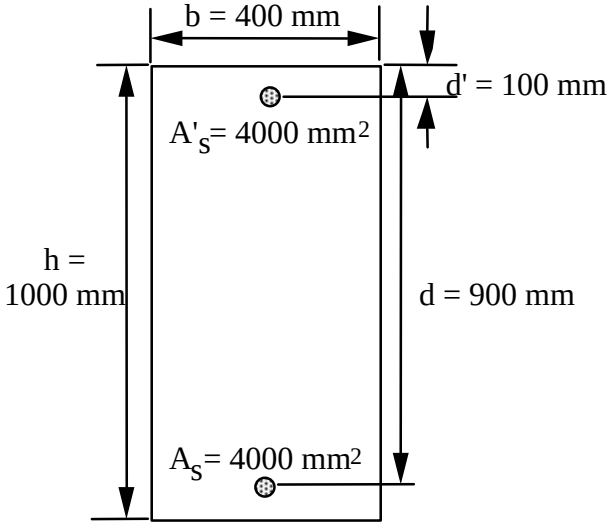
2005.6.06

Mechanics of Structural Concrete

Assignment No.2

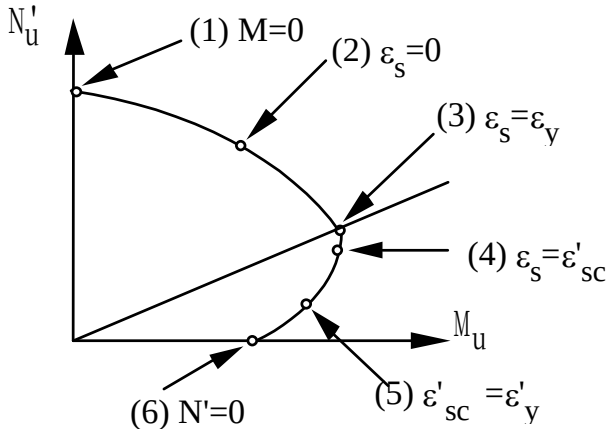
The RC cross-section as the same as that of **Assignment No.1** is given. The dimensions and material properties are also same. When this RC cross section is subjected to the combination of flexural moment and axial force, calculate the ultimate capacity, M_u (kN-m) and N'_u (kN) according to the condition shown in the following interaction curve. Then, draw the interaction curve accurately.



Dimensions and materials:

h= 1000 mm, b = 400 mm, d= 900 mm,
d'= 100 mm,
As=A's= 4000 mm², fy = f'y= 400 N/mm²,
Es= 200 kN/mm², Ec=25 kN/mm²,
f'c = 30 N/mm²,
$\varepsilon'_u = 0.0035$, $\varepsilon'_o = 0.002$

Interaction Curve



Comments

For the calculation of the resultant of compressive stresses in concrete, the equivalent stress block ($0.85f'_c \times 0.8x$) can be used.

(1) M=0. $x \rightarrow \infty$. $N'_c = 0.85f'_c \times 0.8x \times b = 0.85f'_c\, b\, h$

(2) $\varepsilon_s = 0$.

(3) $\varepsilon_s = \varepsilon_y$. Balanced failure.

(4) $\varepsilon_s = \varepsilon'_{sc}$.

(5) $\varepsilon'_{sc} = \varepsilon'_y$.

(6) N'=0.