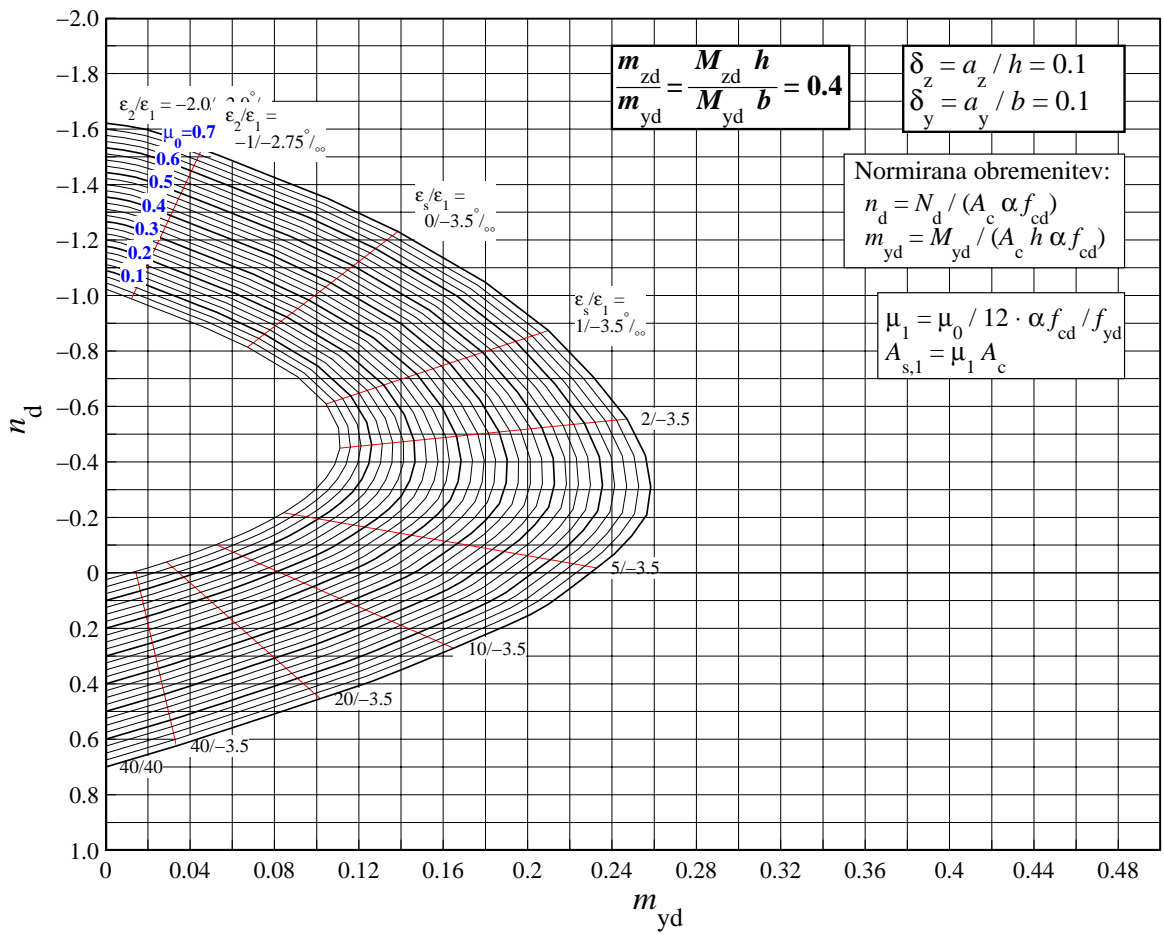
Slika 201: Pravokotni prerez: $\delta_z = 0.1, \delta_y = 0.1$, 12 palic.



