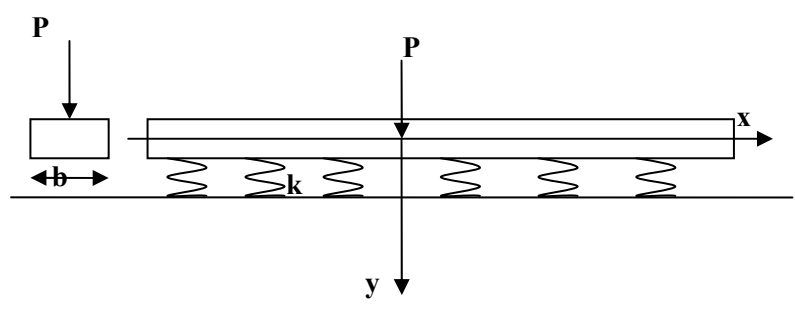


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 . () b (

[,]

$$(1) \quad b = \frac{As}{2 * a}$$

As

a

[, ,]

$$(2) \quad \frac{d^4 y}{dx^4} = -\frac{b * k * y}{EI}$$

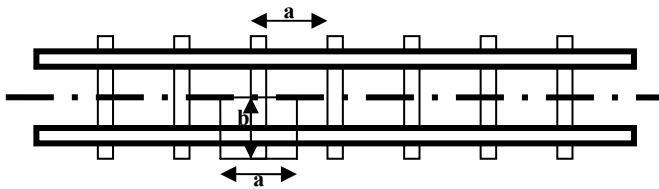
EI

y

b

k

P



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(2)

$$y''' = \beta^3 [-e^{\beta x} A_1 (\cos \beta x + \sin \beta x) + e^{-\beta x} A_2 (\cos \beta x - \sin \beta x) + e^{\beta x} A_3 (\cos \beta x - \sin \beta x) + e^{-\beta x} A_4 (\cos \beta x + \sin \beta x)] \quad (3)$$

$$y'' = \beta^2 [-e^{\beta x} A_1 \sin \beta x + e^{-\beta x} A_2 \sin \beta x + e^{\beta x} A_3 \cos \beta x - e^{-\beta x} A_4 \cos \beta x] \quad (4)$$

$$y' = \frac{1}{2} \beta [e^{\beta x} A_1 (\cos \beta x - \sin \beta x) - e^{-\beta x} A_2 (\cos \beta x + \sin \beta x) + e^{\beta x} A_3 (\cos \beta x + \sin \beta x) + e^{-\beta x} A_4 (\cos \beta x - \sin \beta x)] \quad (5)$$

$$y = \frac{1}{2} e^{\beta x} (A_1 \cos \beta x + A_3 \sin \beta x) + e^{-\beta x} (A_2 \cos \beta x + A_4 \sin \beta x) \quad (6)$$

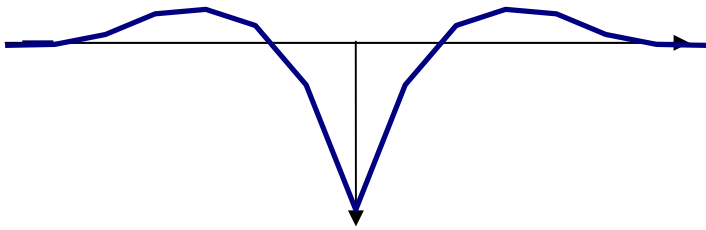
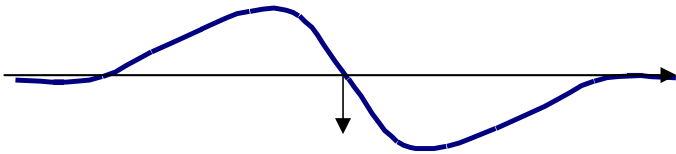
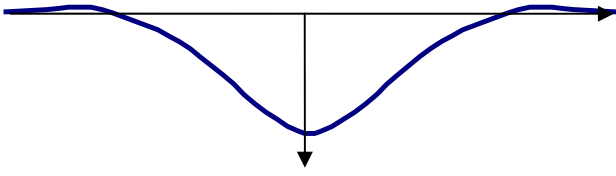
k

