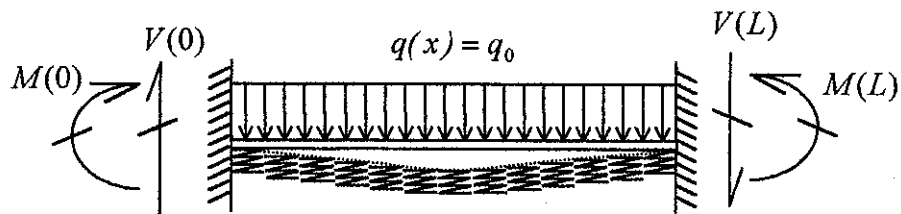


บทที่ 4 ผลการวิจัย

บทนี้ จะกล่าวถึงผลการวิจัย คานบนฐานรากยึดหยุ่น ที่มีแรงกระทำแบบ Uniform load และ Linear load โดยจะแสดงค่าฟังก์ชันต่างๆ เช่น การโก่งตัว , มุมหมุน , โมเมนต์ดัด , แรงเฉือน เมื่อที่รองรับของคานบนฐานรากยึดหยุ่นเป็นไปในกรณีต่างๆ

ในส่วนของบทนี้ จะแสดงเฉพาะผลเท่านั้น ซึ่งรายละเอียดได้กล่าวไว้ในบทที่ 3

กรณีที่ 1



เงื่อนไขขอบ

$$\begin{aligned} w(0) &= 0 & w(L) &= 0 \\ w'(0) &= 0 & w'(L) &= 0 \end{aligned}$$

" Value of A , B , C and D "

$$\begin{aligned} A &= \left[\frac{q_0 (-1 + e^{\beta L} \cos(\beta L) + e^{\beta L} \sin(\beta L))}{4EI\beta^4 (1 - e^{2\beta L} - 2e^{\beta L} \sin(\beta L))} \right] \\ B &= \left[\frac{q_0 (-1 + e^{\beta L} \cos(\beta L) - e^{\beta L} \sin(\beta L))}{4EI\beta^4 (-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right] \\ C &= \left[\frac{e^{\beta L} q_0 (-e^{\beta L} + \cos(\beta L) - \sin(\beta L))}{4EI\beta^4 (-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right] \\ D &= \left[\frac{e^{\beta L} q_0 (-e^{\beta L} + \cos(\beta L) + \sin(\beta L))}{4EI\beta^4 (-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right] \end{aligned}$$

ฟังก์ชันที่ปลายคาน

$$V(0) = \left[\frac{q_0(1 + e^{2\beta L} - 2e^{\beta L} \cos(\beta L))}{\beta(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right]$$

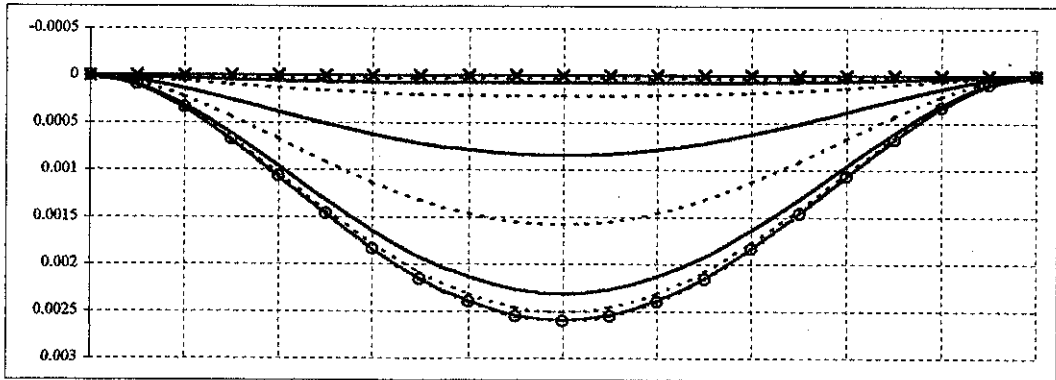
$$M(0) = \left[\frac{q_0(1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{2\beta^2(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right]$$

$$V(L) = \left[\frac{-q_0(1 + e^{2\beta L} - 2e^{\beta L} \cos(\beta L))}{\beta(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right]$$

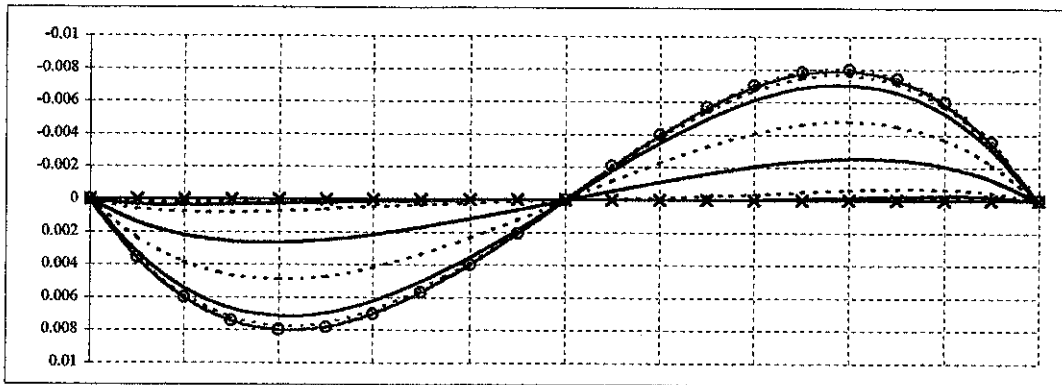
$$M(L) = \left[\frac{q_0(1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{2\beta^2(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 1

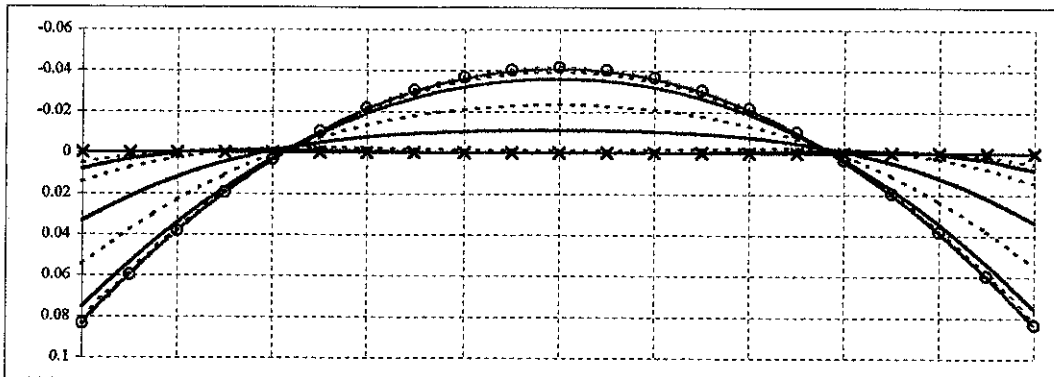
DEFLECTION (EIw/q_0L^4)



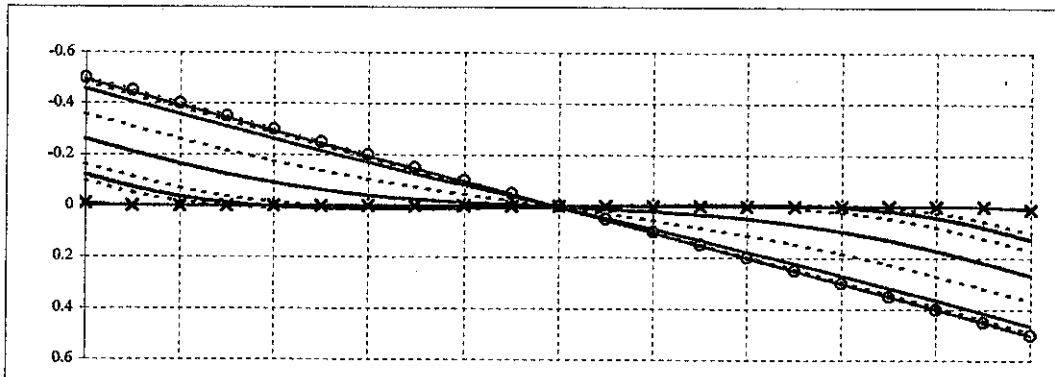
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



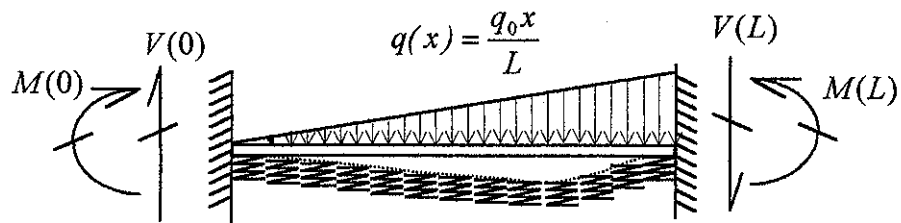
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที 2



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad w(L) = 0$$

$$w'(0) = 0 \qquad w'(L) = 0$$

" Value of A , B , C and D "

$$A = \frac{e^{\beta L} q_0 \begin{pmatrix} e^{\beta L} + \beta L \cos(\beta L) - e^{2\beta L} \beta L \cos(\beta L) \\ -e^{\beta L} \cos(2\beta L) - \sin(\beta L) + e^{2\beta L} \sin(\beta L) \\ -\beta L \sin(\beta L) - e^{2\beta L} \beta L \sin(\beta L) \end{pmatrix}}{4EI\beta^5 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$B = \frac{q_0 \begin{pmatrix} -1 + e^{2\beta L} + e^{\beta L} \cos(\beta L) - e^{3\beta L} \cos(\beta L) \\ -e^{\beta L} \beta L \cos(\beta L) + e^{3\beta L} \beta L \cos(\beta L) + 2e^{\beta L} \sin(\beta L) \\ + 3e^{\beta L} \beta L \sin(\beta L) - e^{3\beta L} \beta L \sin(\beta L) - e^{2\beta L} \sin(2\beta L) \end{pmatrix}}{4EI\beta^5 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$C = \frac{e^{\beta L} q_0 \begin{pmatrix} -e^{\beta L} - \beta L \cos(\beta L) + e^{2\beta L} \beta L \cos(\beta L) \\ + e^{\beta L} \cos(2\beta L) + \sin(\beta L) - e^{2\beta L} \sin(\beta L) \\ + \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L) \end{pmatrix}}{4EI\beta^5 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$D = \frac{e^{\beta L} q_0 \left(\begin{aligned} &e^{\beta L} - e^{3\beta L} - \cos(\beta L) + e^{2\beta L} \cos(\beta L) - \beta L \cos(\beta L) \\ &+ e^{2\beta L} \beta L \cos(\beta L) - 2e^{2\beta L} \sin(\beta L) - \beta L \sin(\beta L) \\ &+ 3e^{2\beta L} \beta L \sin(\beta L) + e^{\beta L} \sin(2\beta L) \end{aligned} \right)}{4EI\beta^5 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

ฟังก์ชันที่ปลายคาน

$$M(0) = \frac{-q_0 \left(\begin{aligned} &-1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ &+ 2e^{\beta L} \sin(\beta L) + 2e^{3\beta L} \sin(\beta L) + 4e^{\beta L} \beta L \sin(\beta L) \\ &- 4e^{3\beta L} \beta L \sin(\beta L) - 2e^{2\beta L} \sin(2\beta L) \end{aligned} \right)}{2\beta^3 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

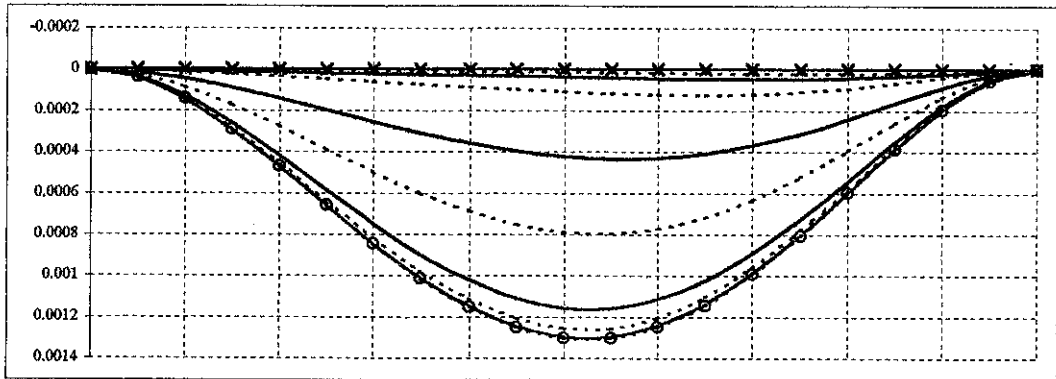
$$V(0) = \frac{q_0 \left(\begin{aligned} &1 + e^{4\beta L} + 4e^{\beta L} \beta L \cos(\beta L) - 4e^{3\beta L} \beta L \cos(\beta L) \\ &- 2e^{2\beta L} \cos(2\beta L) - 4e^{\beta L} \sin(\beta L) + 4e^{3\beta L} \sin(\beta L) \\ &- 4e^{\beta L} \beta L \sin(\beta L) - 4e^{3\beta L} \beta L \sin(\beta L) \end{aligned} \right)}{2\beta^2 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$M(L) = \frac{-q_0 (1 + e^{2\beta L} - 2e^{\beta L} \cos(\beta L)) \left(\begin{aligned} &1 - e^{2\beta L} + \beta L + e^{2\beta L} \beta L \\ &+ 2e^{\beta L} \beta L \cos(\beta L) \\ &- 2e^{\beta L} \sin(\beta L) \end{aligned} \right)}{2\beta^3 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

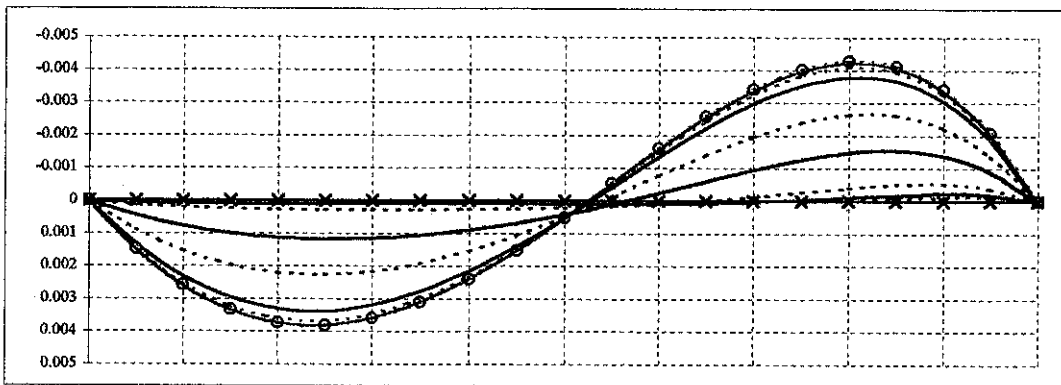
$$V(L) = \frac{-q_0 \left(\begin{aligned} &-1 - e^{4\beta L} - 2\beta L + 2e^{4\beta L} \beta L + 2e^{2\beta L} \cos(2\beta L) \\ &+ 4e^{\beta L} \sin(\beta L) - 4e^{3\beta L} \sin(\beta L) + 4e^{2\beta L} \beta L \sin(2\beta L) \end{aligned} \right)}{2\beta^2 L(1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

กราฟแสดงผลการวิเคราะห์ที่ 2

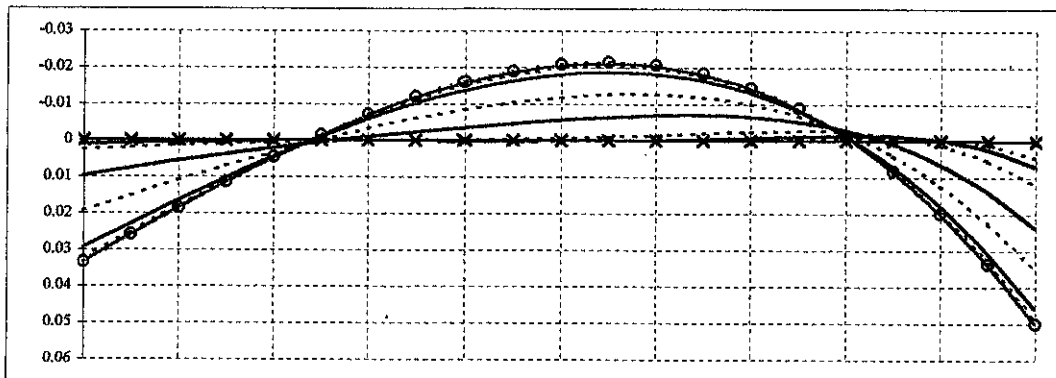
DEFLECTION (Elw/q_0L^4)



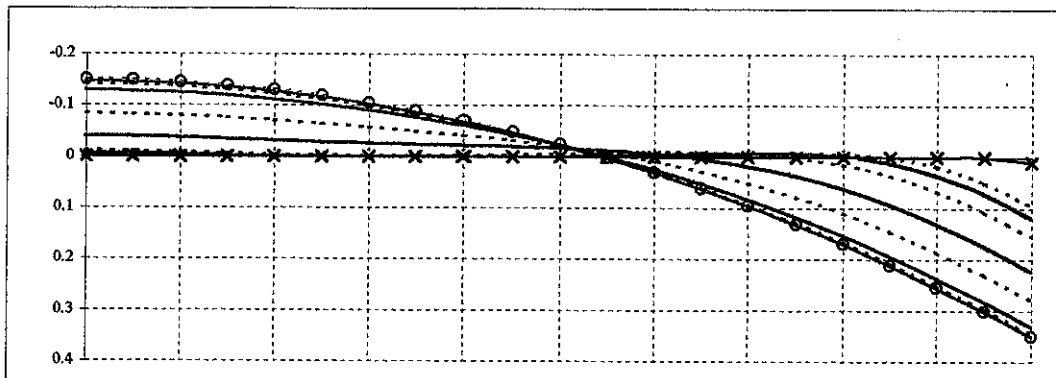
SLOPE (Elw/q_0L^3)



MOMENT (M/q_0L^2)



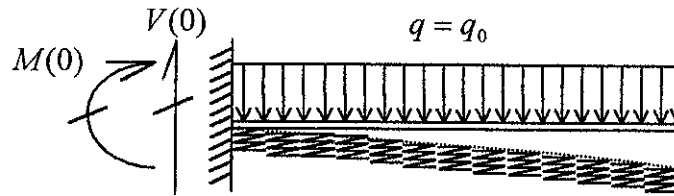
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	---	—	---	—	---	—	---	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 3



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad M(L) = 0$$

$$w'(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0(1 + 2e^{2\beta L} + e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{q_0(1 - e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{-e^{2\beta L} q_0(2 + e^{2\beta L} + \cos(2\beta L) + \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{e^{2\beta L} q_0(-e^{2\beta L} + \cos(2\beta L) - \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$M(0) = \left[\frac{-q_0(1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{2\beta^2(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

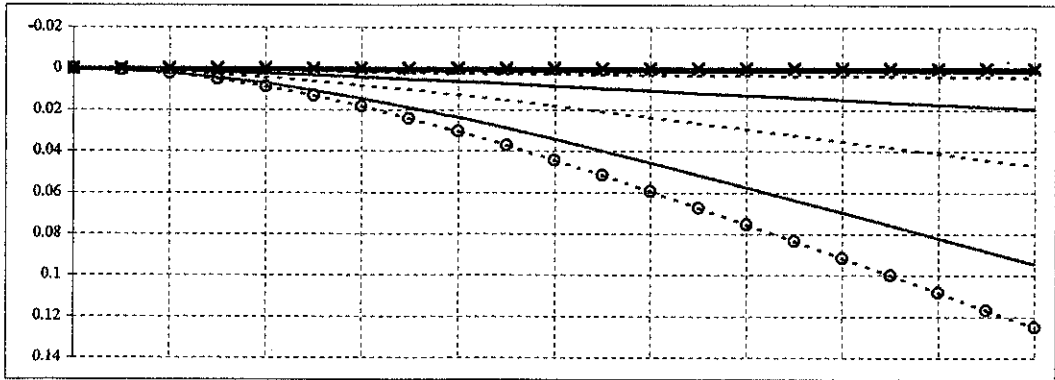
$$V(0) = \left[\frac{q_0(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{\beta(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0(1 + e^{2\beta L} - 2e^{\beta L} \cos(2\beta L))^2}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

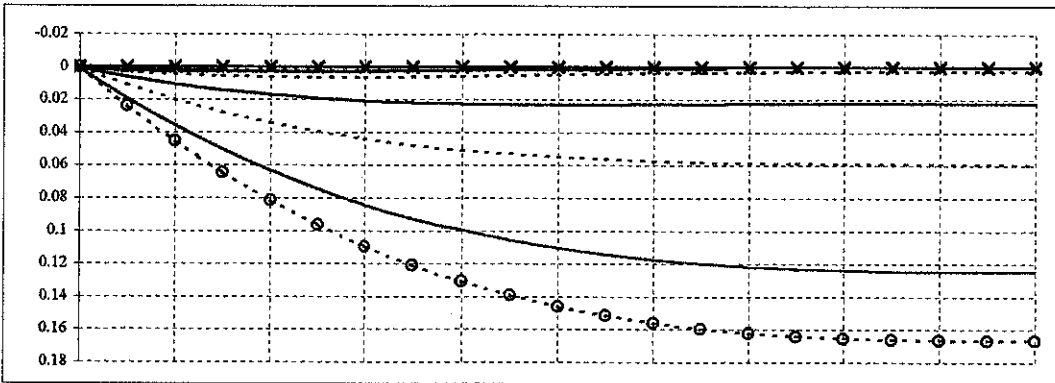
$$w'(L) = \left[\frac{e^{\beta L} q_0(\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{\beta^3 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 3