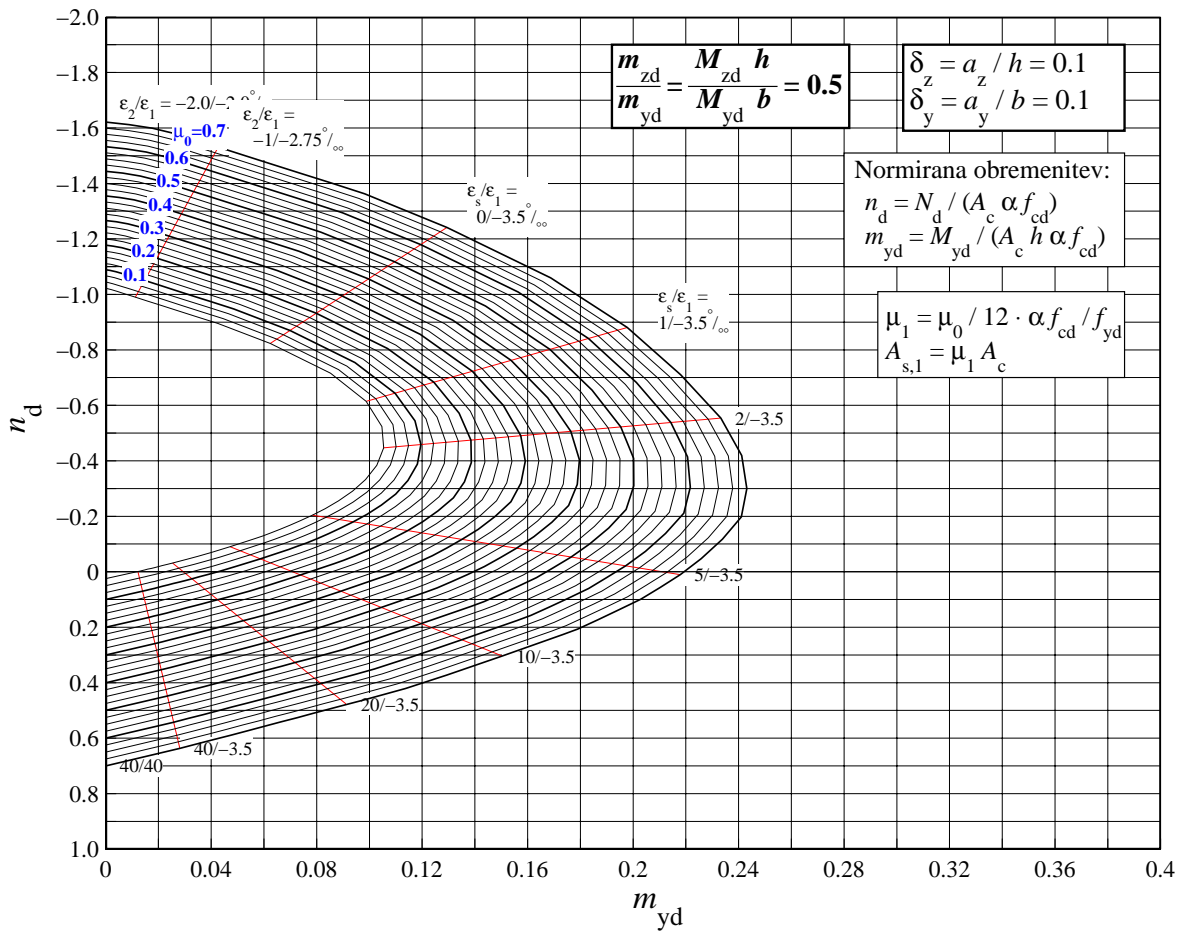
Slika 202: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



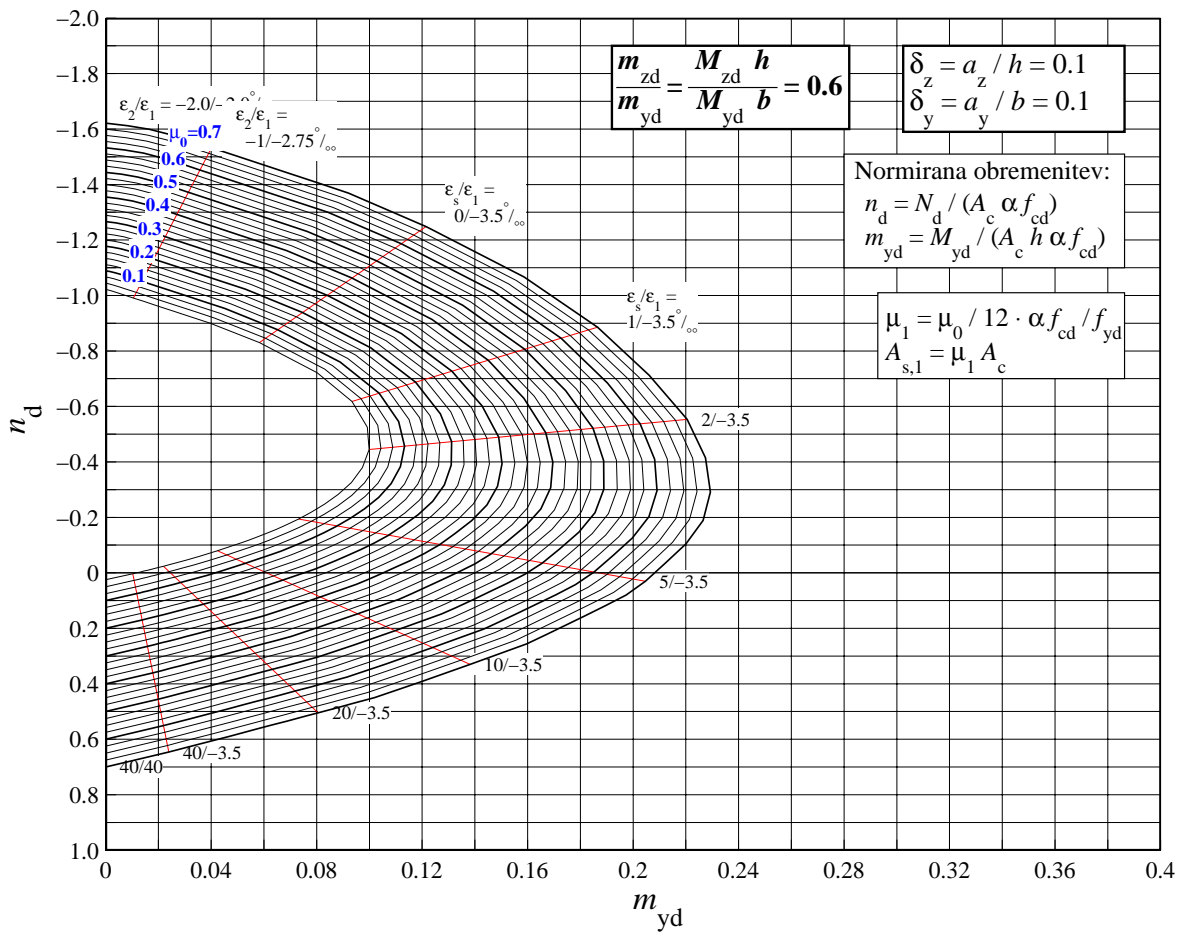