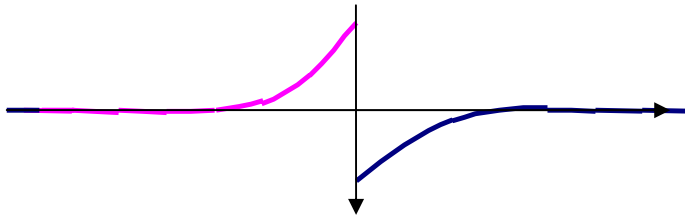
b

β

EI)

$$\beta = \sqrt[4]{\frac{kb}{4EI}} \quad (7)$$





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$$Q = \frac{P}{2} e^{-\beta x} \cos \beta x \quad (8)$$

$$M = \frac{P}{4\beta} e^{-\beta x} [\cos \beta x - \sin \beta x] \quad (9)$$

$$y' = -\frac{P \beta^2}{kb} e^{-\beta x} \sin \beta x \quad (10)$$

$$y = \frac{P \beta}{2kb} e^{-\beta x} [\cos \beta x + \sin \beta x] \quad (11)$$

$$y_1' = \frac{1}{2} \beta_1 [e^{\beta_1 x} A_1 (\cos \beta_1 x - \sin \beta_1 x) e^{-\beta_1 x} A_2 (\cos \beta_1 x + \sin \beta_1 x) + e^{\beta_1 x} A_3 (\cos \beta_1 x + \sin \beta_1 x) + e^{-\beta_1 x} A_4 (\cos \beta_1 x - \sin \beta_1 x)] \quad (14)$$

$$y_1 = \frac{1}{2} [e^{\beta_1 x} (A_1 \cos \beta_1 x + A_3 \sin \beta_1 x) + e^{-\beta_1 x} (A_2 \cos \beta_1 x + A_4 \sin \beta_1 x)] \quad (15)$$

: y

$$y_2''' = \beta_2^3 [-e^{\beta_2 x} A_5 (\cos \beta_2 x + \sin \beta_2 x) + e^{-\beta_2 x} A_6 (\cos \beta_2 x - \sin \beta_2 x) + e^{\beta_2 x} A_7 (\cos \beta_2 x - \sin \beta_2 x) + e^{-\beta_2 x} A_8 (\cos \beta_2 x + \sin \beta_2 x)] \quad (16)$$

$$y_2'' = \beta_2^2 [-e^{\beta_2 x} A_5 \sin \beta_2 x + e^{-\beta_2 x} A_6 \sin \beta_2 x + e^{\beta_2 x} A_7 \cos \beta_2 x - e^{-\beta_2 x} A_8 \cos \beta_2 x] \quad (17)$$

$$y_2' = \frac{1}{2} \beta_2 [e^{\beta_2 x} A_5 (\cos \beta_2 x - \sin \beta_2 x) - e^{-\beta_2 x} A_6 (\cos \beta_2 x + \sin \beta_2 x) + e^{\beta_2 x} A_7 (\cos \beta_2 x + \sin \beta_2 x) + e^{-\beta_2 x} A_8 (\cos \beta_2 x - \sin \beta_2 x)] \quad (18)$$

$$y_2 = \frac{1}{2} [e^{\beta_2 x} (A_5 \cos \beta_2 x + A_7 \sin \beta_2 x) + e^{-\beta_2 x} (A_6 \cos \beta_2 x + A_8 \sin \beta_2 x)] \quad (19)$$

:

$$x \rightarrow -\infty$$

$$y_1 = 0 \quad (20)$$

$$y_1' = 0$$

:

$$A1 = 0; A3 = 0 \quad (21)$$

$$x \rightarrow +\infty$$

$$y_2 = 0 \quad (22)$$

$$y_2' = 0$$

$$A5=0 ; A7=0 \quad (23)$$

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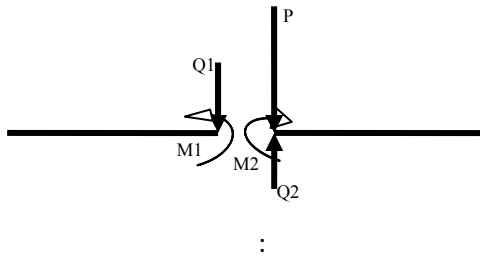
$$x = 0$$