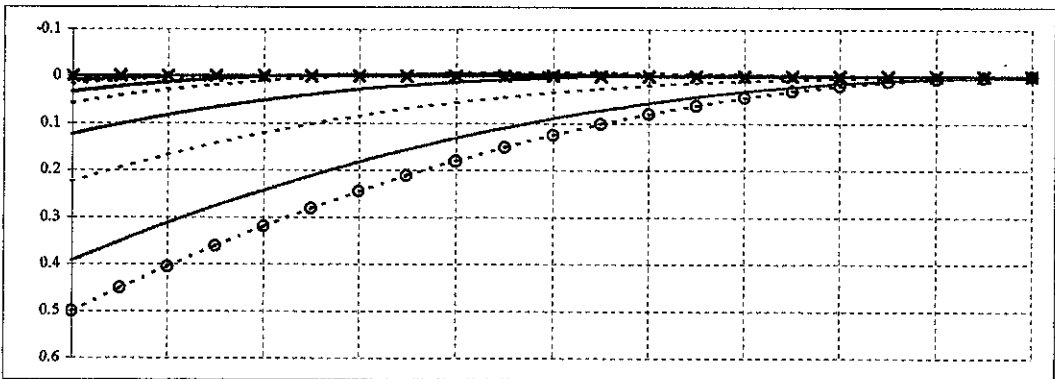
DEFLECTION (EIw/q_0L^4)



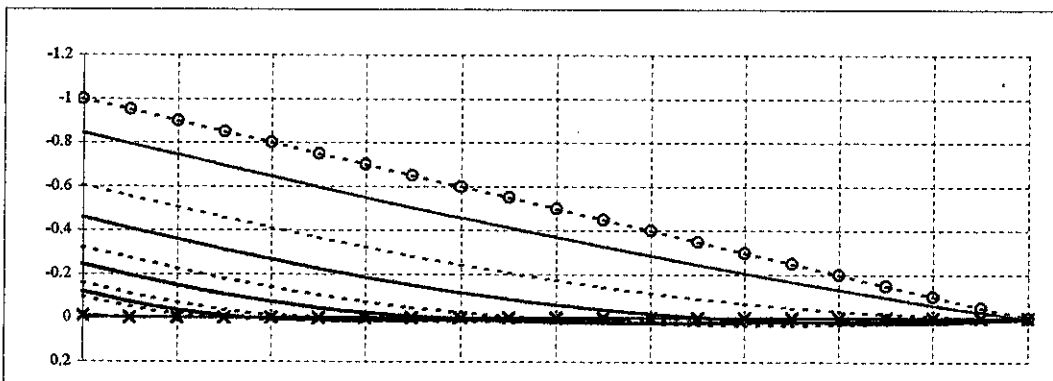
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



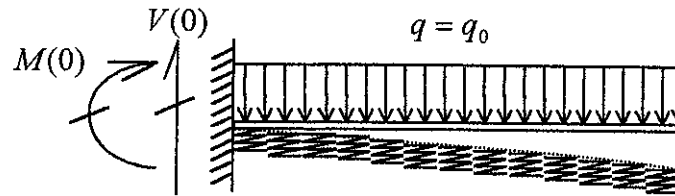
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที 3



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad M(L) = 0$$

$$w'(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0(1 + 2e^{2\beta L} + e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{q_0(1 - e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{-e^{2\beta L} q_0(2 + e^{2\beta L} + \cos(2\beta L) + \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{e^{2\beta L} q_0(-e^{2\beta L} + \cos(2\beta L) - \sin(2\beta L))}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$M(0) = \left[\frac{-q_0(1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{2\beta^2(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

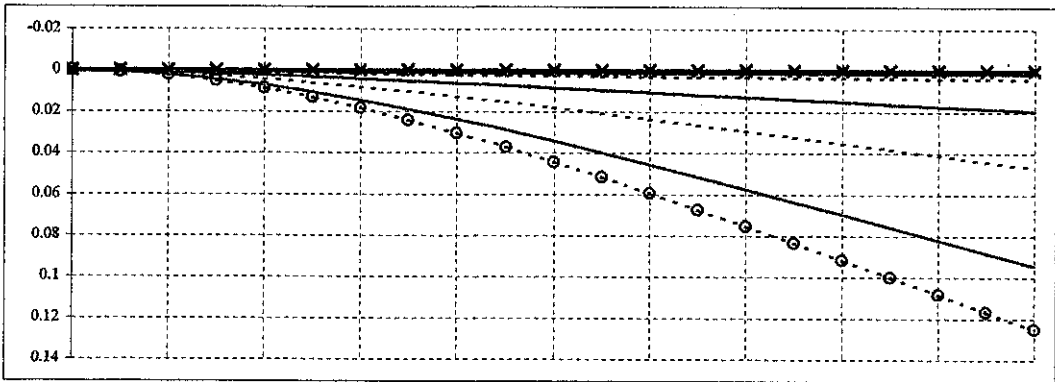
$$V(0) = \left[\frac{q_0(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{\beta(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0(1 + e^{2\beta L} - 2e^{\beta L} \cos(2\beta L))^2}{4\beta^4 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

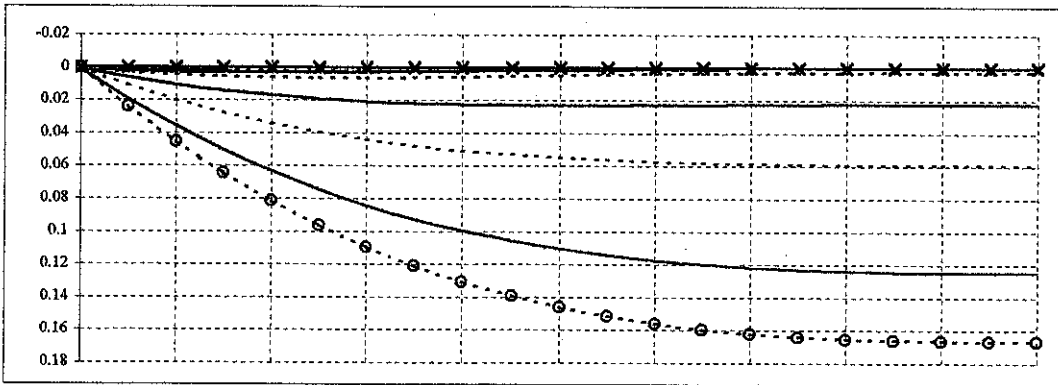
$$w'(L) = \left[\frac{e^{\beta L} q_0(\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{\beta^3 EI(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 3

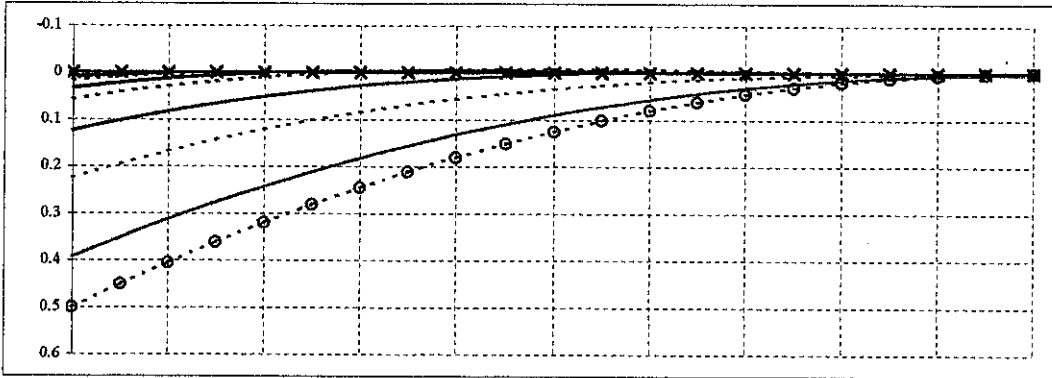
DEFLECTION (Et_w/q_0L^4)



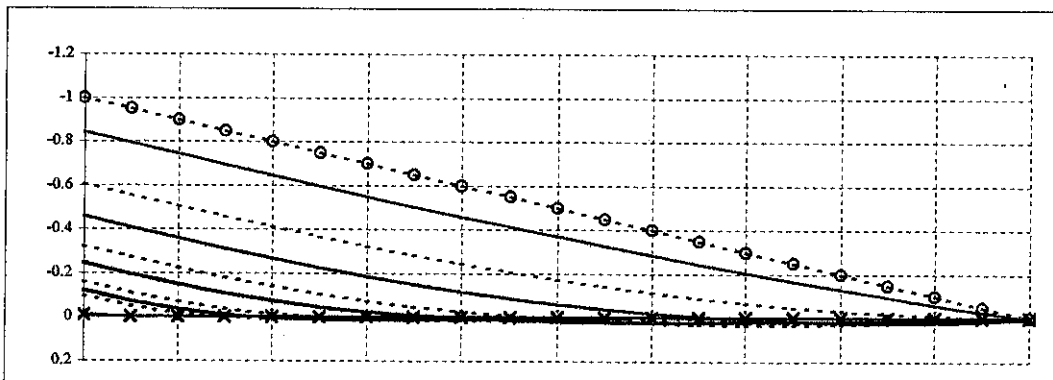
SLOPE (Et_w/q_0L^3)



MOMENT (M/q_0L^2)



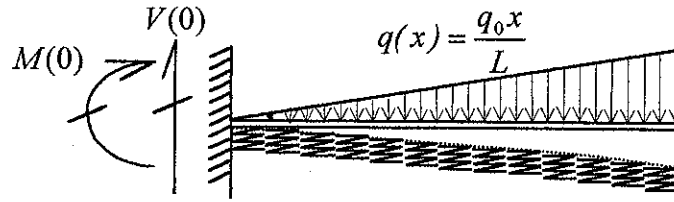
SHEAR (V/q_0L)



x/L

เส้นกราฟ	---○---	—	---	—	---	—	---	—	---	—x—
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 4



เงื่อนไขขอบ

$$w(0) = 0 \qquad M(L) = 0$$

$$w'(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-\left(e^{2\beta L} q_0 \cos^2(\beta L)\right)}{2\beta^5 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{-\left(q_0(1+e^{2\beta L} + e^{2\beta L} \sin(2\beta L))\right)}{4\beta^5 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{\left(e^{2\beta L} q_0 \cos^2(\beta L)\right)}{2\beta^5 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{-\left(e^{2\beta L} q_0(1+e^{2\beta L} - \sin(2\beta L))\right)}{4\beta^5 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$M(0) = \left[\frac{q_0(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{2\beta^3 L(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

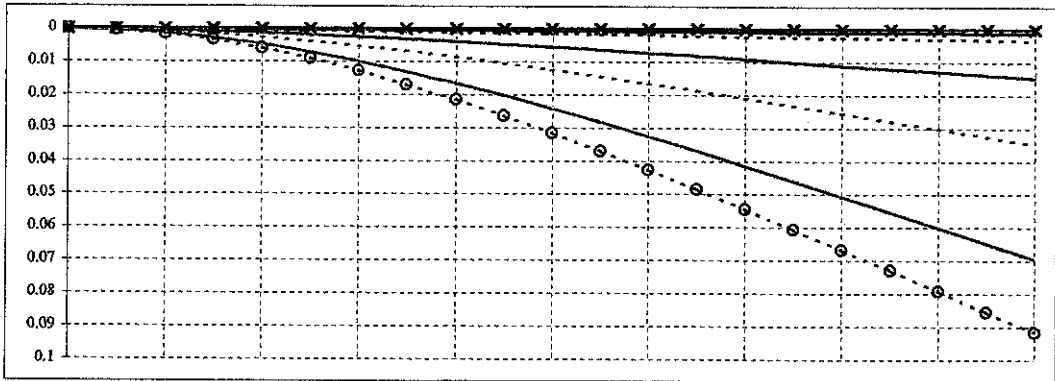
$$V(0) = \left[\frac{q_0(1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{2\beta^2 L(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 \left(\beta L + 4e^{2\beta L} \beta L + e^{4\beta L} \beta L + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \right) + 2e^{2\beta L} \beta L \cos(2\beta L) - 2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L)}{4\beta^5 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

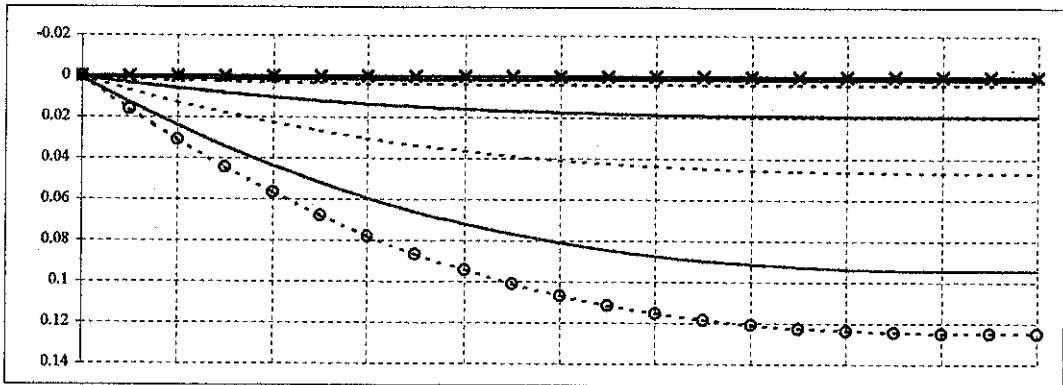
$$w'(L) = \left[\frac{q_0(1 + e^{2\beta L} - 2e^{\beta L} \cos(\beta L))^2}{4\beta^4 EIL(1+4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 4

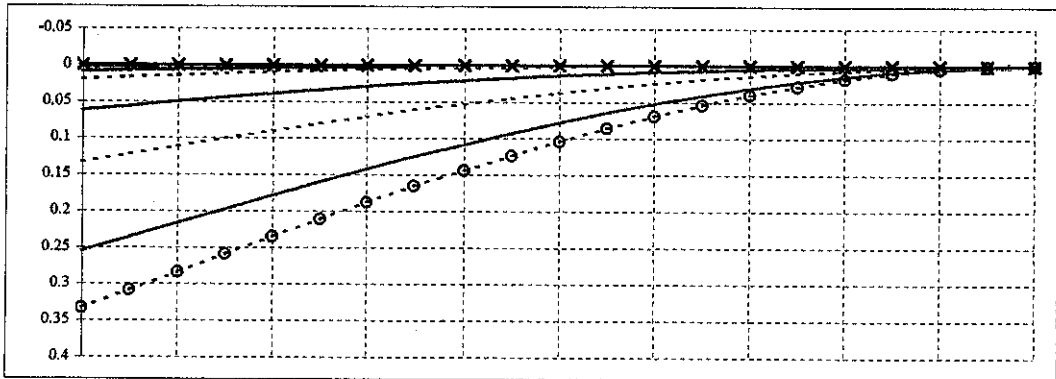
DEFLECTION (Elw/q_0L^4)



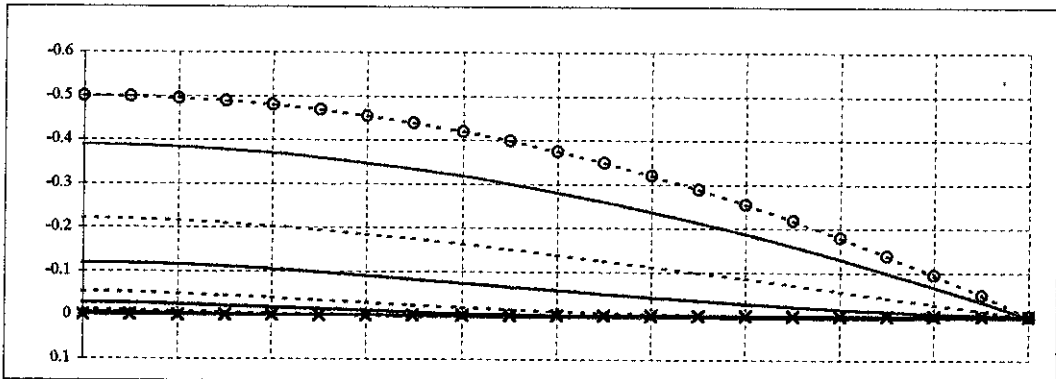
SLOPE (Elw/q_0L^3)



MOMENT (M/q_0L^2)



SHEAR (V/q_0L)



x/L | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0

เส้นกราฟ	○	—	---	—	---	—	---	—	---	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

7A
492
.65
42747
2542

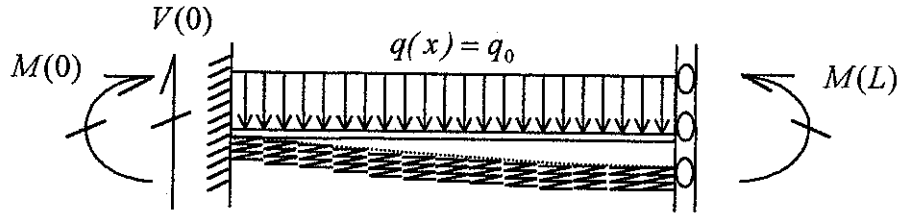
= 4 พ.ศ. 2543

4340224



สำนักหอสมุด

กรณีที่ 5



เงื่อนไขขอบ

$$\begin{aligned} w(0) &= 0 & V(L) &= 0 \\ w'(0) &= 0 & w'(L) &= 0 \end{aligned}$$

" Value of A , B , C and D "

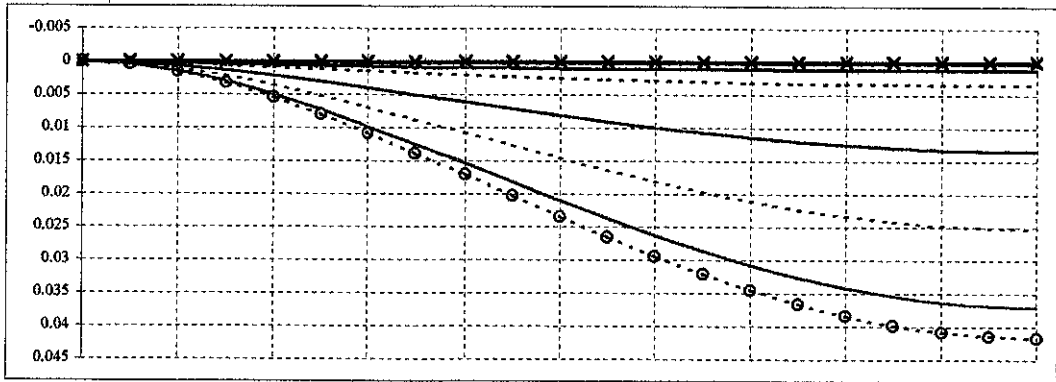
$$\begin{aligned} A &= \left[\frac{q_0(-1 + e^{2\beta L} \cos(2\beta L) + e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \\ B &= \left[\frac{q_0(-1 + e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ C &= \left[\frac{e^{2\beta L} q_0(-e^{2\beta L} + \cos(2\beta L) - \sin(2\beta L))}{4\beta^4 EI(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ D &= \left[\frac{e^{2\beta L} q_0(-e^{2\beta L} + \cos(2\beta L) + \sin(2\beta L))}{4\beta^4 EI(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \end{aligned}$$

ฟังก์ชันที่ปลายคาน

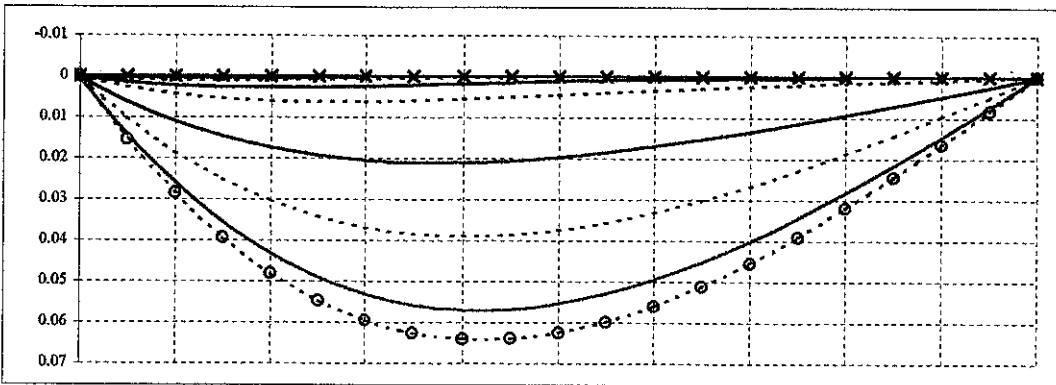
$$\begin{aligned} M(0) &= \left[\frac{q_0(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{2\beta^2(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ V(0) &= \left[\frac{q_0(1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{\beta(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ w(L) &= \left[\frac{q_0 \begin{pmatrix} -1 + e^{4\beta L} + 2e^{2\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ -2e^{2\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{pmatrix}}{4\beta^4 EI(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ M(L) &= \left[\frac{e^{\beta L} q(-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{\beta^2(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \end{aligned}$$