Slika 203: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



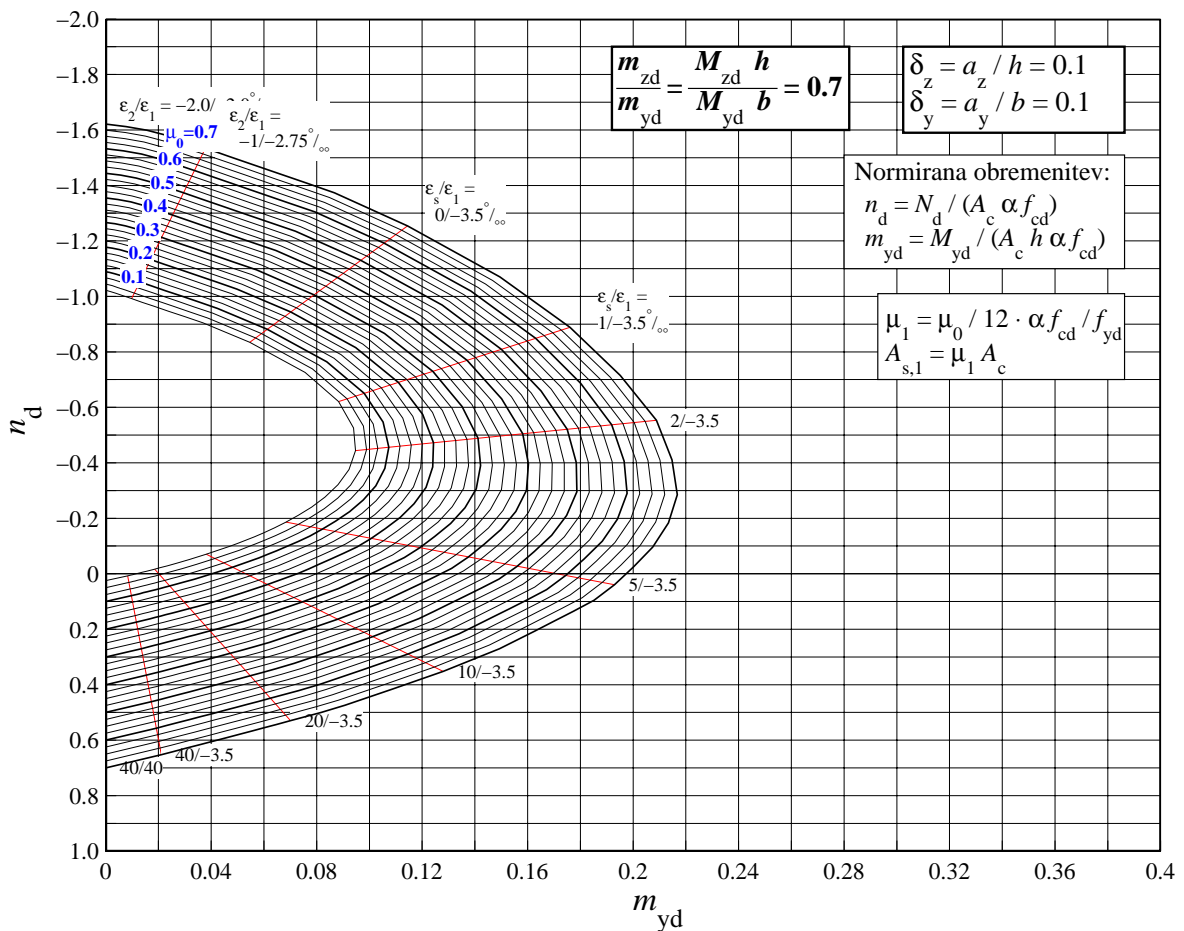
Slika 204: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