$$y_1 = y_2$$

$$y_1' = y_2' \quad (24)$$

$$y_1'' = y_2''$$

$$y_1''' - y_2''' = \frac{P}{EI}$$

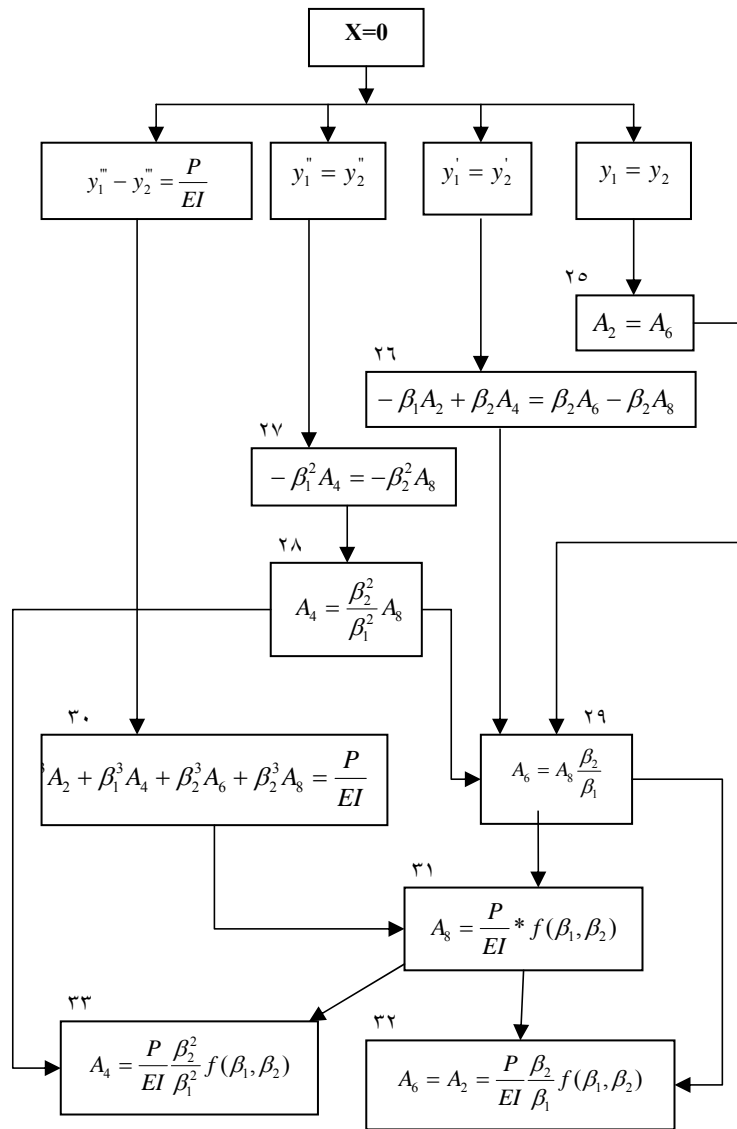


$$A2, A4, A6, A8 \quad (7)$$

$$(25) \quad f \quad f(\beta_1, \beta_2)$$

k1, k2

$$f(\beta_1, \beta_2) = \frac{\beta_1}{\beta_1^3 \beta_2 + \beta_1 \beta_2^3 + \beta_1^2 \beta_2^2 + \beta_2^4} \quad (25)$$



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$$(19) \quad (12)$$

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$$y_1 = e^{-\beta_1 x} \frac{P}{2EI} f \left(\frac{\beta_2}{\beta_1} \cos \beta_1 x + \frac{\beta_2^2}{\beta_1^2} \sin \beta_1 x \right) \quad (35)$$

$$y_2 = e^{-\beta_2 x} \frac{P}{2EI} f \left[\frac{\beta_2}{\beta_1} \cos \beta_2 x + \sin \beta_2 x \right] \quad (36)$$

$$M_1 = -y_1'' EI$$

$$M_1 = -P * f * e^{-\beta_1 x} * \beta_1^2 \left(\frac{\beta_2}{\beta_1} \sin \beta_1 x - \frac{\beta_2^2}{\beta_1^2} \cos \beta_1 x \right) \quad (37)$$

$$M_2 = -y_2'' EI$$

$$M_2 = -P * f * e^{-\beta_2 x} * \beta_2^2 \left(\frac{\beta_2}{\beta_1} \sin \beta_2 x - \cos \beta_2 x \right) \quad (38)$$