กราฟแสดงผลการวิเคราะห์ที่ 5

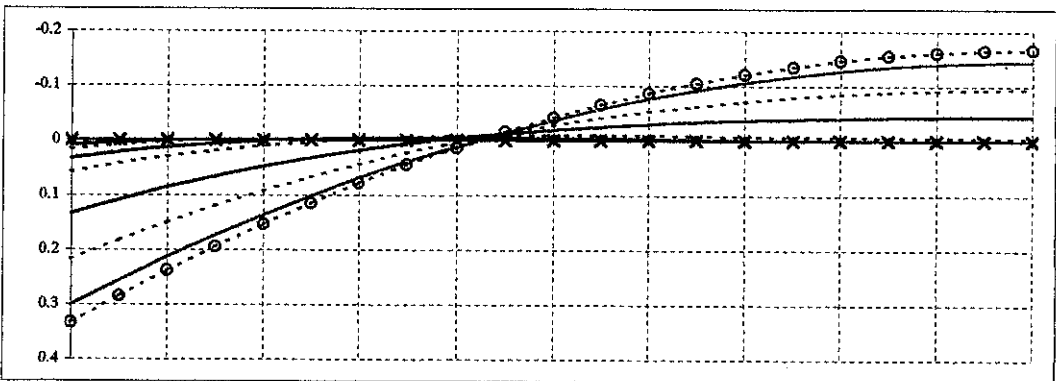
DEFLECTION (EIw/q_0L^4)



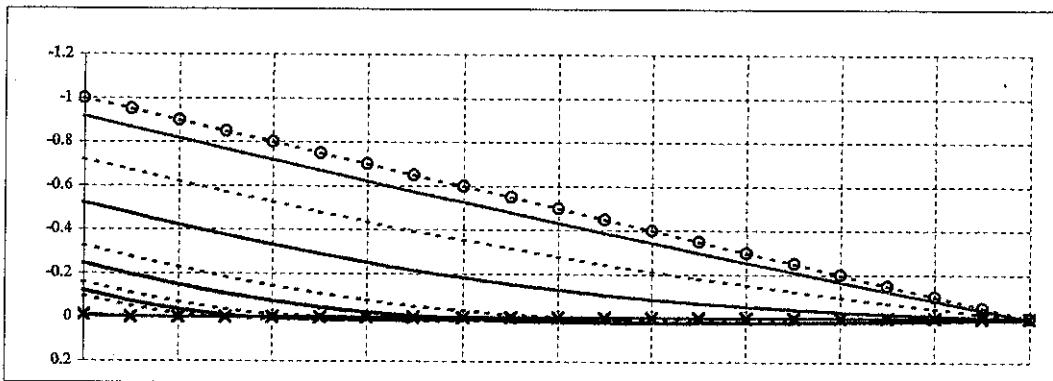
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)

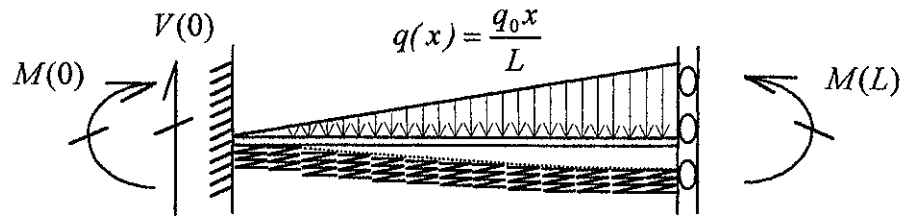


SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	—	×
BL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที่ 6



เงื่อนไขขอบ

$$w(0) = 0$$

$$V(L) = 0$$

$$w'(0) = 0$$

$$w'(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{e^{\beta L} q_0 \left(\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) \right)}{8\beta^5 EIL \left(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L) \right)} \right]$$

$$B = \left[\frac{q_0 \left(2 - 3e^{\beta L} \cos(\beta L) - e^{3\beta L} \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L) - e^{\beta L} \sin(\beta L) - e^{3\beta L} \sin(\beta L) \right)}{8\beta^5 EIL \left(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L) \right)} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 \left(-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) \right)}{8\beta^5 EIL \left(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L) \right)} \right]$$

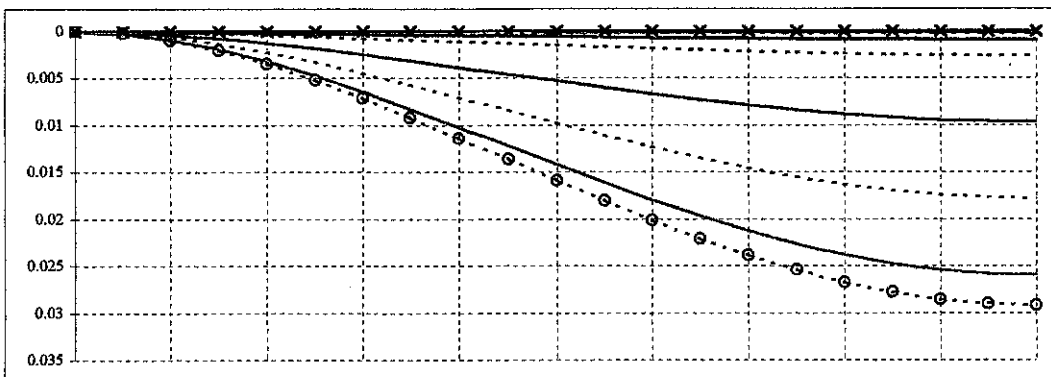
$$D = \left[\frac{e^{\beta L} q_0 \left(2e^{3\beta L} - \cos(\beta L) - 3e^{2\beta L} \cos(\beta L) + 2e^{\beta L} \cos(2\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L) \right)}{8\beta^5 EIL \left(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L) \right)} \right]$$

ฟังก์ชันที่ปลายคาน

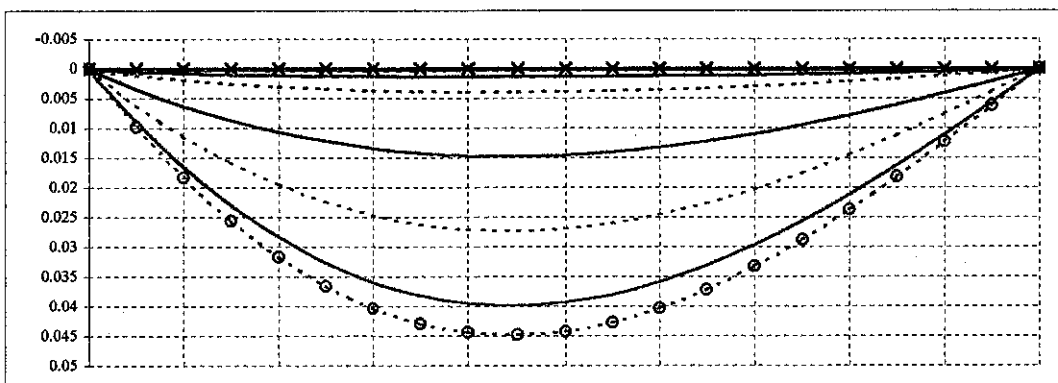
$$\begin{aligned}
 M(0) &= \left[\frac{q_0 (1 + e^{4\beta L} - 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L))}{2\beta^3 L (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \\
 V(0) &= \left[\frac{q_0 \left(\begin{aligned} &1 - e^{4\beta L} - 2e^{\beta L} \cos(\beta L) + 2e^{3\beta L} \cos(\beta L) - 2e^{\beta L} \sin(\beta L) \\ &- 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{aligned} \right)}{2\beta^2 L (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \\
 w(L) &= \left[\frac{q_0 \left(\begin{aligned} &-1 - e^{4\beta L} - 2\beta L + 2e^{4\beta L} \beta L + 2e^{2\beta L} \cos(2\beta L) \\ &+ 4e^{\beta L} \sin(\beta L) - 4e^{3\beta L} \sin(\beta L) + 4e^{2\beta L} \beta L \sin(2\beta L) \end{aligned} \right)}{8\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\
 M(L) &= \left[\frac{q_0 (-1 - e^{2\beta L} + 2e^{\beta L} \cos(\beta L))^2}{4\beta^3 L (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]
 \end{aligned}$$

กราฟแสดงผลการวิเคราะห์ที่ 6

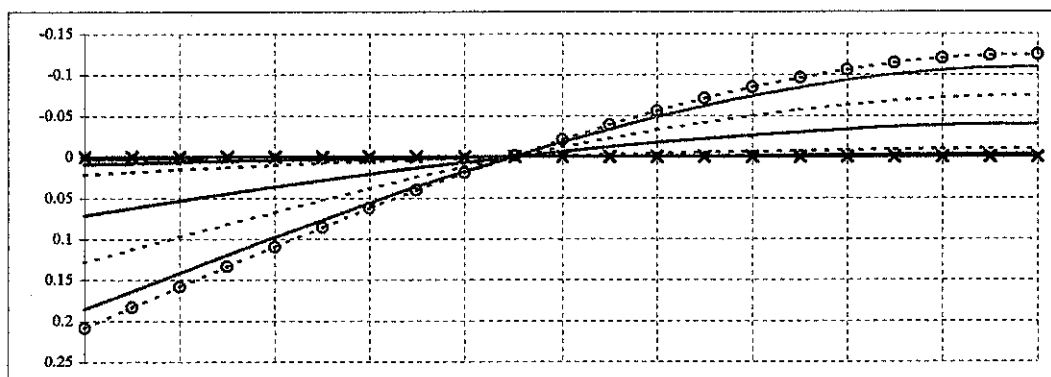
DEFLECTION (EIw/q_0L^4)



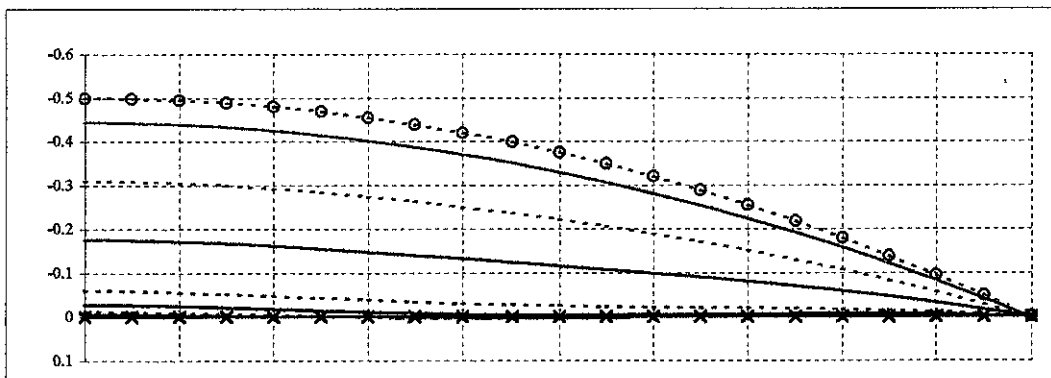
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



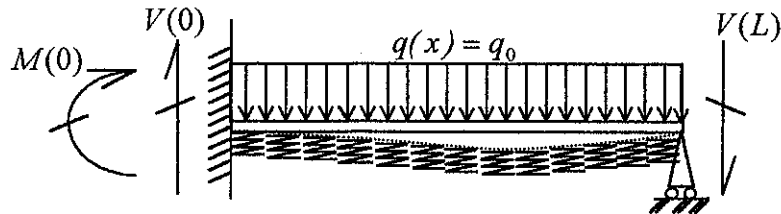
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
BL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 7



เงื่อนไขสภาพขอบ

$$\begin{aligned} w(0) &= 0 & w(L) &= 0 \\ w'(0) &= 0 & M(L) &= 0 \end{aligned}$$

" Value of A , B , C and D "

$$\begin{aligned} A &= \left[\frac{q_0 (1 - e^{\beta L} \cos(\beta L) - e^{3\beta L} \cos(\beta L) + e^{2\beta L} \cos(2\beta L) + e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \\ B &= \left[\frac{q_0 \left(1 - 2e^{\beta L} \cos(\beta L) + e^{2\beta L} \cos(2\beta L) + e^{\beta L} \sin(\beta L) + e^{3\beta L} \sin(\beta L) - e^{2\beta L} \sin(2\beta L) \right)}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \\ C &= \left[\frac{e^{\beta L} q_0 (-e^{3\beta L} + \cos(\beta L) + e^{2\beta L} \cos(\beta L) - e^{\beta L} \cos(2\beta L) + e^{\beta L} \sin(2\beta L))}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right] \\ D &= \left[\frac{e^{\beta L} q_0 \left(e^{3\beta L} - 2e^{2\beta L} \cos(\beta L) + e^{\beta L} \cos(2\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L) + e^{\beta L} \sin(2\beta L) \right)}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right] \end{aligned}$$

ฟังก์ชันที่ปลายคาน

$$M(0) = \left[\frac{q_0 \left(\begin{aligned} &-1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ &- 2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{aligned} \right)}{2\beta^2 (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

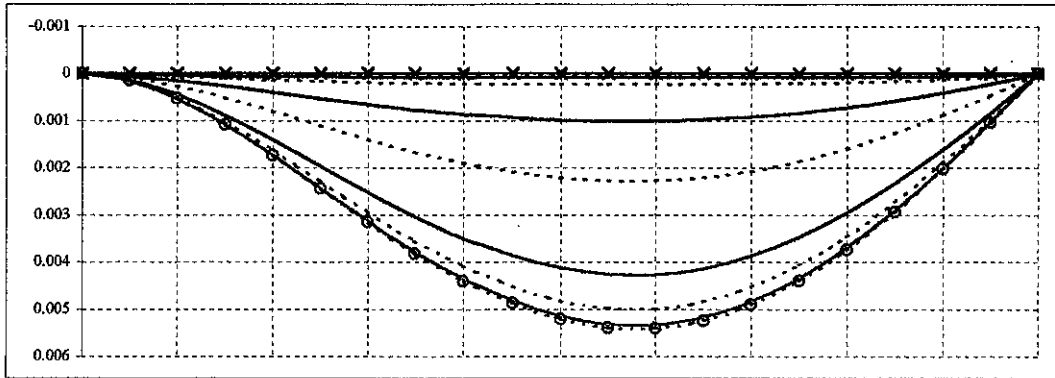
$$V(0) = \left[\frac{-q_0(1 + e^{4\beta L} - 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L))}{\beta - \beta e^{4\beta L} + 2\beta e^{2\beta L} \sin(2\beta L)} \right]$$

$$w(L) = \left[\frac{q_0(1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))^2}{4\beta^3 EI(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

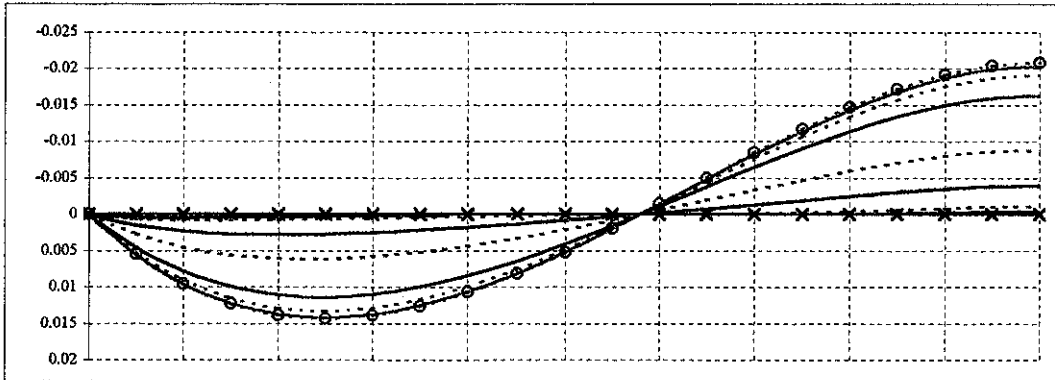
$$V(L) = \left[\frac{q_0(-1 - e^{2\beta L} + 2e^{\beta L} \cos(\beta L))^2}{2\beta(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 7

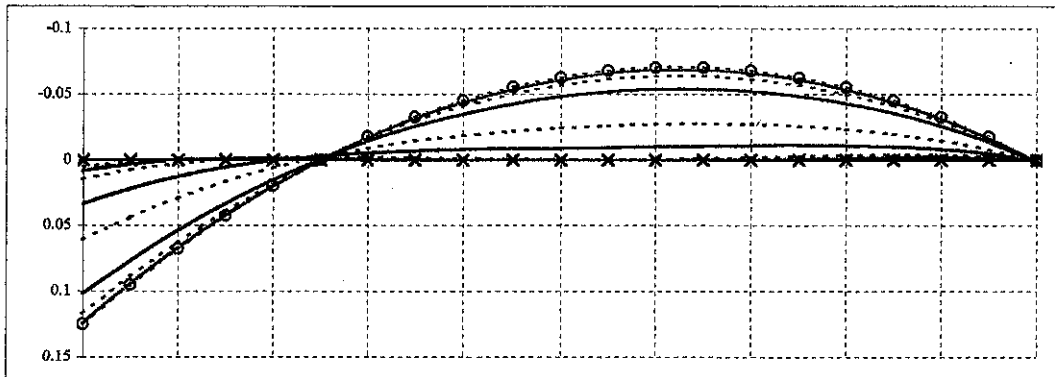
DEFLECTION (EIw/q_0L^4)



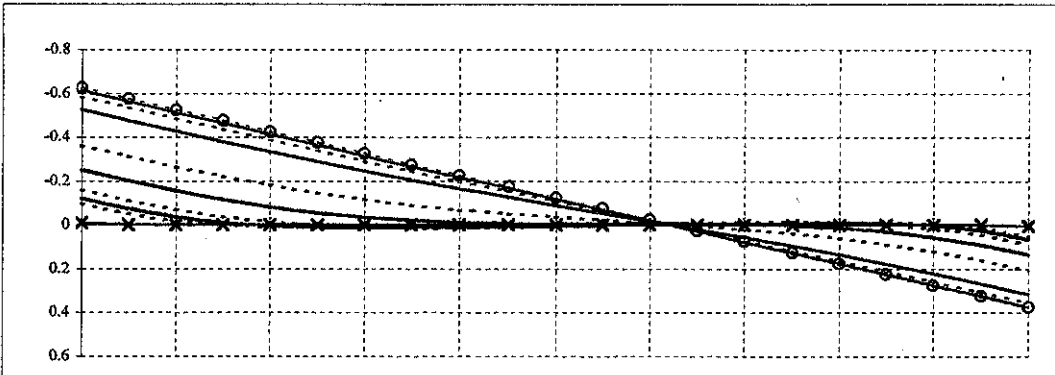
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)

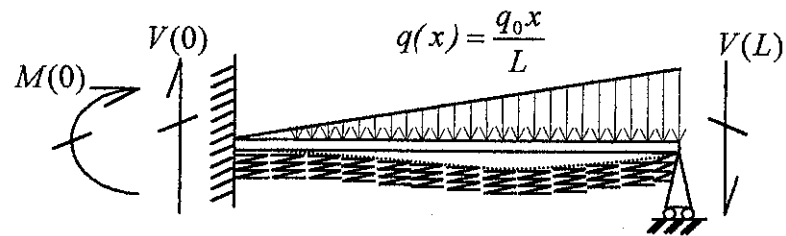


SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	---○---	————	-----	————	-----	————	-----	————	-----	————	---×---
βL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที 8



เงื่อนไขขอบ

$$w(0) = 0 \qquad w(L) = 0$$

$$w'(0) = 0 \qquad M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{e^{\beta L} q_0 \cos(\beta L) (\beta L + e^{2\beta L} \beta L - 2e^{\beta L} \sin(\beta L))}{4\beta^5 EIL(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{q_0 \left(-1 - 2e^{\beta L} \beta L \cos(\beta L) + e^{2\beta L} \cos(2\beta L) \right) + e^{\beta L} \beta L \sin(\beta L) + e^{3\beta L} \beta L \sin(\beta L)}{4\beta^5 EIL(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 \cos(\beta L) (\beta L + e^{2\beta L} \beta L - 2e^{\beta L} \sin(\beta L))}{4\beta^5 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

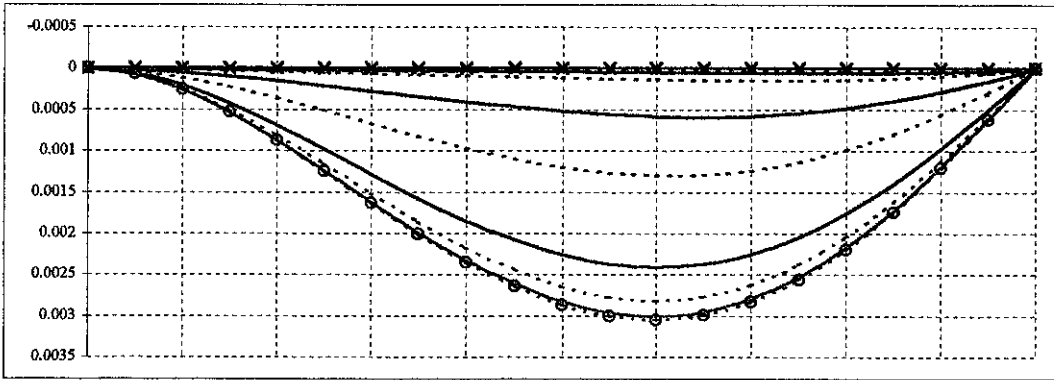
$$D = \left[\frac{e^{\beta L} q_0 \left(-e^{3\beta L} + 2e^{2\beta L} \beta L \cos(\beta L) + e^{\beta L} \cos(2\beta L) \right) + \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L)}{4\beta^5 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