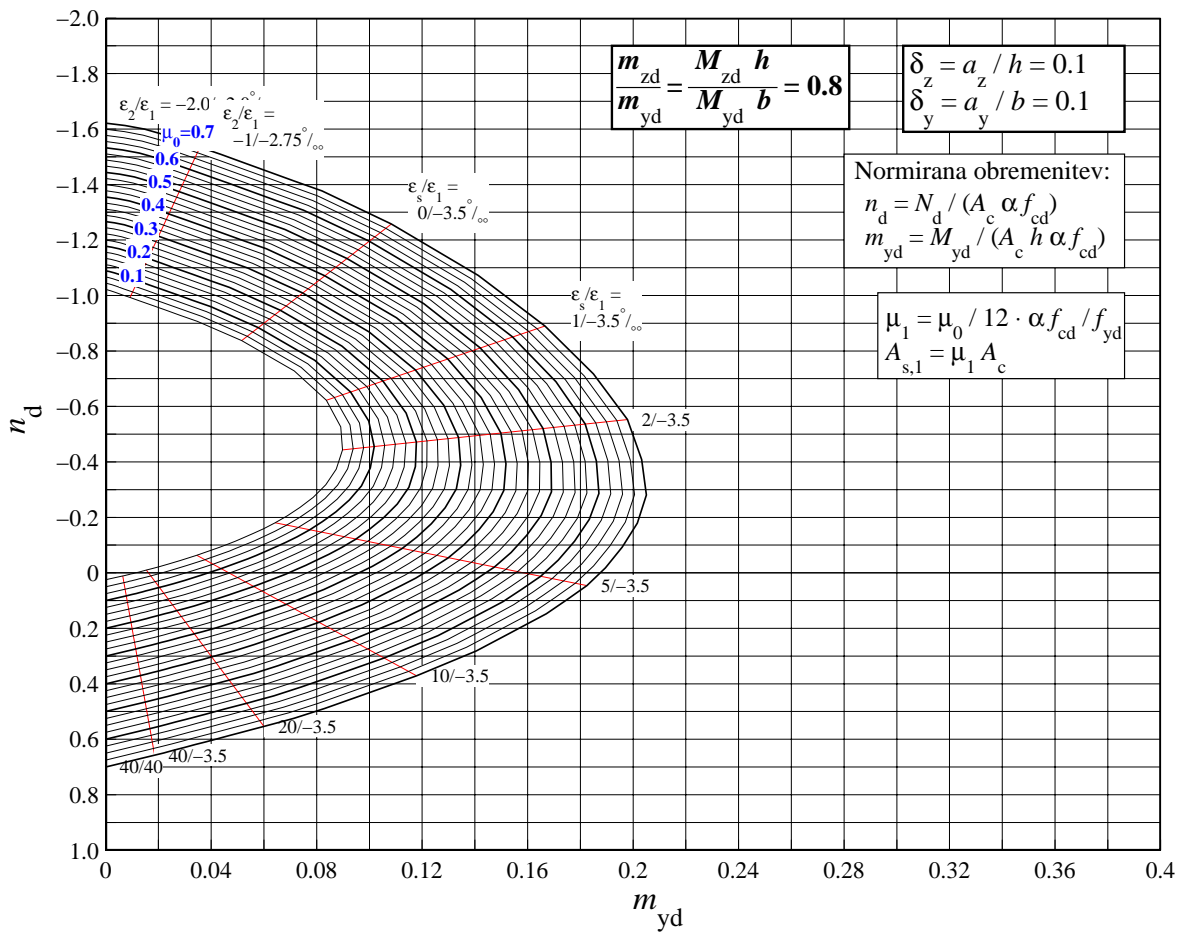
Slika 205: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



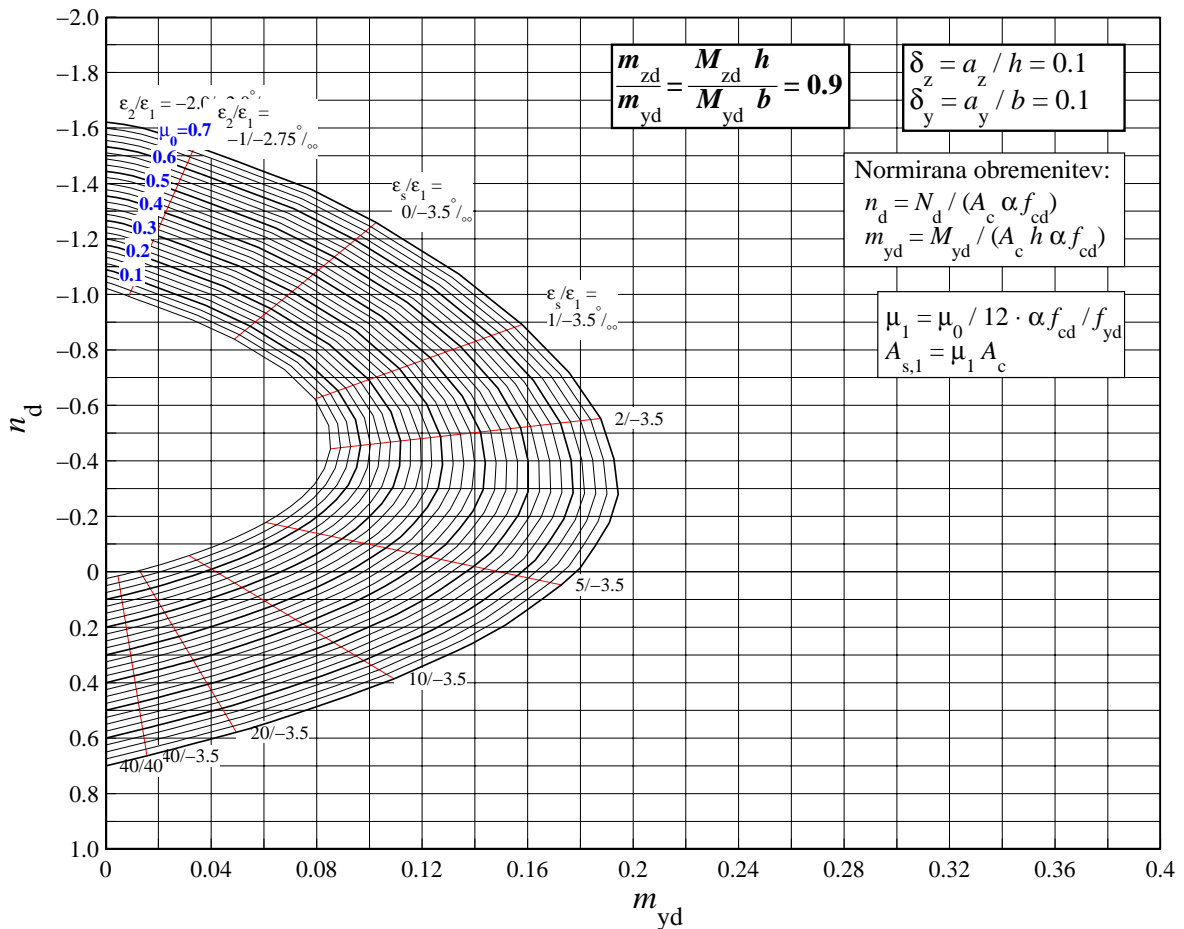
Slika 206: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