$$Q_1 = -y_1''' * EI$$

$$Q_1 = -P * f * e^{-\beta_1 x} * \beta_1^3 \left[\frac{\beta_2}{\beta_1} (\cos \beta_1 x - \sin \beta_1 x) + \frac{\beta_2^2}{\beta_1^2} (\cos \beta_1 x + \sin \beta_1 x) \right] \quad (39)$$

$$Q_2 = -y_2''' * EI$$

$$Q_2 = -P * f * e^{-\beta_2 x} * \beta_2^3 \left[\frac{\beta_2}{\beta_1} (\cos \beta_2 x - \sin \beta_2 x) + (\cos \beta_2 x + \sin \beta_2 x) \right] \quad (40)$$

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$$\sigma = - \frac{M}{W_x} \quad (1)$$

Wx

$$p = k * y \quad (2)$$

: -4

$$(\circ) \quad f \quad \beta_1 = \beta_2 = \beta \quad (3)$$

$$f(\beta_1, \beta_2) = \frac{\beta}{4 \beta^4} \quad (4)$$

$$y = e^{-\beta x} \frac{P}{2 EI} \frac{\beta}{4 \beta^4} (\cos \beta_1 x + \sin \beta_1 x)$$

$$y = e^{-\beta x} \frac{P \beta}{8 EI \beta^4} [\cos \beta x + \sin \beta x]$$

$$y = e^{-\beta x} \frac{P \beta}{8 EI \frac{kb}{4 EI}} [\cos \beta x + \sin \beta x]$$

$$y = e^{-\beta x} \frac{P \beta}{2 kb} [\cos \beta x + \sin \beta x]$$

(1)



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: [γ]

γo. -

Wx=335cm3

UIC60 -

Ix=3.00cm4

B70 -

a=60 cm

γo γ.

k1=100 N/cm3 -

γ.

k2=150,200 N/cm3 -

$$\eta = 1 + \frac{V^2}{30000} \leq 1.6 \quad [\gamma]$$

microsoft Exel 2003

γ

. γ-γ γ-γ k1=100,k2=150

. γ-λ γ-λ k1=100,k2=200



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(

| M% | Y% | K2 | K1 |
|------|------|----|----|
| 5.3 | 5.7 | | |
| 11.8 | 12.5 | | |
| 20.3 | 21.2 | | |

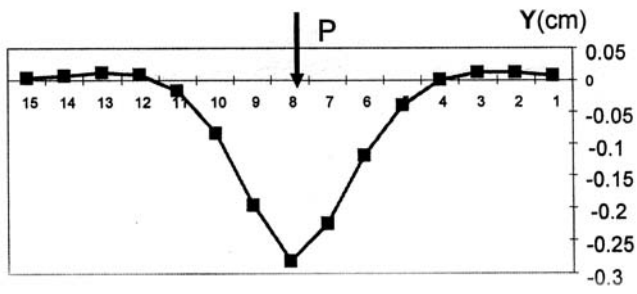
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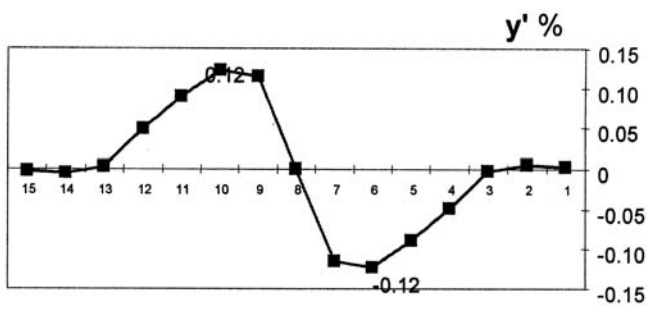
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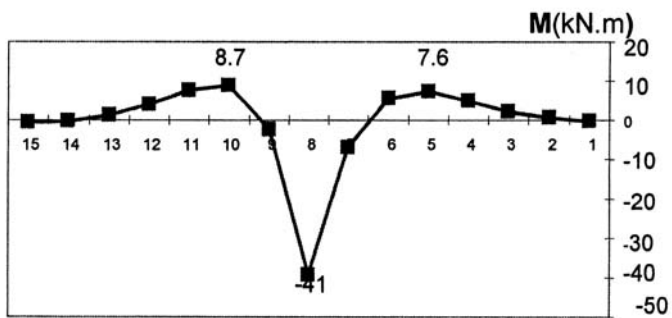
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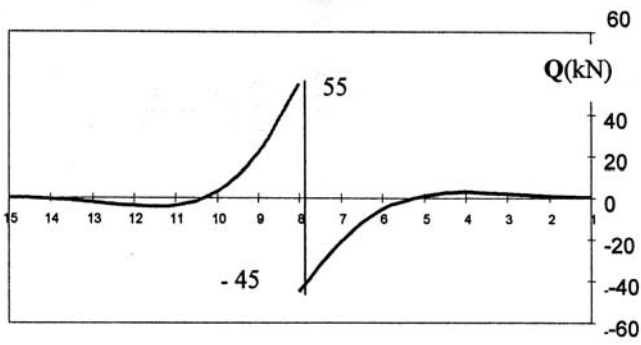
($k_1=100, k_2=150$) : -