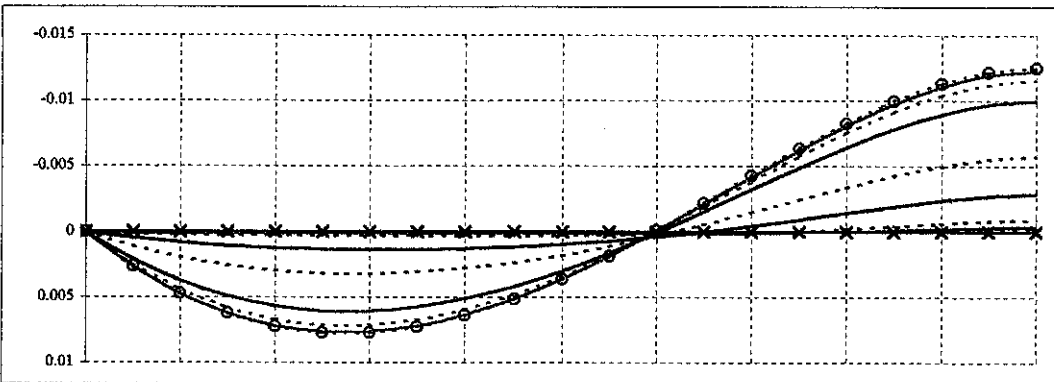
$$M(0) = \left[\frac{-q_0 \left(1 + e^{4\beta L} + 2e^{\beta L} \beta L \cos(\beta L) - 2e^{3\beta L} \beta L \cos(\beta L) - 2e^{2\beta L} \cos(2\beta L) - 2e^{\beta L} \beta L \sin(\beta L) - 2e^{3\beta L} \beta L \sin(\beta L) \right)}{2\beta^3 L(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 8

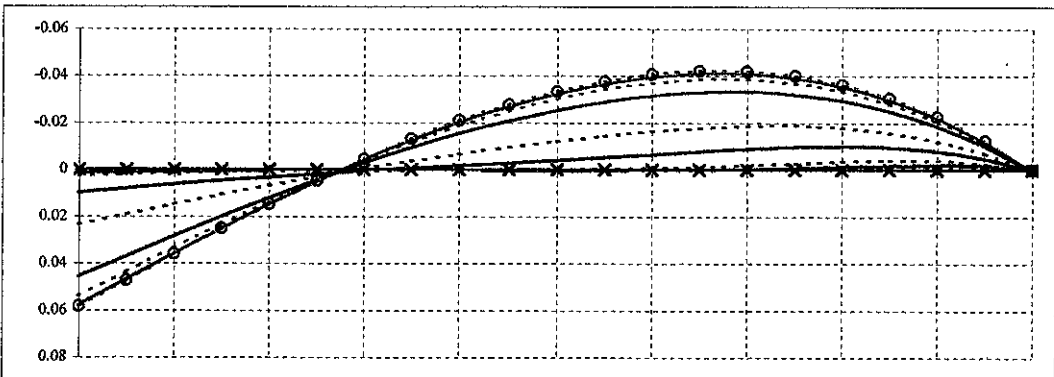
DEFLECTION (Elw/q_0L^4)



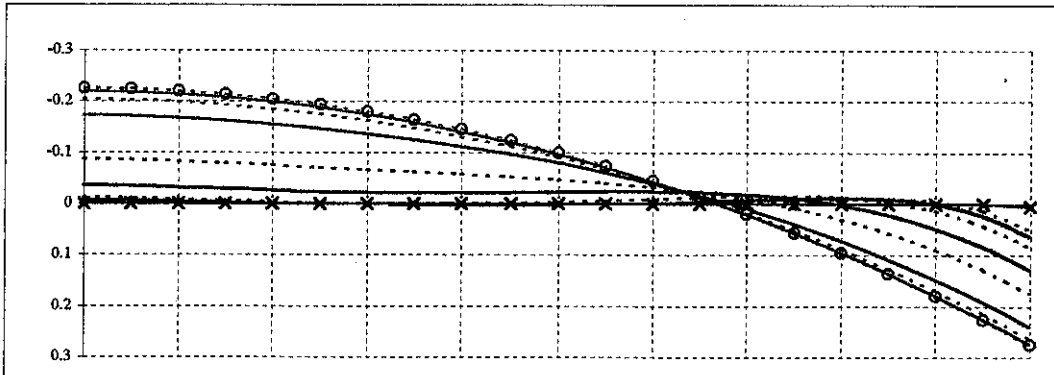
SLOPE (Elw/q_0L^3)



MOMENT (M/q_0L^2)

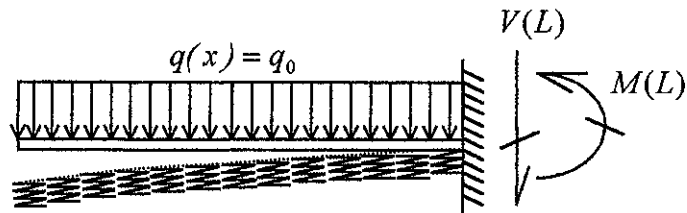


SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	○	—	---	—	---	—	---	—	---	—	×
βL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที่ 9



เงื่อนไขสภาพขอบ

$$M(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad w'(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-\left(e^{\beta L} q_0 (3 \cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L)) \right)}{4\beta^4 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{\left(e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L)) \right)}{4\beta^4 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{-\left(e^{\beta L} q_0 (\cos(\beta L) + 3e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L)) \right)}{4\beta^4 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{\left(e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L)) \right)}{4\beta^4 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0 (1 + e^{2\beta L} - 2e^{\beta L} \cos(2\beta L))^2}{4\beta^4 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

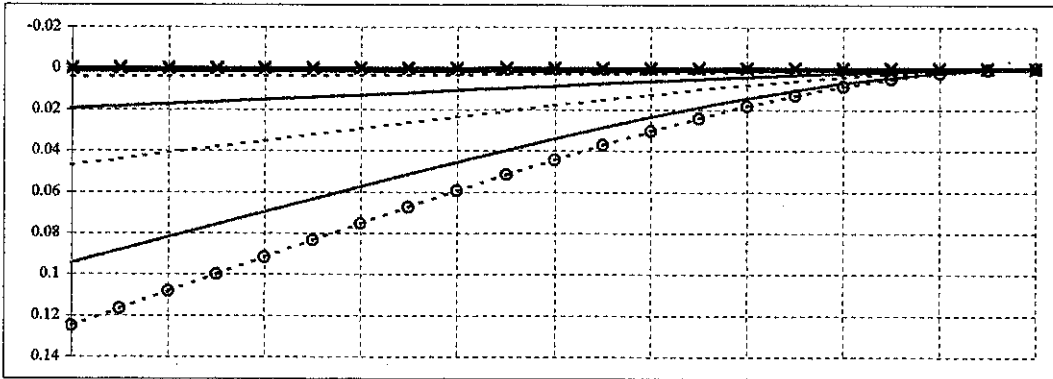
$$w'(0) = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{\beta^3 EI (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$M(L) = \left[\frac{-q_0 (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{2\beta^2 (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

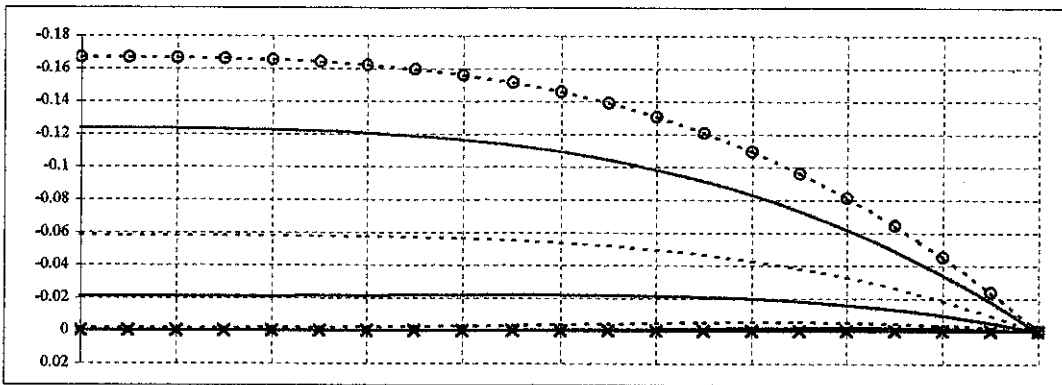
$$V(L) = \left[\frac{q_0 (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}{\beta (1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 9

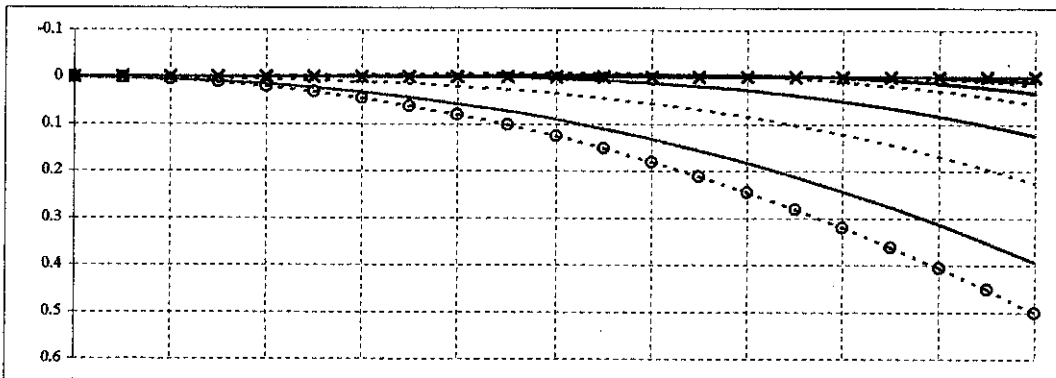
DEFLECTION (EIw/q_0L^4)



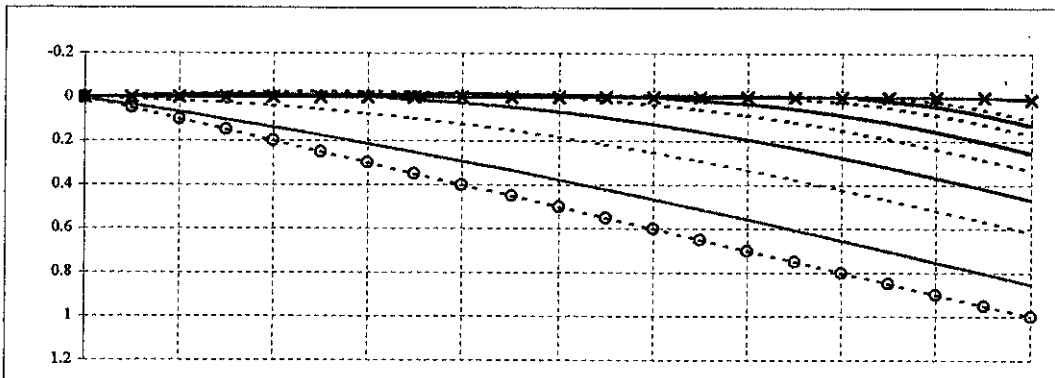
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



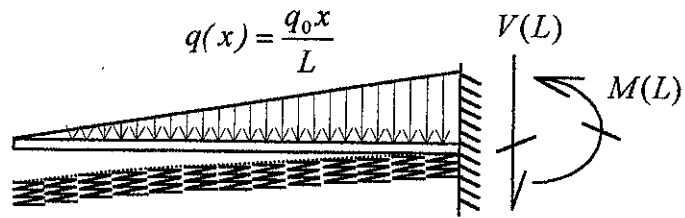
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	---	----	-----	-----	-----	-----	-----	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 10



เงื่อนไขสภาพขอบ

$$M(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad w'(L) = 0$$

" Value of A , B , C and D "

$$A = \frac{-e^{\beta L} q_0 \left(\begin{array}{l} 2 \cos(\beta L) + 3\beta L \cos(\beta L) + e^{2\beta L} \beta L \cos(\beta L) \\ -\sin(\beta L) - e^{2\beta L} \sin(\beta L) + \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$B = \frac{e^{\beta L} q_0 \left(\begin{array}{l} -\cos(\beta L) - e^{2\beta L} \cos(\beta L) - \beta L \cos(\beta L) \\ + e^{2\beta L} \beta L \cos(\beta L) - \beta L \sin(\beta L) - e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$C = \frac{e^{\beta L} q_0 \left(\begin{array}{l} 2e^{2\beta L} \cos(\beta L) - \beta L \cos(\beta L) - 3e^{2\beta L} \beta L \cos(\beta L) \\ + \sin(\beta L) + e^{2\beta L} \sin(\beta L) + \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

$$D = \frac{e^{\beta L} q_0 \left(\begin{array}{l} -\cos(\beta L) - e^{2\beta L} \cos(\beta L) - \beta L \cos(\beta L) \\ + e^{2\beta L} \beta L \cos(\beta L) - \beta L \sin(\beta L) - e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{e^{\beta L} q_0 \begin{pmatrix} -\cos(\beta L) + e^{2\beta L} \cos(\beta L) - 2\beta L \cos(\beta L) \\ -2e^{2\beta L} \beta L \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L) \end{pmatrix}}{2\beta^5 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

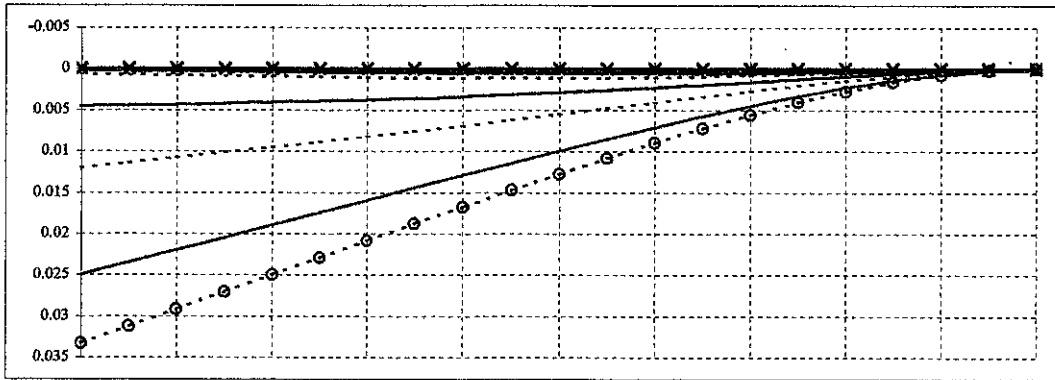
$$w'(0) = \left[\frac{q_0 \begin{pmatrix} 1 + 4e^{2\beta L} + e^{4\beta L} - 4e^{\beta L} \cos(\beta L) - 4e^{3\beta L} \cos(\beta L) \\ -4e^{\beta L} \beta L \cos(\beta L) + 4e^{3\beta L} \beta L \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L) \\ -4e^{\beta L} \beta L \sin(\beta L) - 4e^{3\beta L} \beta L \sin(\beta L) \end{pmatrix}}{4\beta^4 EIL(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$M(L) = \left[\frac{-q_0(1 - e^{4\beta L} + \beta L + e^{4\beta L} \beta L - 2e^{2\beta L} \beta L \cos(2\beta L) + 2e^{2\beta L} \sin(2\beta L))}{2\beta^3 L(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

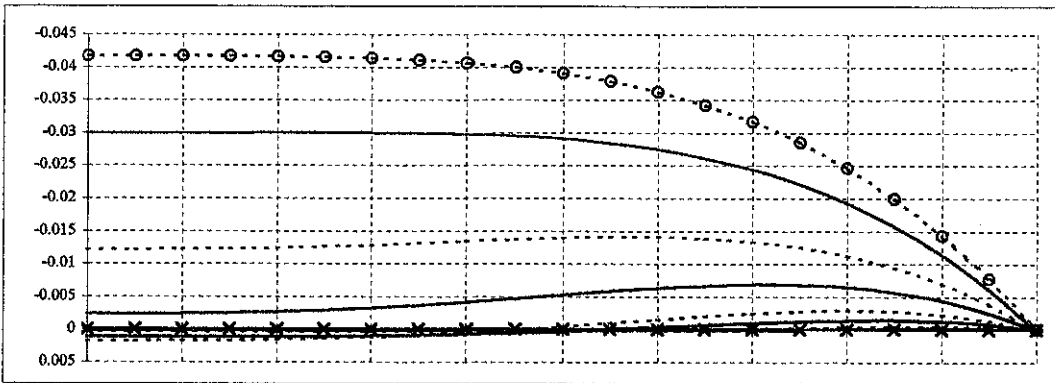
$$V(L) = \left[\frac{q_0(1 + e^{4\beta L} + 2\beta L - 2e^{4\beta L} \beta L - 2e^{2\beta L} \cos(2\beta L) - 4e^{2\beta L} \beta L \sin(2\beta L))}{2\beta^2 L(1 + 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 10

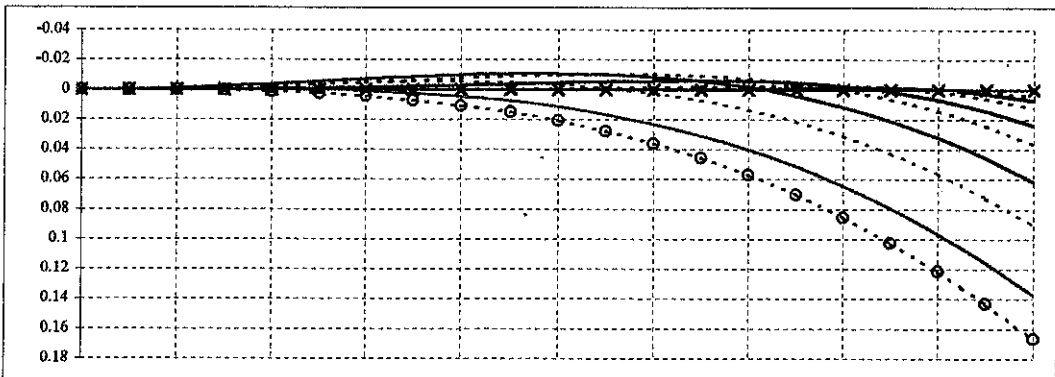
DEFLECTION (EIw/q_0L^4)



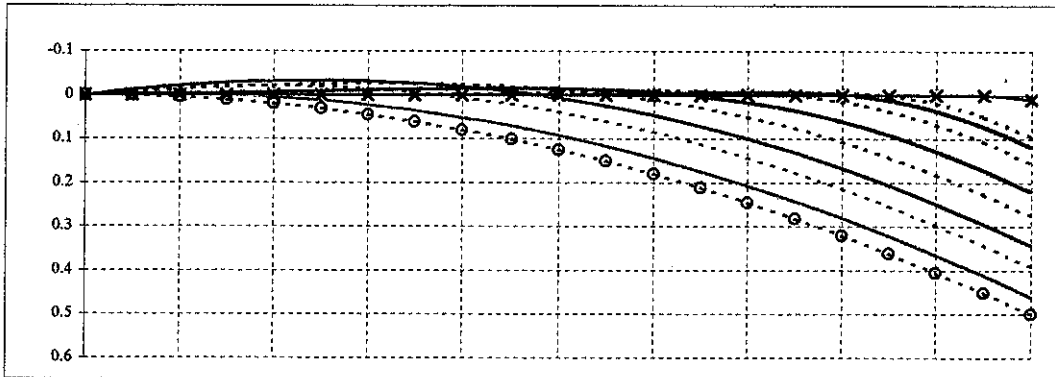
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



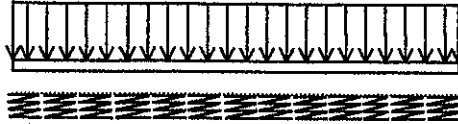
SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	—	×
BL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที่ 11

$$q(x) = q_0$$



เงื่อนไขสภาพขอบ

$$M(0) = 0$$

$$M(L) = 0$$

$$V(0) = 0$$

$$V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \frac{q_0}{4\beta^4 EI}$$

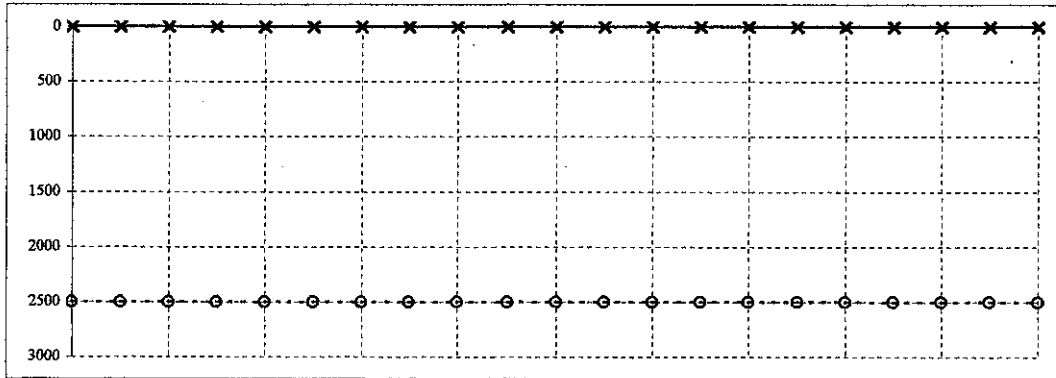
$$w'(0) = 0$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