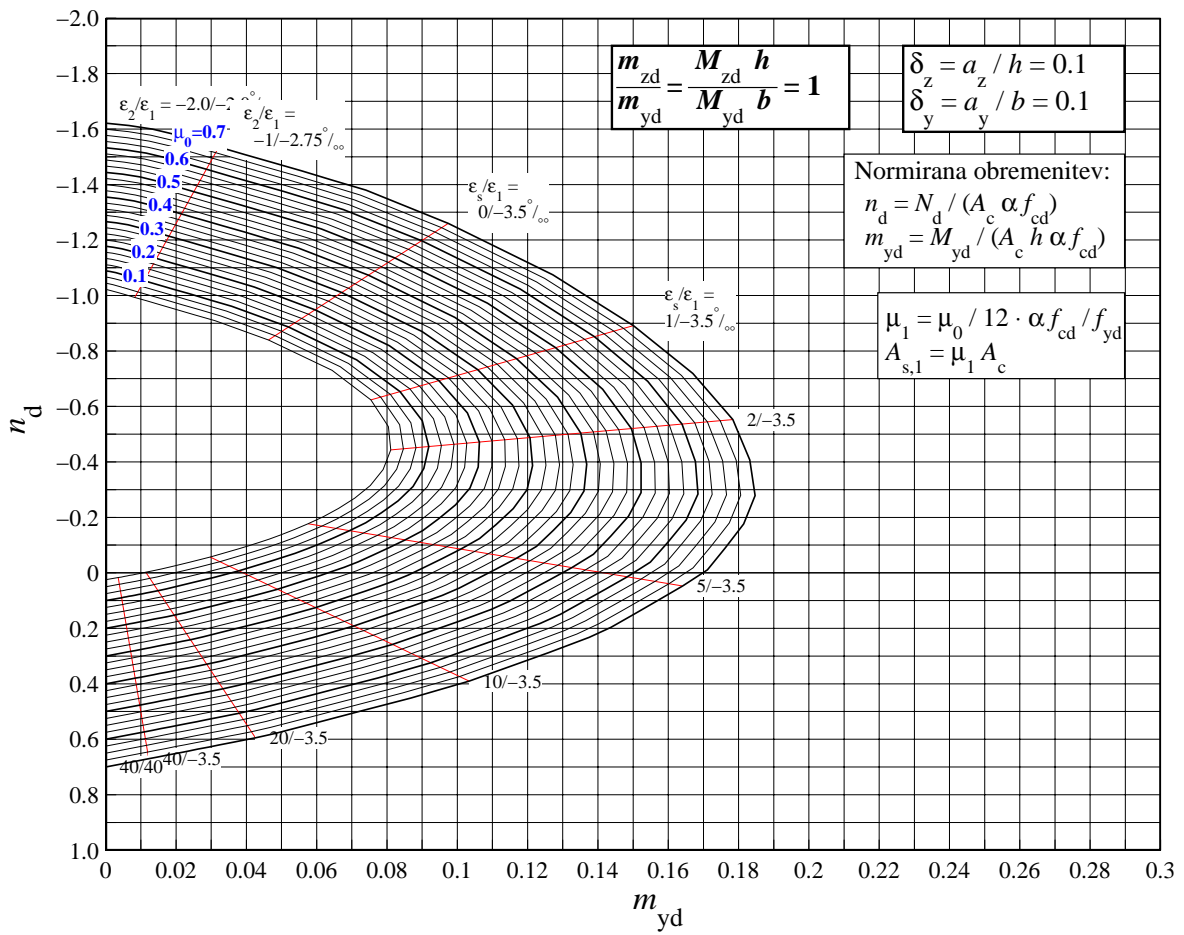
Slika 207: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



Slika 208: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



Slika 209: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.



Slika 210: Pravokotni prerez: $\delta_z = 0.1$, $\delta_y = 0.1$, 12 palic.