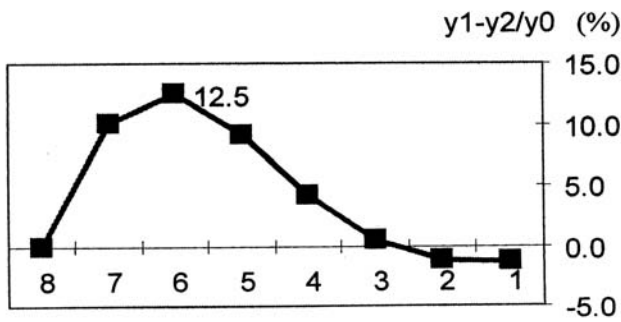
($k_1=100, k_2=150$) : -



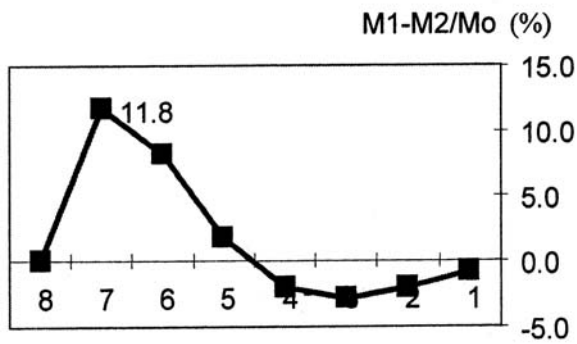
($k_1=100, k_2=150$) : -



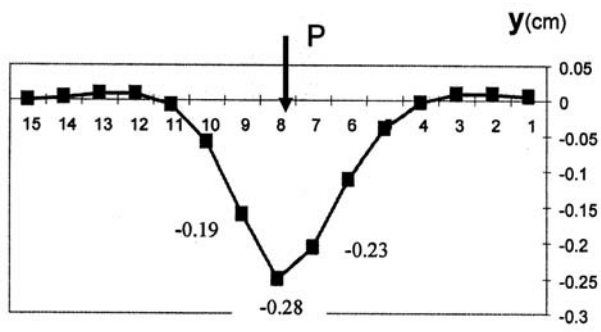
(k1=100,k2=150) : -



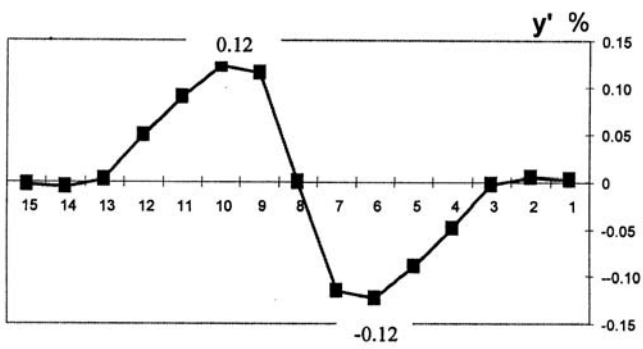
(k1=100,k2=150) : -



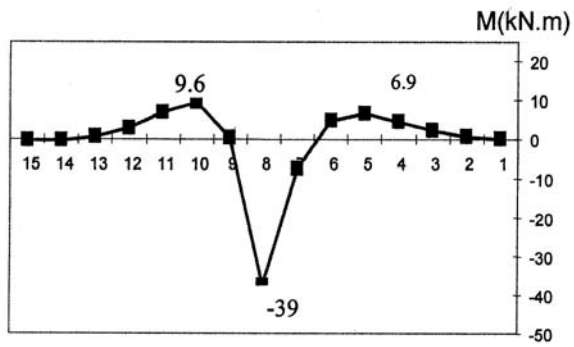
(k1=100,k2=150) : -



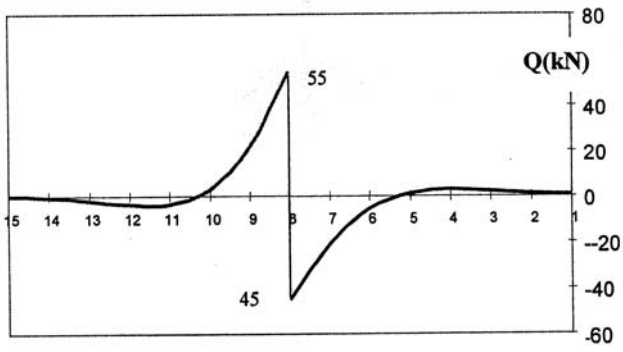
($k_1=100, k_2=200$) : -



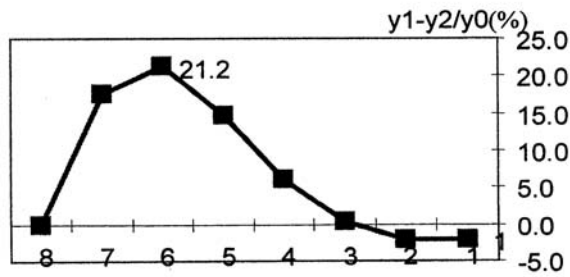