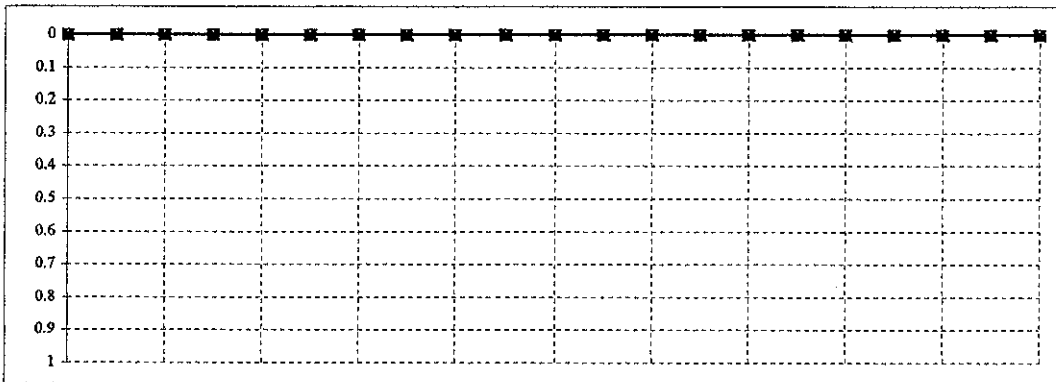
$$w'(L) = 0$$

กราฟแสดงผลการวิเคราะห์ที่ 11

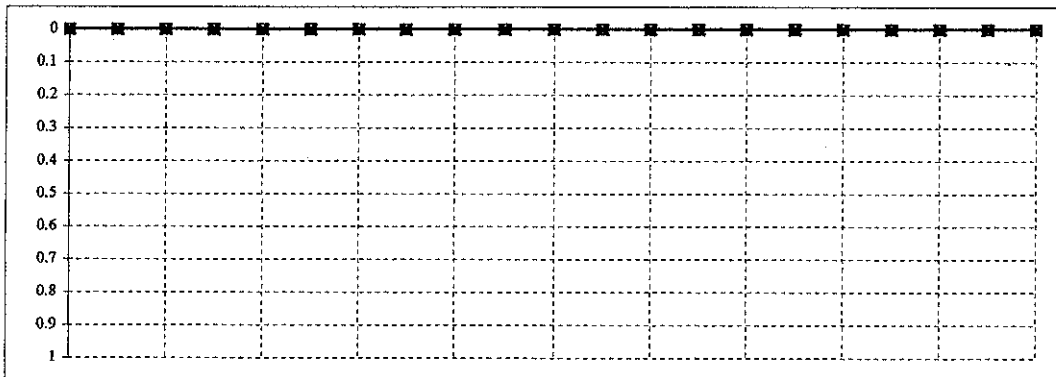
DEFLECTION (EIw/q_0L^4)



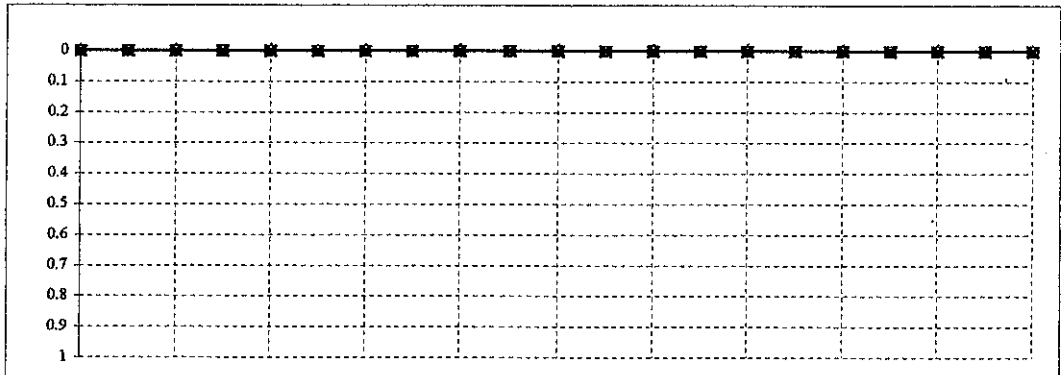
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



SHEAR (V/q_0L)

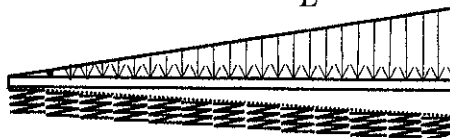


x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	————	-----	————	-----	————	-----	————	-----	—x—
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 12

$$q(x) = \frac{q_0 x}{L}$$



เงื่อนไขขอบ

$$M(0) = 0$$

$$M(L) = 0$$

$$V(0) = 0$$

$$V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w(0) = 0$$

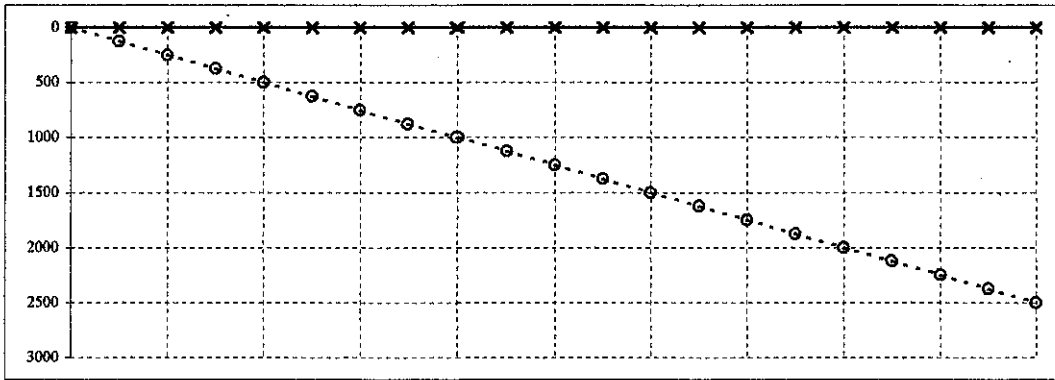
$$w'(0) = \frac{q_0}{4\beta^4 EI}$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

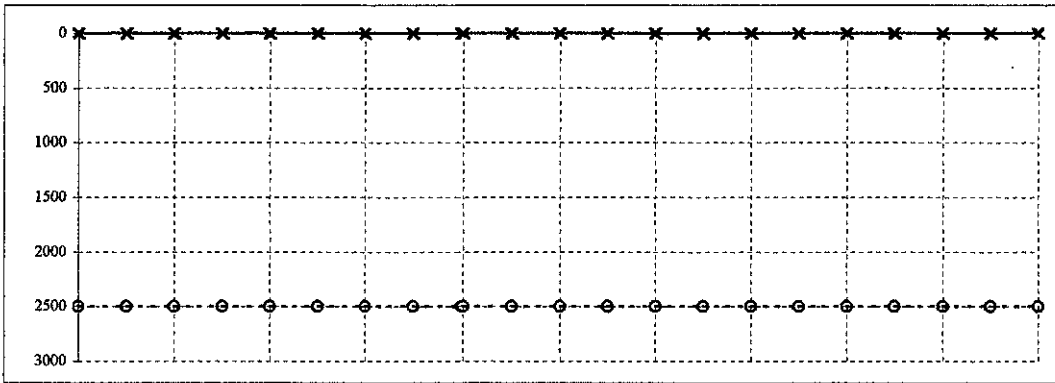
$$w'(L) = \frac{q_0}{4\beta^4 EI}$$

กราฟแสดงผลการวิเคราะห์ที่ 12

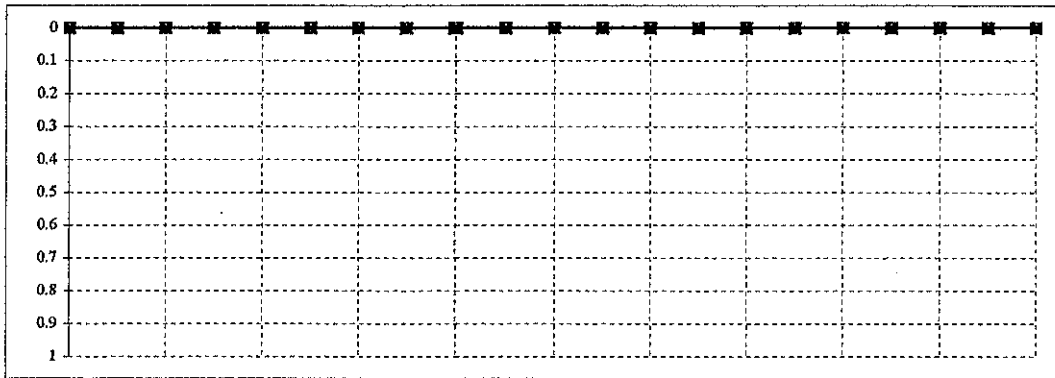
DEFLECTION (EIw/q_0L^4)



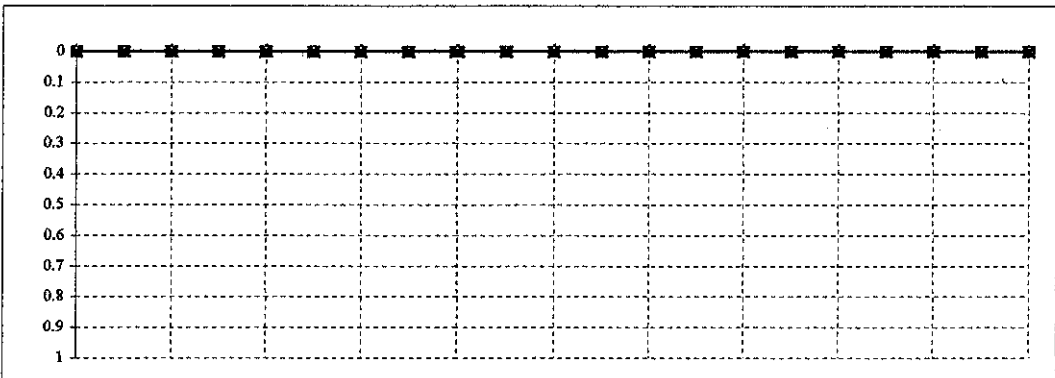
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



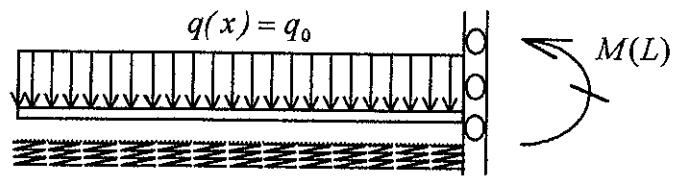
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---	—○—	—	---	—	---	—	---	—	---	—x—
βL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที่ 13



เงื่อนไขขอบ

$$M(0) = 0 \qquad w'(L) = 0$$

$$V(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = 0$$

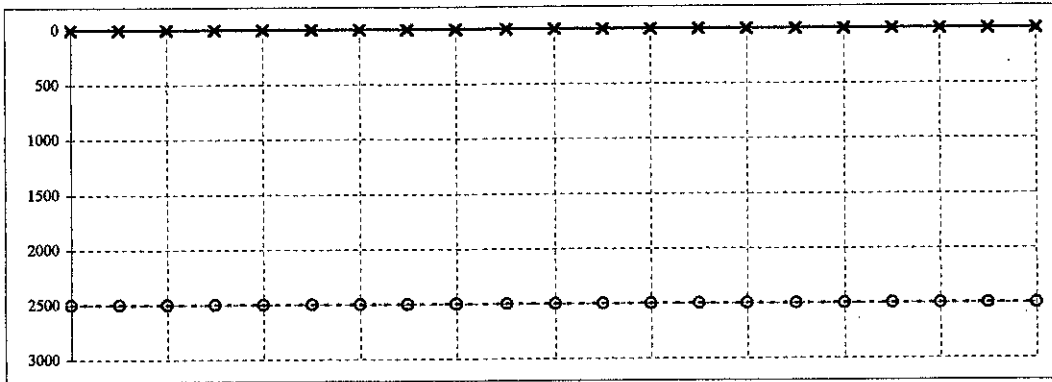
$$w(0) = \frac{q_0}{4\beta^4 EI}$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

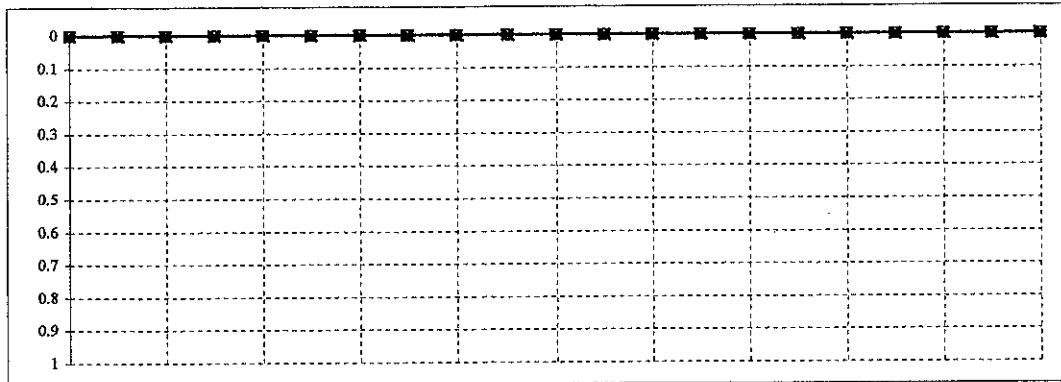
$$M(L) = 0$$

กราฟแสดงผลการวิเคราะห์ที่ 13

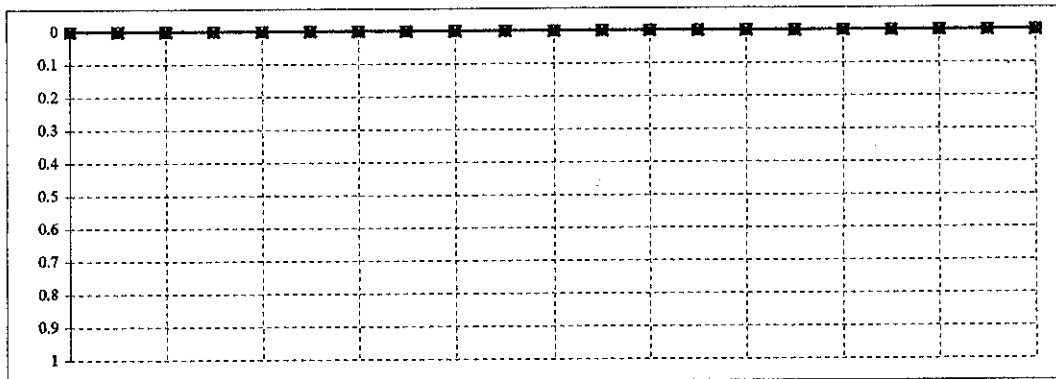
DEFLECTION (EIw/q_0L^4)



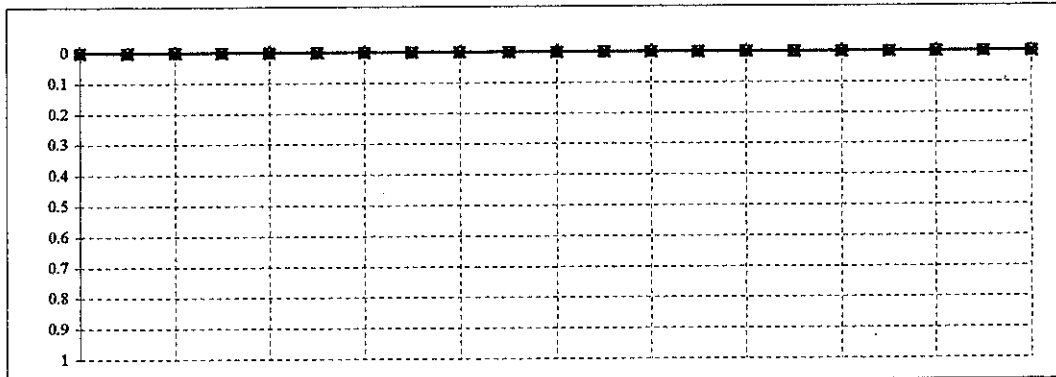
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



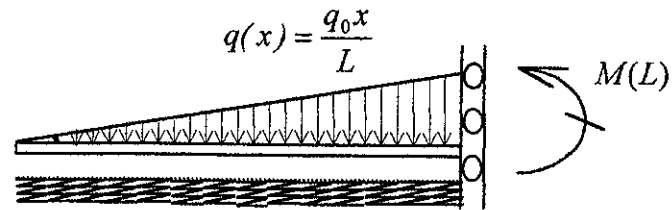
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	o	—	---	—	---	—	---	—	---	x
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 14



เงื่อนไขขอบ

$$M(0) = 0 \qquad w'(L) = 0$$

$$V(0) = 0 \qquad V(L) = 0$$

" Value of A , B , and D "

$$A = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) - 3 \sin(\beta L) + e^{2\beta L} \sin \beta L)}{8\beta^5 EIL(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{e^{\beta L} q_0 (\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) + 3e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \sin(\beta L)}{2\beta^5 EIL(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

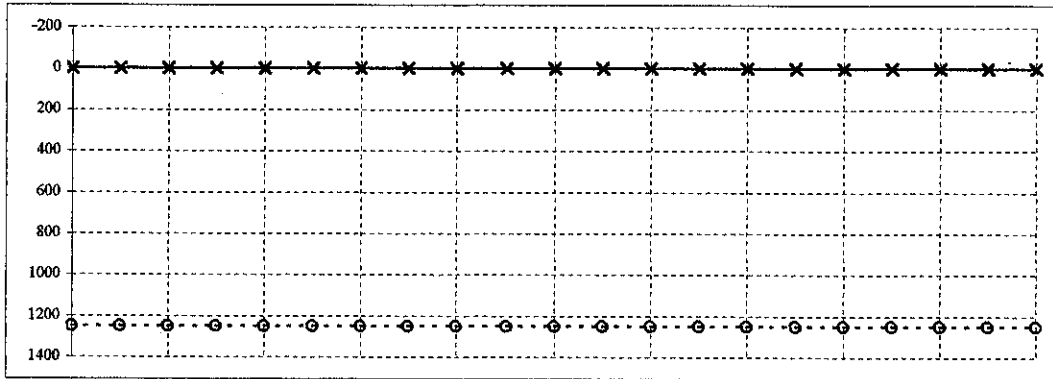
$$w'(0) = \left[\frac{q_0 \left(-1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \right)}{4\beta^4 EIL(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 (-1 - e^{4\beta L} - 2\beta L + 2e^{4\beta L} \beta L + 2e^{2\beta L} \cos(2\beta L) + 4e^{2\beta L} \beta L \sin(2\beta L))}{8\beta^5 EIL(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

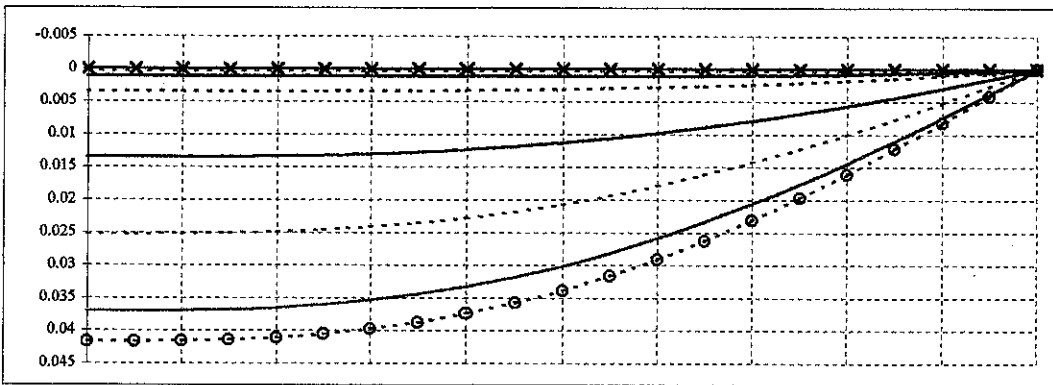
$$M(L) = \left[\frac{q_0 (1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{4\beta^3 L(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 14

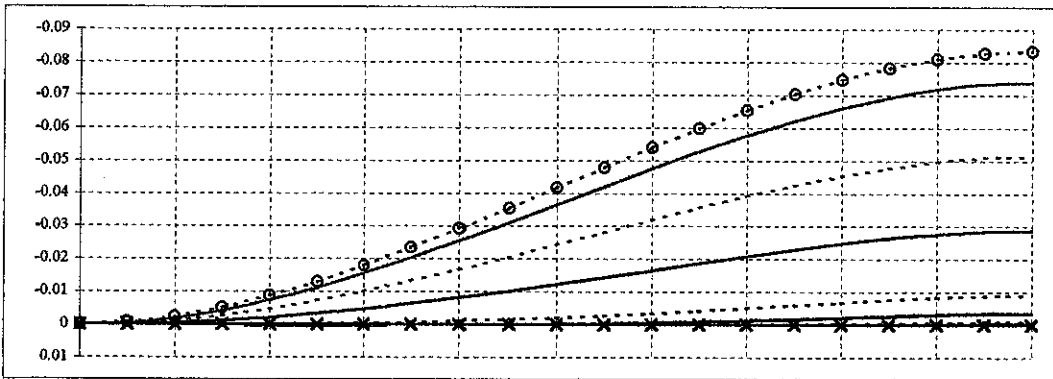
DEFLECTION (EIw/q_0L^4)



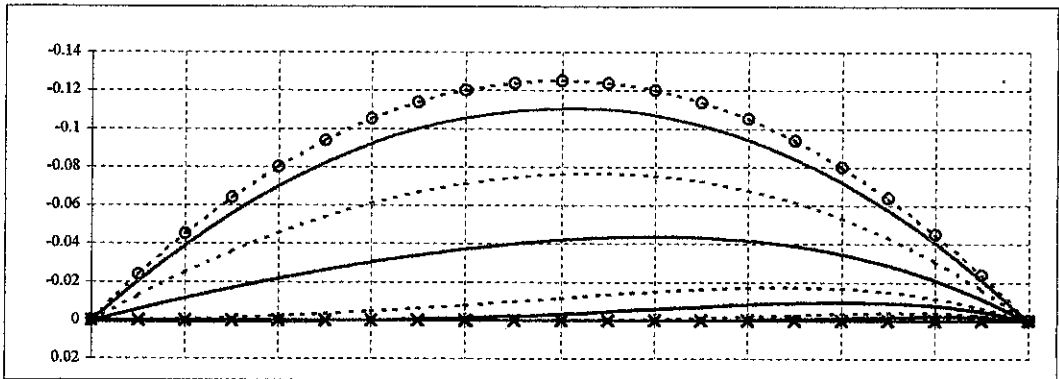
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



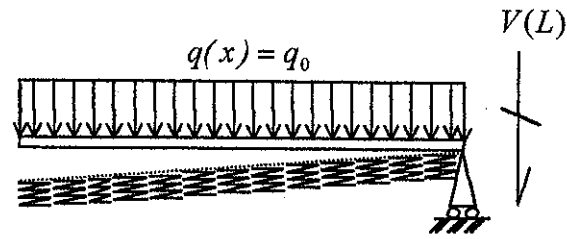
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 15



เงื่อนไขขอบ

$$M(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + 2 \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + 2e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0 \left(\begin{aligned} &-1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ &+ 2e^{\beta L} \sin(\beta L) + 2e^{3\beta L} \sin(\beta L) - 2e^{2\beta L} \sin(2\beta L) \end{aligned} \right)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

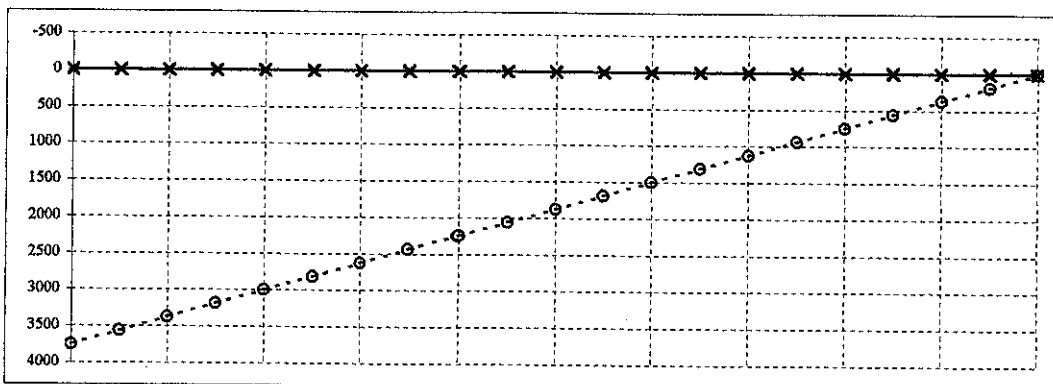
$$w'(0) = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \sin(\beta L)}{\beta^3 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$w'(L) = \left[\frac{q_0 (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{4\beta^3 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

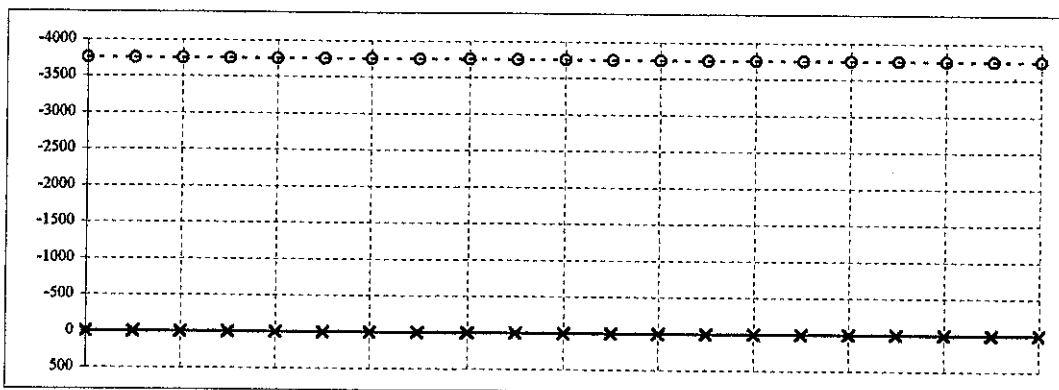
$$V(L) = \left[\frac{q_0 (1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{2\beta (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 15

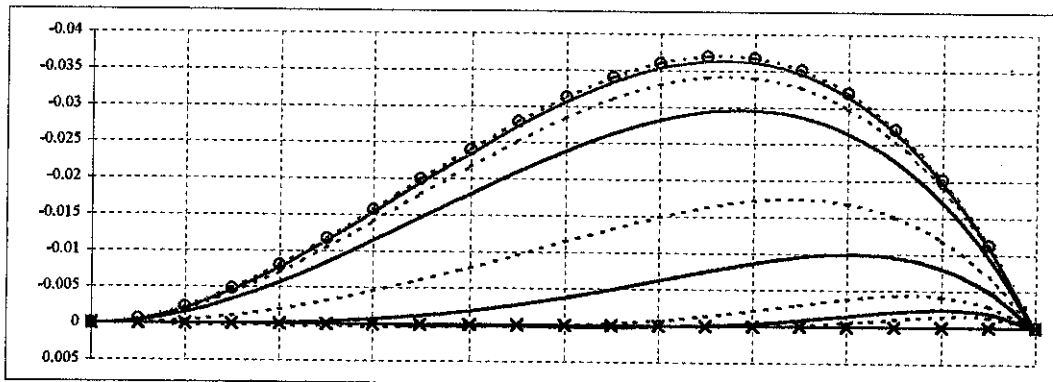
DEFLECTION (EIw/q_0L^4)



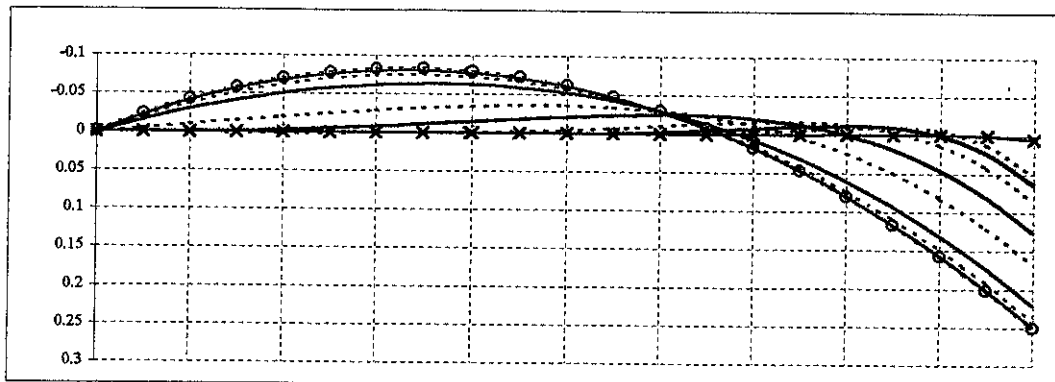
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)

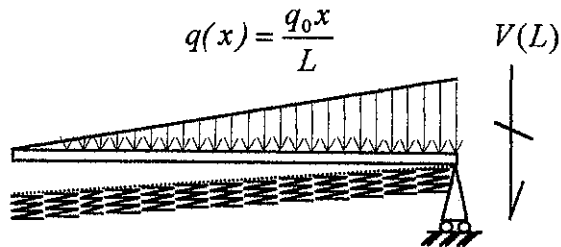


SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	o	—	- - -	—	- - -	—	- - -	—	- - -	—	x
βL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณี 16



เงื่อนไขสภาพขอบ

$$M(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + 2 \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + 2e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{2\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

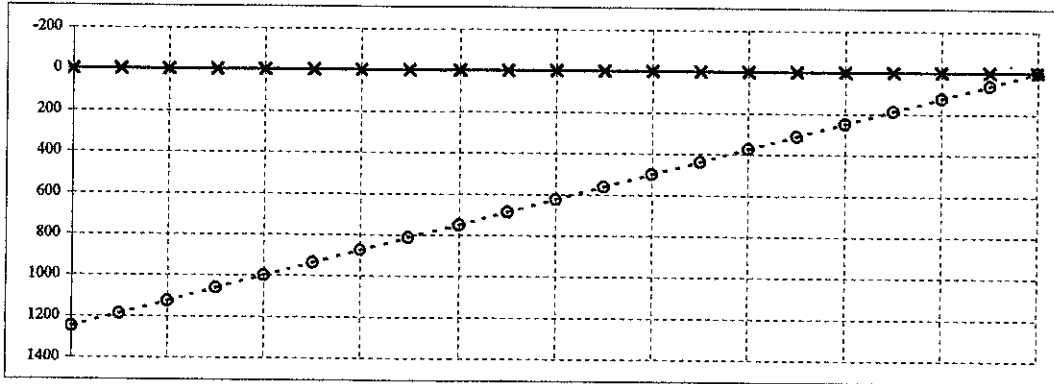
$$w'(0) = \left[\frac{q_0 (1 - e^{4\beta L} - 4e^{\beta L} \beta L \sin(\beta L) + 4e^{3\beta L} \beta L \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L))}{4\beta^4 EIL (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$w'(L) = \left[\frac{q_0 (1 - e^{4\beta L} + \beta L + e^{4\beta L} \beta L - 2e^{2\beta L} \beta L \cos(2\beta L) + 2e^{2\beta L} \sin(2\beta L))}{4\beta^4 EIL (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

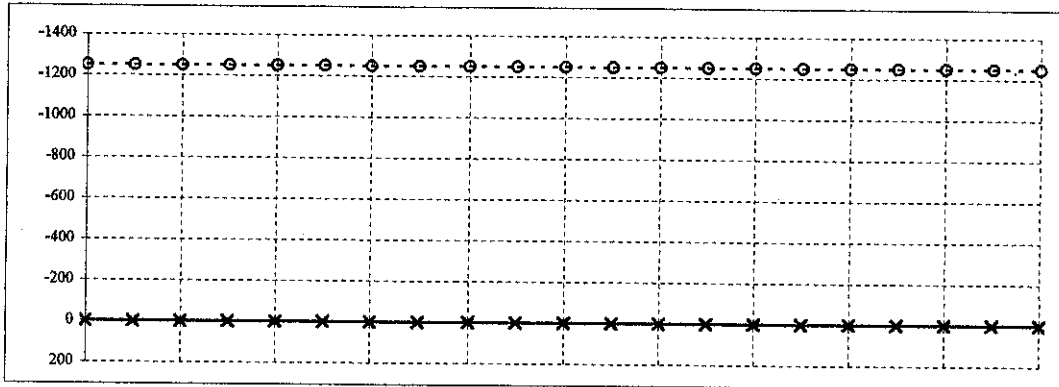
$$V(L) = \left[\frac{q_0 (1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{2\beta (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 16

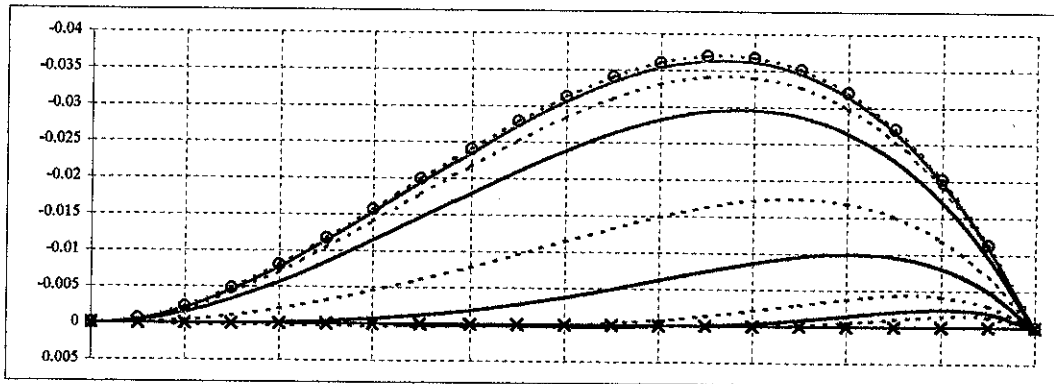
DEFLECTION (Elw/q_0L^4)



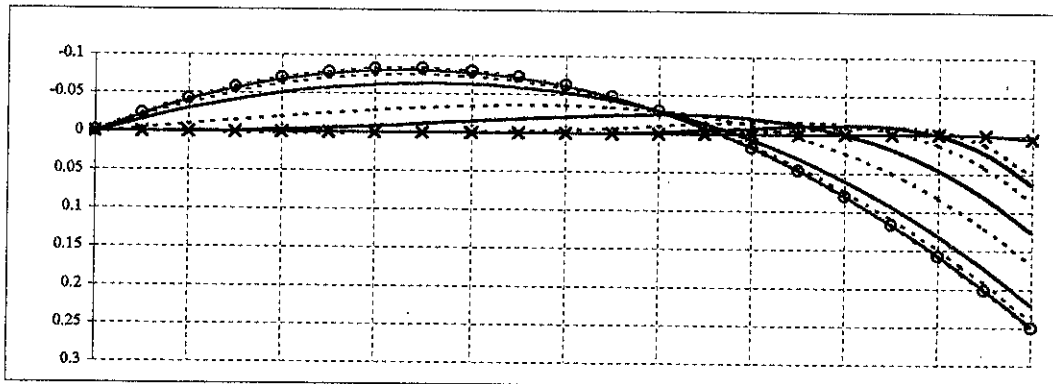
SLOPE (Elw/q_0L^3)



MOMENT (M/q_0L^2)



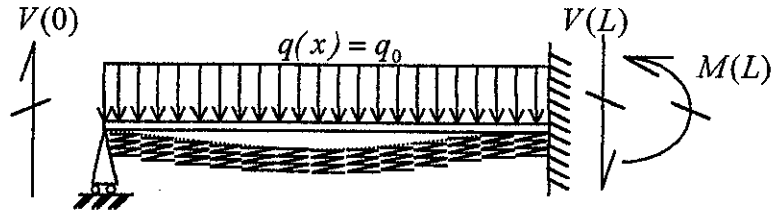
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	o	—	---	—	---	—	---	—	---	x
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 17



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad w(L) = 0$$

$$M(0) = 0 \qquad w'(L) = 0$$

" Value of A , B , C and D "

$$A = \frac{q_0 \left(\begin{array}{l} 1 + e^{2\beta L} - e^{\beta L} \cos(\beta L) - e^{3\beta L} \cos(\beta L) \\ + e^{\beta L} \sin(\beta L) - e^{3\beta L} \sin(\beta L) + e^{2\beta L} \sin(2\beta L) \end{array} \right)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}$$

$$B = \frac{e^{\beta L} q_0 \left(\begin{array}{l} e^{\beta L} - \cos(\beta L) - e^{2\beta L} \cos(\beta L) \\ + e^{\beta L} \cos(2\beta L) - \sin(\beta L) + e^{2\beta L} \sin(\beta L) \end{array} \right)}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}$$

$$C = \frac{e^{\beta L} q_0 \left(\begin{array}{l} -e^{\beta L} - e^{3\beta L} + \cos(\beta L) + e^{2\beta L} \cos(\beta L) \\ -\sin(\beta L) + e^{2\beta L} \sin(\beta L) + e^{\beta L} \sin(2\beta L) \end{array} \right)}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}$$

$$D = \frac{e^{\beta L} q_0 \left(\begin{array}{l} e^{\beta L} - \cos(\beta L) - e^{2\beta L} \cos(\beta L) \\ + e^{\beta L} \cos(2\beta L) - \sin(\beta L) + e^{2\beta L} \sin(\beta L) \end{array} \right)}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \left[\frac{q_0 (-1 + e^{2\beta L} - 2e^{\beta L} \sin(\beta L))^2}{4\beta^3 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

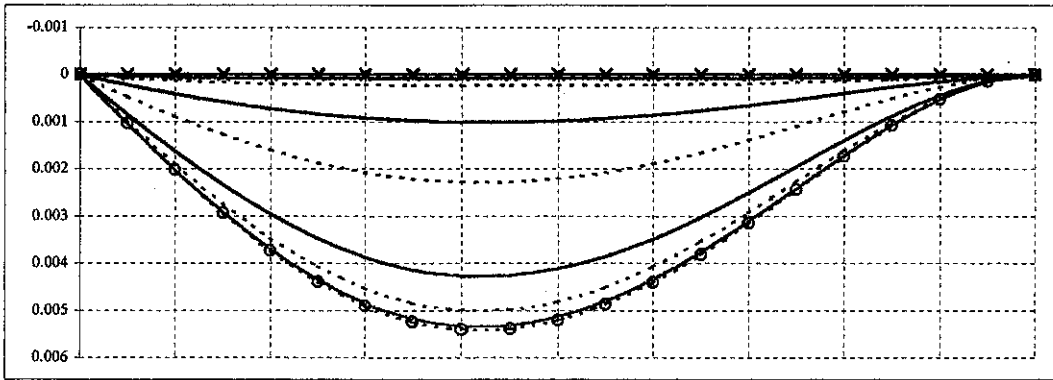
$$V(0) = \left[\frac{-q_0 (1 + e^{2\beta L} - 2e^{\beta L} \cos(\beta L))^2}{2\beta (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$M(L) = \left[\frac{q_0 \begin{pmatrix} -1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ -2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{pmatrix}}{2\beta^2 (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

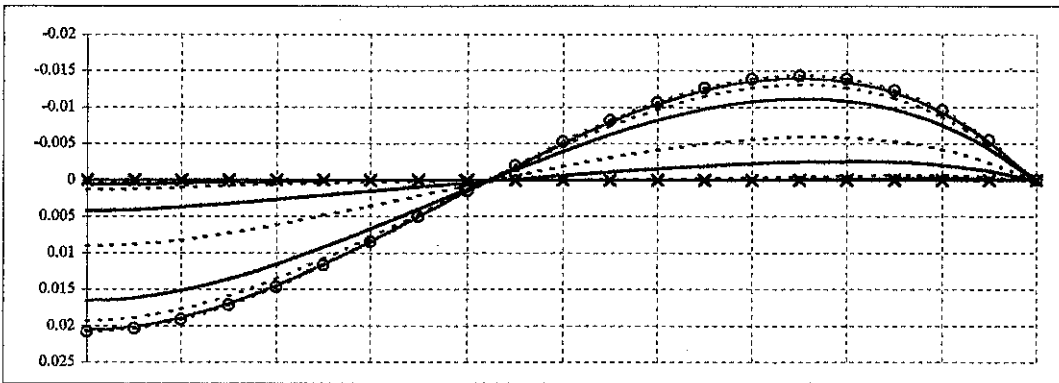
$$V(L) = \left[\frac{q_0 \begin{pmatrix} 1 + e^{4\beta L} - 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ + 2e^{2\beta L} \cos(2\beta L) \end{pmatrix}}{(\beta - \beta e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 17

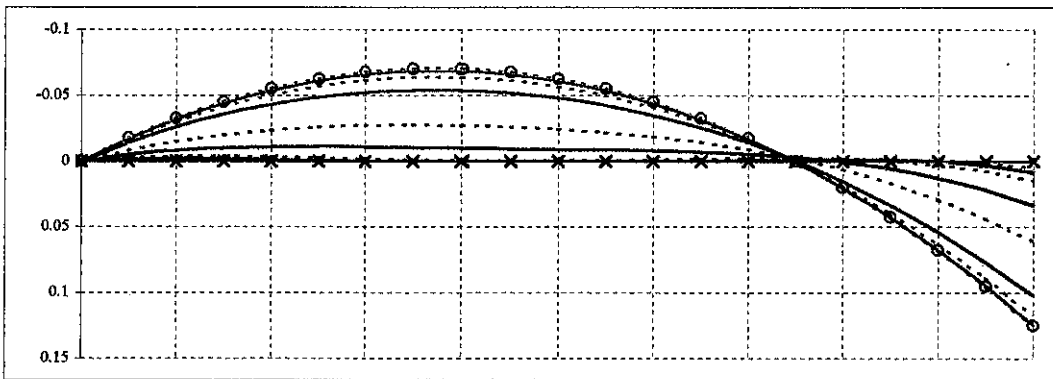
DEFLECTION (EIw/q_0L^4)



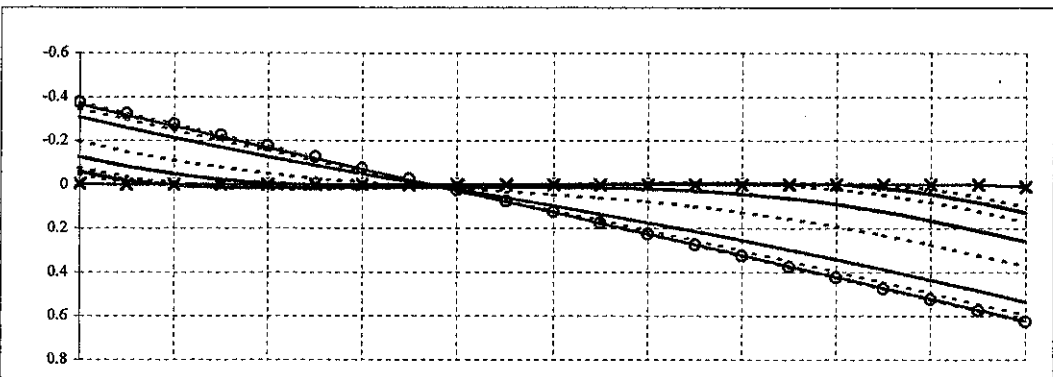
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