($k_1=100, k_2=200$) : -



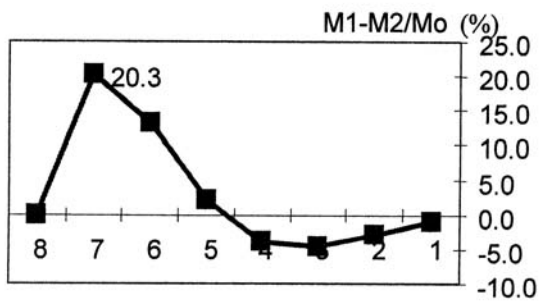
($k_1=100, k_2=200$) : -



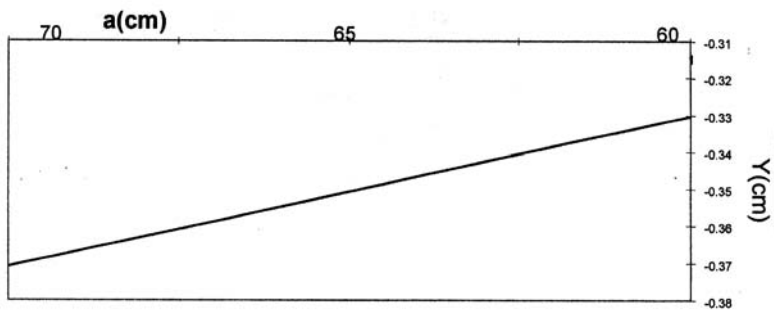
(k1=100,k2=200) : -



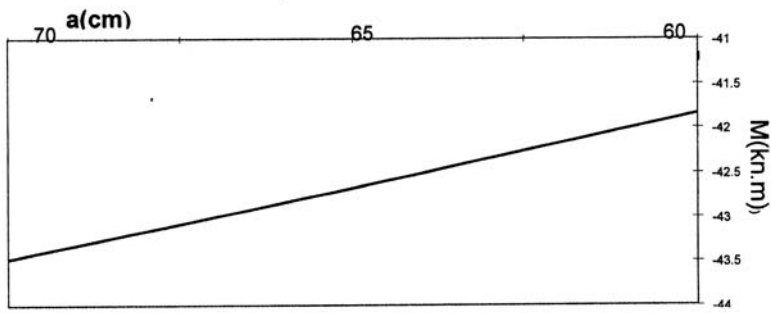
(k1=100,k2=200) : -



(k1=100,k2=200) : -



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IS(e-mail: bteodoru@ce.tuiasi.ro)

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www.cfssyria.org

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