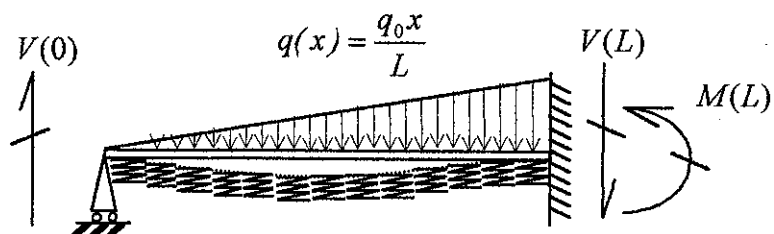
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 18



เงื่อนไขสภาพขอบ

$$w(0) = 0$$

$$w(L) = 0$$

$$M(0) = 0$$

$$w'(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{e^{\beta L} q_0 \left(\begin{array}{l} \beta L \cos(\beta L) + e^{2\beta L} \beta L \cos(\beta L) - \sin(\beta L) \\ - e^{2\beta L} \sin(\beta L) - \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{e^{\beta L} q_0 \left(\begin{array}{l} \cos(\beta L) - e^{2\beta L} \cos(\beta L) + \beta L \cos(\beta L) \\ + e^{2\beta L} \beta L \cos(\beta L) + \beta L \sin(\beta L) - e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 \left(\begin{array}{l} \beta L \cos(\beta L) + e^{2\beta L} \beta L \cos(\beta L) - \sin(\beta L) \\ - e^{2\beta L} \sin(\beta L) - \beta L \sin(\beta L) + e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} q_0 \left(\begin{array}{l} \cos(\beta L) - e^{2\beta L} \cos(\beta L) + \beta L \cos(\beta L) \\ + e^{2\beta L} \beta L \cos(\beta L) + \beta L \sin(\beta L) - e^{2\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^5 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \frac{q_0 \left(\begin{array}{l} -1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ + 2e^{\beta L} \sin(\beta L) + 2e^{3\beta L} \sin(\beta L) + 4e^{\beta L} \beta L \sin(\beta L) \\ - 4e^{3\beta L} \beta L \sin(\beta L) - 2e^{2\beta L} \sin(2\beta L) \end{array} \right)}{4\beta^4 EIL(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}$$

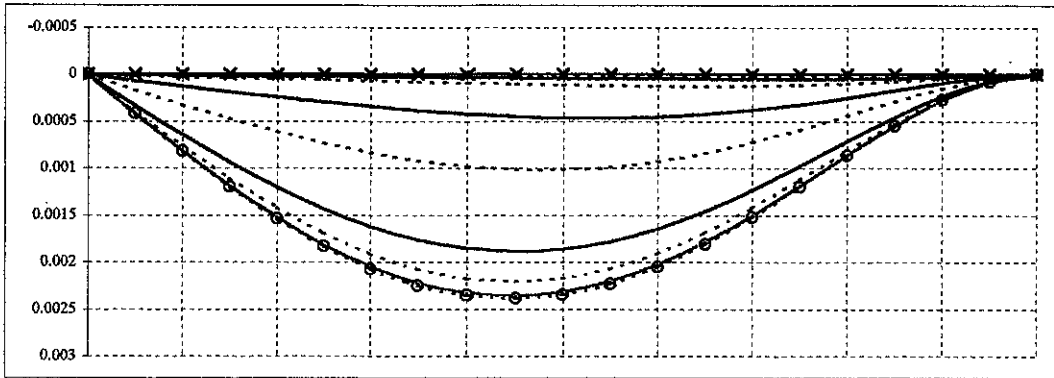
$$V(0) = \frac{e^{\beta L} q_0 \left(\begin{array}{l} \cos(\beta L) - e^{2\beta L} \cos(\beta L) + 2\beta L \cos(\beta L) \\ + 2e^{2\beta L} \beta L \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L) \end{array} \right)}{\beta^2 L(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}$$

$$M(L) = \frac{-q_0(1 + e^{4\beta L} + \beta L - e^{4\beta L} \beta L - 2e^{2\beta L} \cos(2\beta L) - 2e^{2\beta L} \beta L \sin(2\beta L))}{2\beta^3 L(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}$$

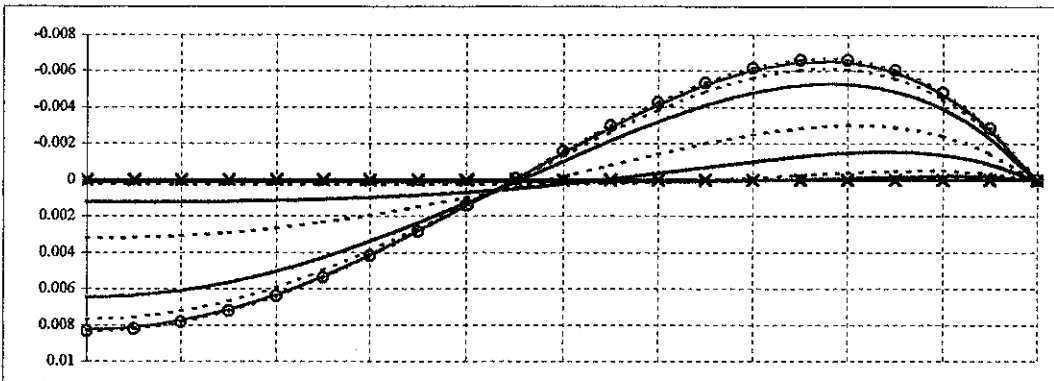
$$V(L) = \frac{q_0(1 - e^{4\beta L} + 2\beta L + 2e^{4\beta L} \beta L + 4e^{2\beta L} \beta L \cos(2\beta L) - 2e^{2\beta L} \sin(2\beta L))}{2\beta^2 L(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}$$

กราฟแสดงผลการวิเคราะห์ที่ 18

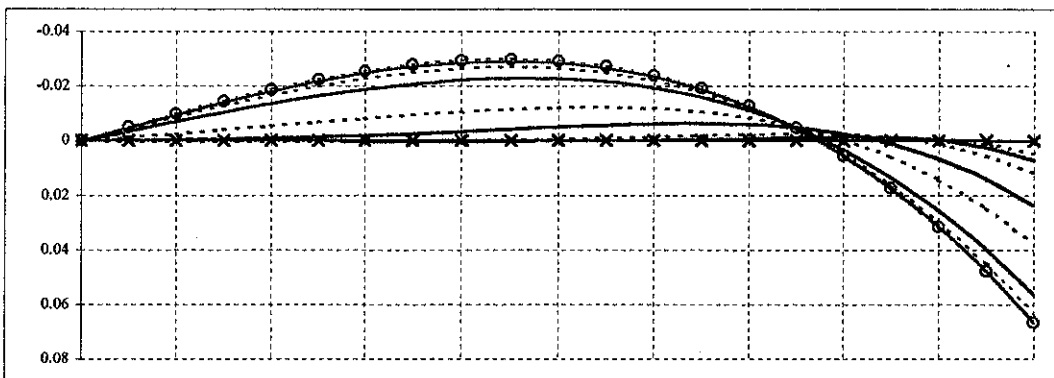
DEFLECTION (EIw/q_0L^4)



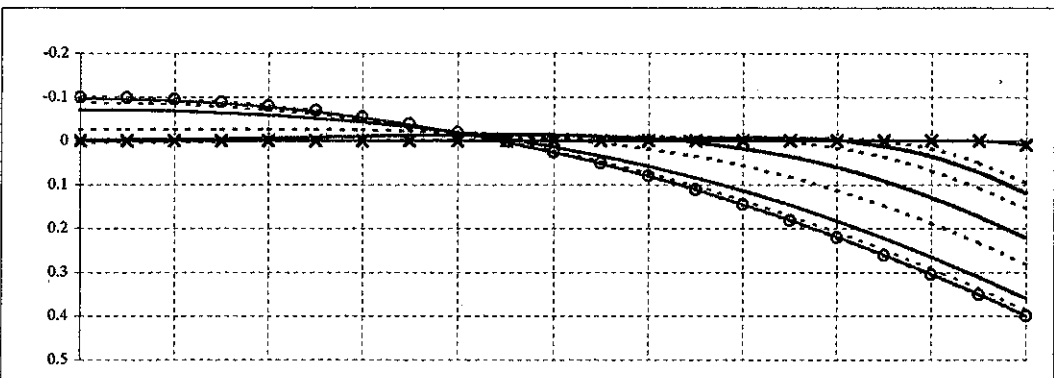
SLOPE (EIw'/q_0L^5)



MOMENT (M/q_0L^2)

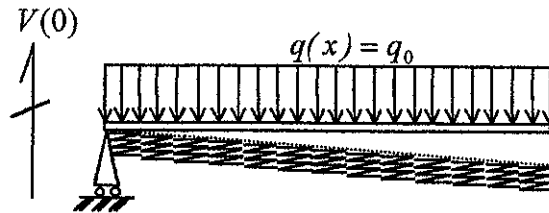


SHEAR (V/q_0L)



x/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
เส้นกราฟ	---○---	—	---	—	---	—	---	—	---	—	---
βL	0.1	1	1.5	2	3	4	6	8	10	100	

กรณีที่ 19



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad M(L) = 0$$

$$M(0) = 0 \qquad V(L) = 0$$

" Value of A, B, C and D "

$$A = \left[\frac{q_0 (1 - e^{2\beta L} + e^{2\beta L} \sin(2\beta L))}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{e^{2\beta L} q_0 \sin^2(\beta L)}{2\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{2\beta L} q_0 (1 - e^{2\beta L} + \sin(2\beta L))}{4\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{2\beta L} q_0 \sin^2(\beta L)}{2\beta^4 EI (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \left[\frac{q_0 (-1 - e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{4\beta^3 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

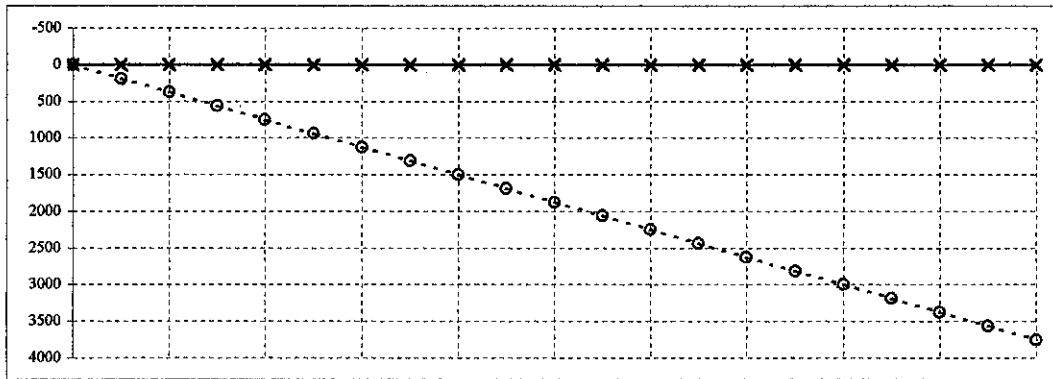
$$V(0) = \left[\frac{q_0 (1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{2\beta (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 \left(\begin{aligned} &1 - e^{4\beta L} - 2e^{\beta L} \cos(\beta L) + 2e^{3\beta L} \cos(\beta L) \\ &- 2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{aligned} \right)}{4\beta^4 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

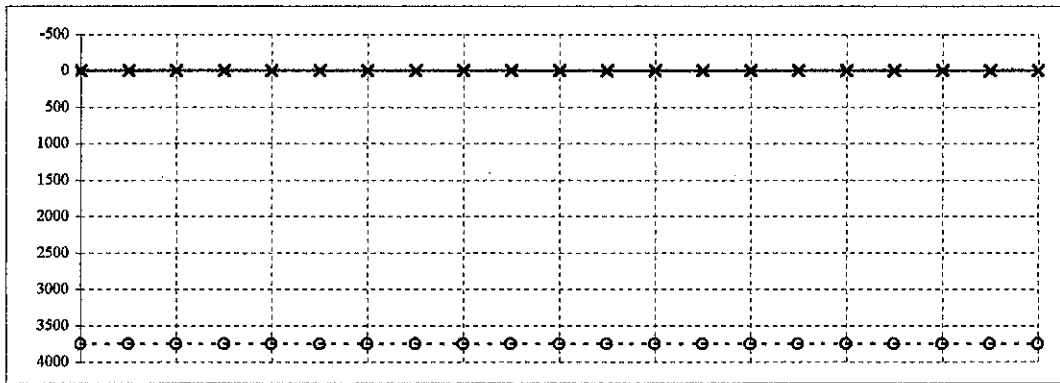
$$w'(L) = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{\beta^3 EI (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 19

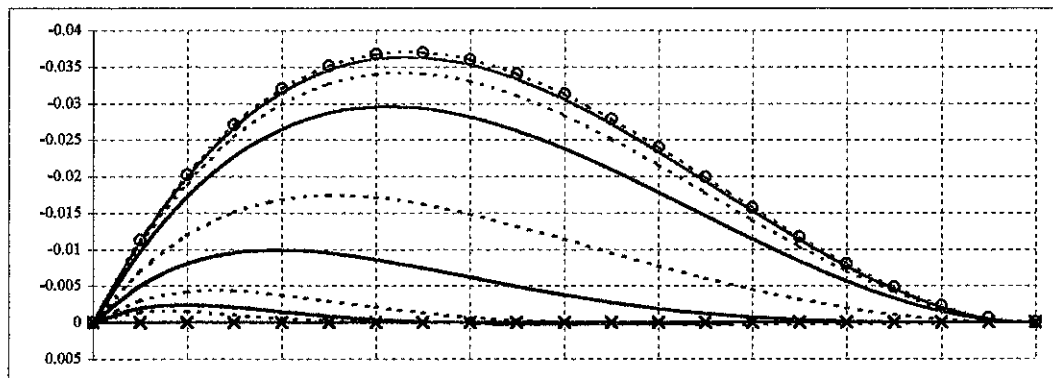
DEFLECTION (EIw/q_0L^4)



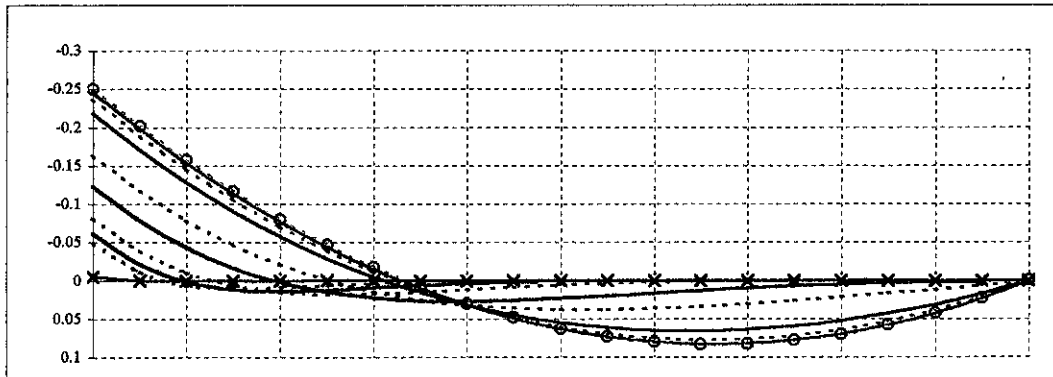
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



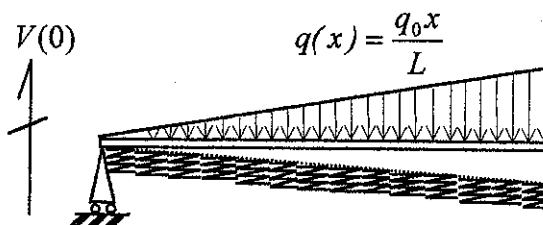
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 20



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad M(L) = 0$$

$$M(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \frac{q_0}{4\beta^4 EI}$$

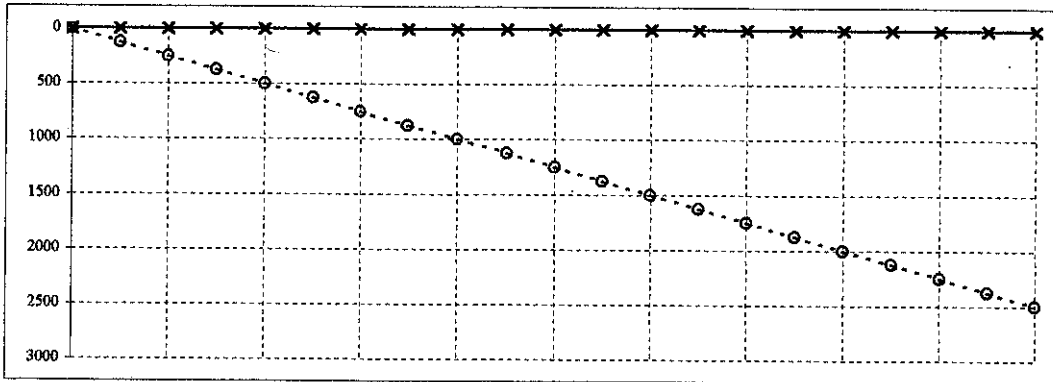
$$V(0) = 0$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

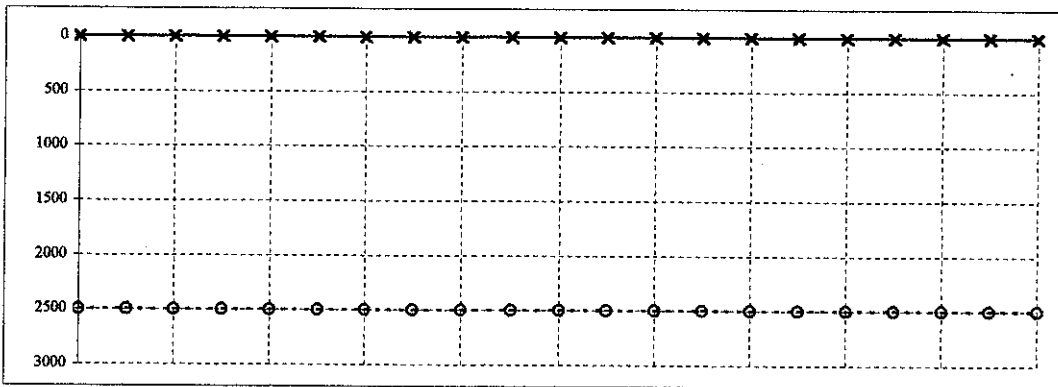
$$w'(L) = \frac{q_0}{4\beta^4 EI}$$

กราฟแสดงผลการวิเคราะห์ที่ 20

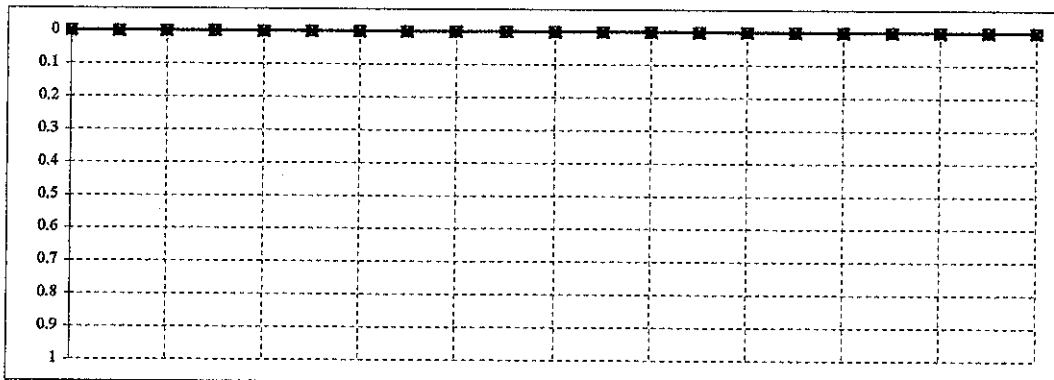
DEFLECTION (EIw/q_0L^4)



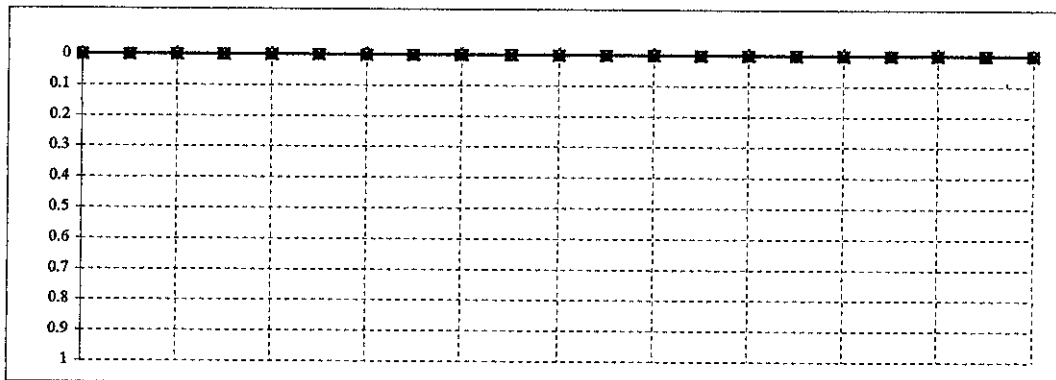
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



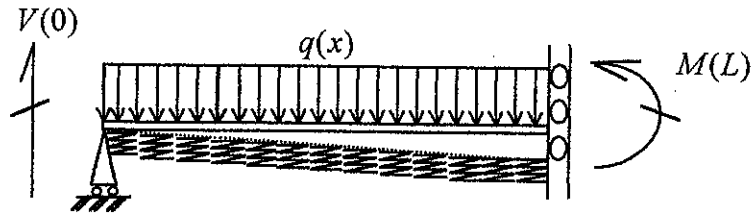
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	————	-----	————	-----	————	-----	————	-----	——×——
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 21



เงื่อนไขขอบ

$$w(0) = 0 \qquad w'(L) = 0$$

$$M(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0(1 + e^{2\beta L} \cos(2\beta L))}{4\beta^4 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{-e^{2\beta L} q_0 \sin(2\beta L)}{4\beta^4 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{-e^{2\beta L} q_0 (e^{2\beta L} + \cos(2\beta L))}{4\beta^4 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{-e^{2\beta L} q_0 \sin(2\beta L)}{4\beta^4 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \left[\frac{q_0(-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}{4\beta^3 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

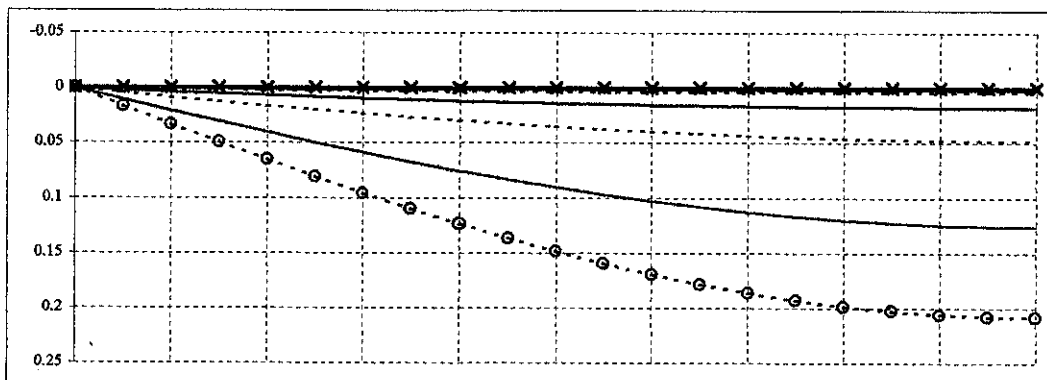
$$V(0) = \left[\frac{q_0(-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{2\beta(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0(1 + e^{4\beta L} - 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L))}{4\beta^4 EI(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

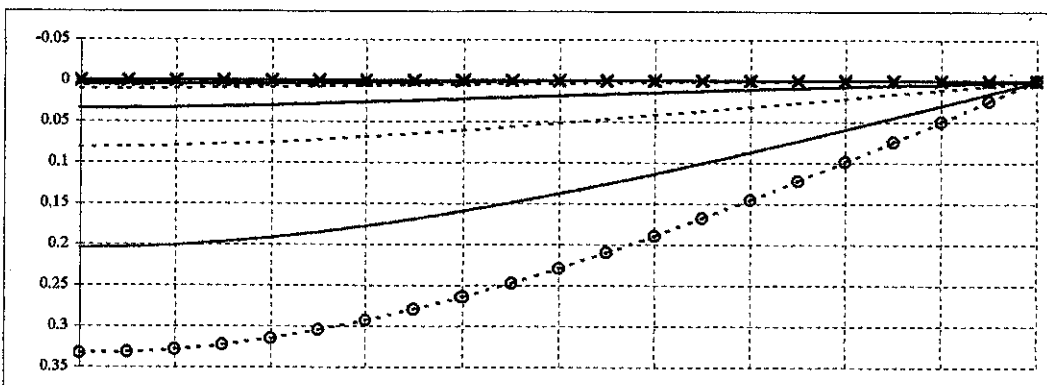
$$M(L) = \left[\frac{e^{\beta L}(-1 + e^{2\beta L}) q_0 \sin(\beta L)}{\beta^2(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 21

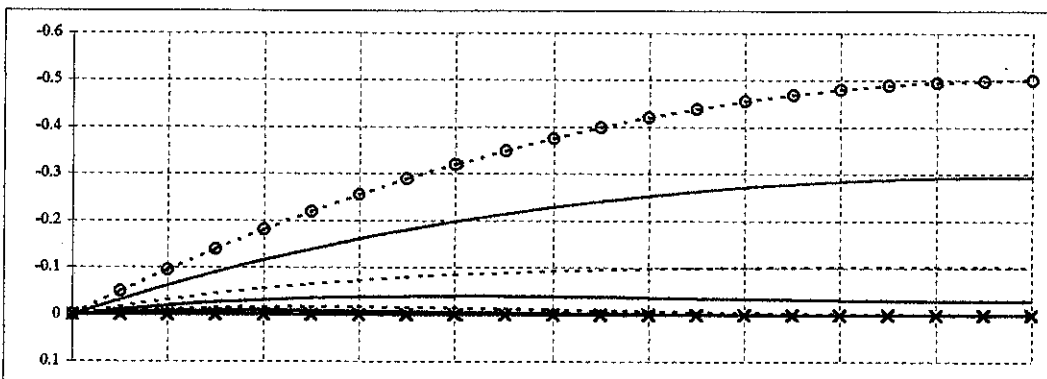
DEFLECTION (EIw/q_0L^4)



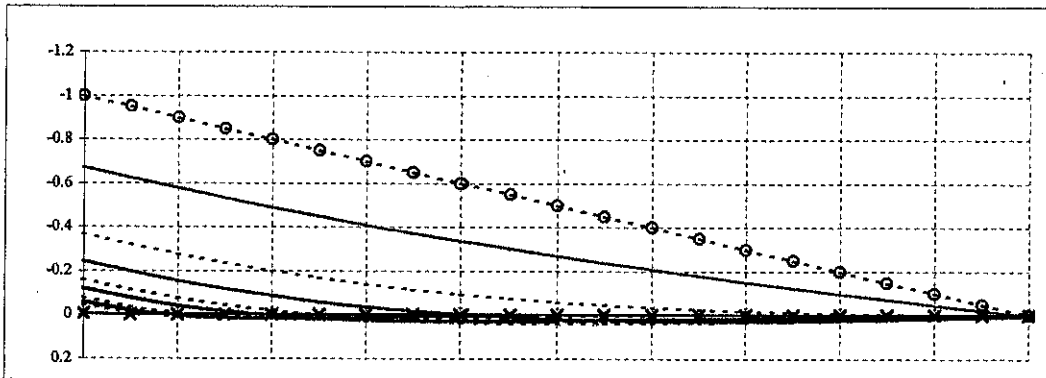
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



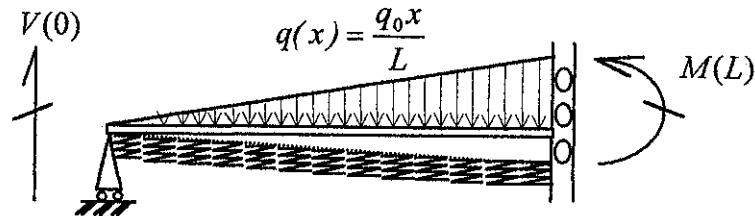
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	—	---	—	---	—	---	—	---	—x—
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 22



เงื่อนไขสภาพขอบ

$$w(0) = 0 \qquad w'(L) = 0$$

$$M(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 (\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \left[\frac{q_0 (1 + e^{4\beta L} - 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) + 2e^{2\beta L} \cos(2\beta L))}{4\beta^4 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

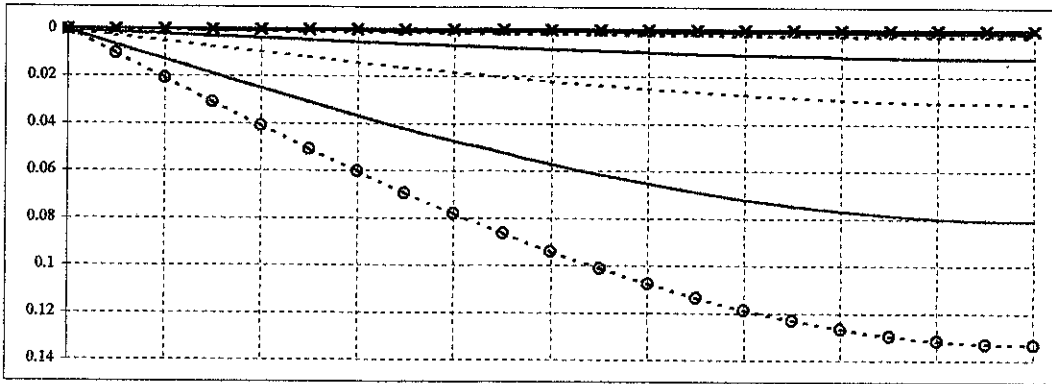
$$V(0) = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \sin(\beta L)}{\beta^2 L(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 (1 - e^{4\beta L} + 2\beta L + 2e^{4\beta L} \beta L + 4e^{2\beta L} \beta L \cos(2\beta L) - 2e^{2\beta L} \sin(2\beta L))}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

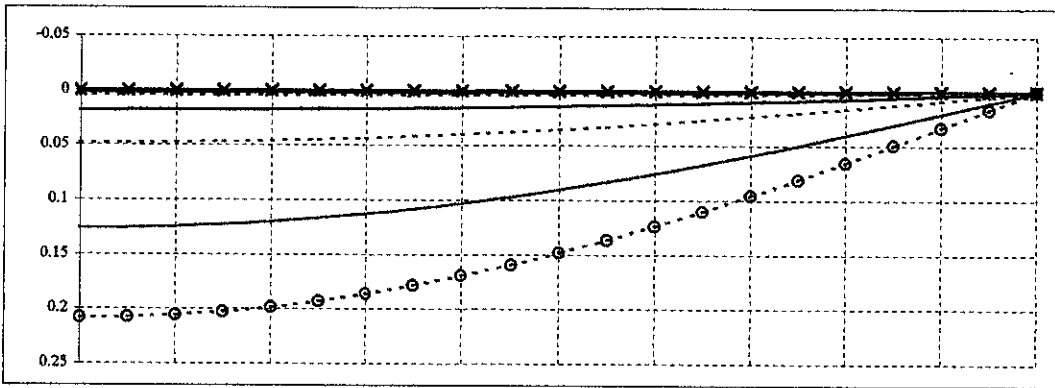
$$M(L) = \left[\frac{q_0 (-1 + e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}{4\beta^3 L(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 22

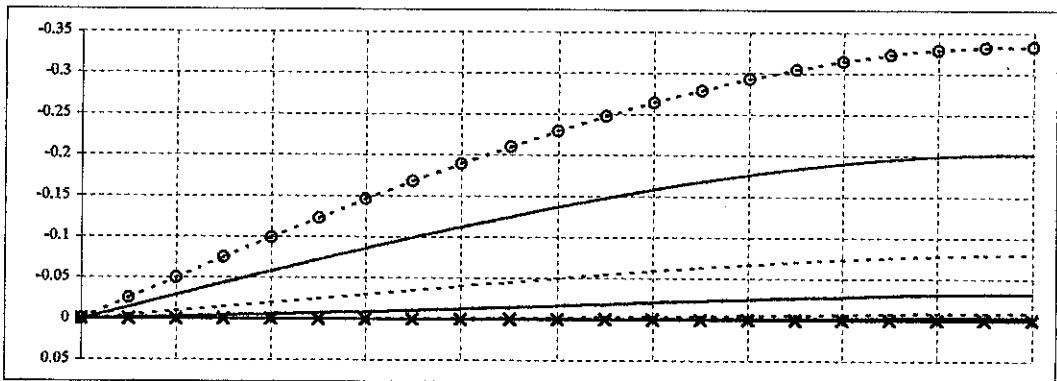
DEFLECTION (EIw/q_0L^4)



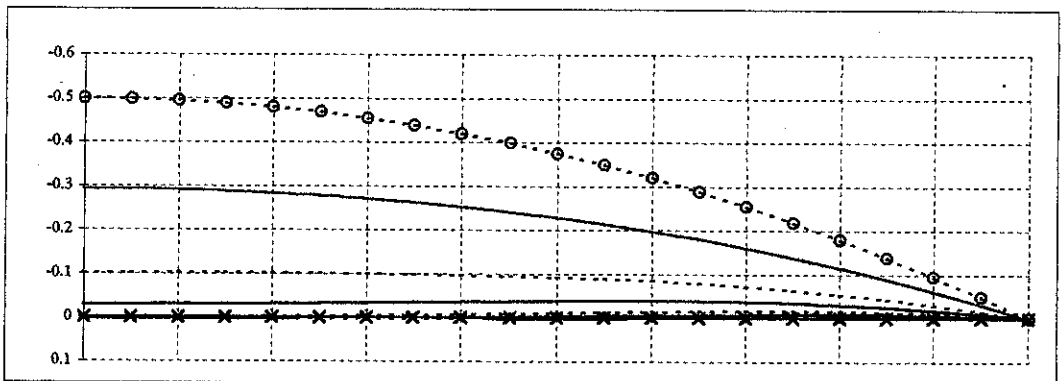
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



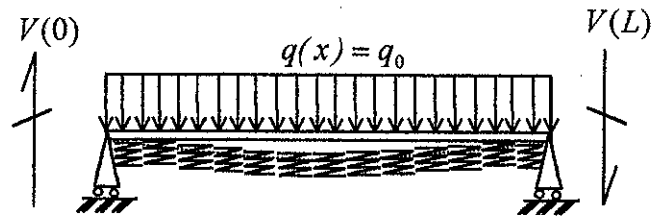
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	---	----	-----	-----	-----	-----	-----	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 23



เงื่อนไขสภาพขอบ

$$w(0) = 0$$

$$w(L) = 0$$

$$M(0) = 0$$

$$M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0(1 + e^{\beta L} \cos(\beta L))}{4\beta^4 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$B = \left[\frac{-e^{\beta L} q_0 \sin(\beta L)}{4\beta^4 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$C = \left[\frac{-e^{\beta L} q_0 (e^{\beta L} + \cos(\beta L))}{4\beta^4 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$D = \left[\frac{-e^{\beta L} q_0 \sin(\beta L)}{4\beta^4 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

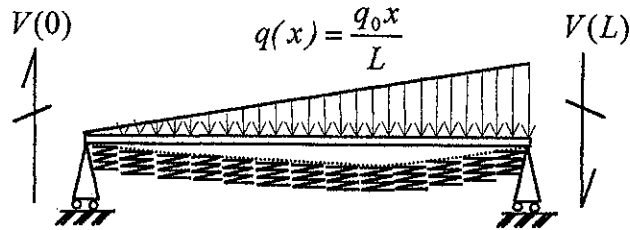
$$w'(0) = \left[\frac{q_0(-1 + e^{2\beta L} - 2e^{\beta L} \sin(\beta L))}{4\beta^3 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$V(0) = \left[\frac{q_0(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{2\beta(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$w'(L) = \left[\frac{q_0(1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{4\beta^3 EI(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$V(L) = \left[\frac{q_0(1 - e^{2\beta L} - 2e^{\beta L} \sin(\beta L))}{2\beta(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

กรณี 24



เงื่อนไขสภาพขอบ

$$w(0) = 0$$

$$w(L) = 0$$

$$M(0) = 0$$

$$M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \cos(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{-e^{\beta L} (1 + e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \cos(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{-e^{\beta L} (1 + e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w'(0) = \left[\frac{q_0 \left(\begin{array}{l} 1 + e^{4\beta L} + 2e^{\beta L} \beta L \cos(\beta L) - 2e^{3\beta L} \beta L \cos(\beta L) \\ - 2e^{2\beta L} \cos(2\beta L) - 2e^{\beta L} \beta L \sin(\beta L) - 2e^{3\beta L} \beta L \sin(\beta L) \end{array} \right)}{4\beta^4 EIL (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

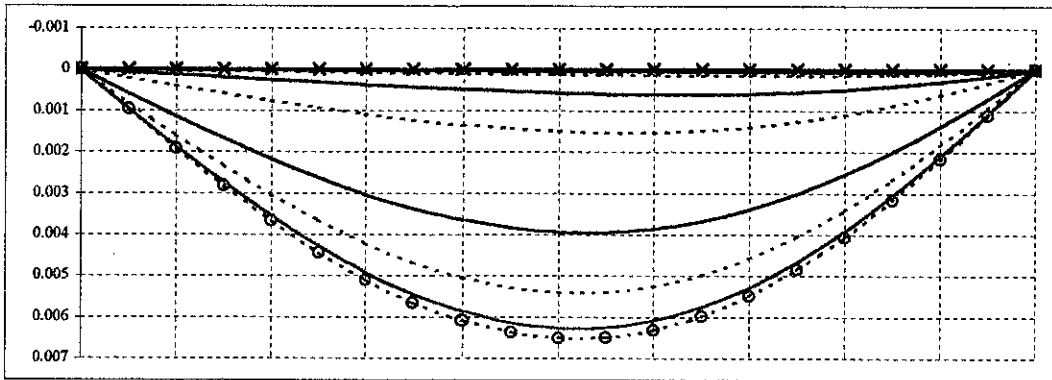
$$V(0) = \left[\frac{e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{(\beta + \beta e^{4\beta L} - 2\beta e^{2\beta L} \cos(2\beta L))} \right]$$

$$w'(L) = \left[\frac{q_0 (-1 - e^{4\beta L} - \beta L + e^{4\beta L} \beta L + 2e^{2\beta L} \cos(2\beta L) + 2e^{2\beta L} \beta L \sin(2\beta L))}{4\beta^4 EIL (-1 - e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

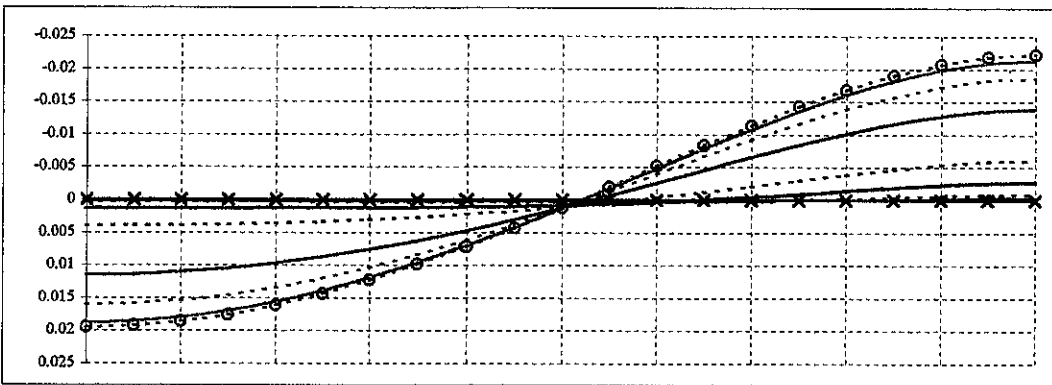
$$V(L) = \left[\frac{q(1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{2\beta(1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 24

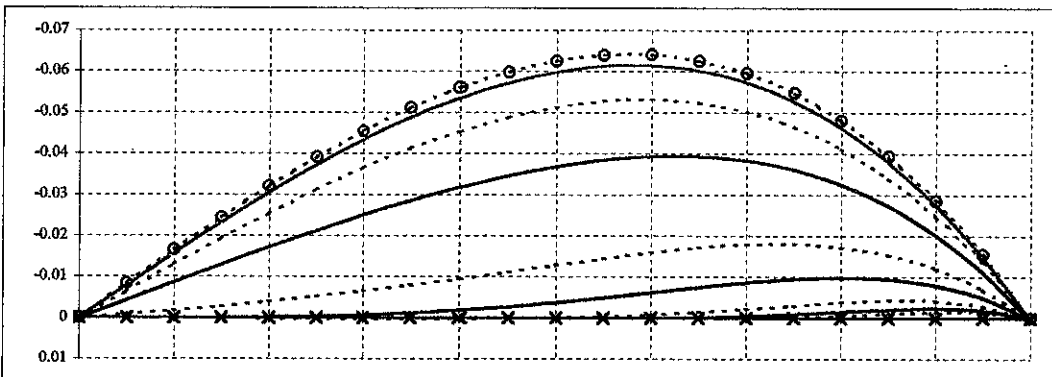
DEFLECTION (Elw/q_0L^4)



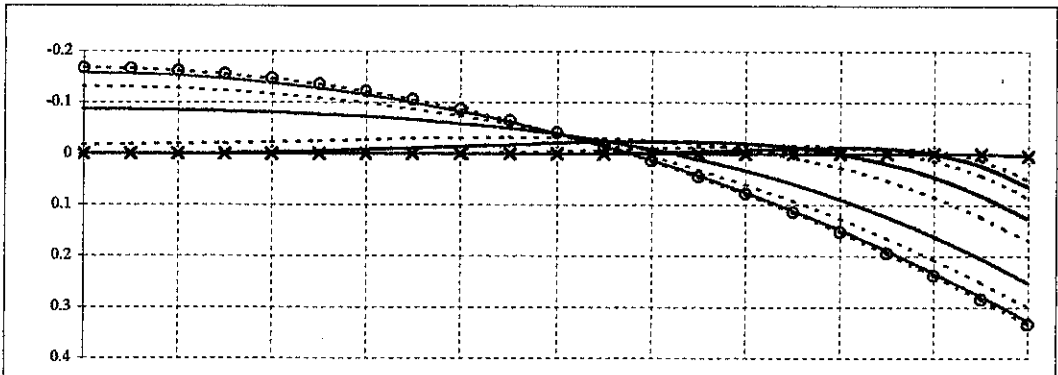
SLOPE (Elw/q_0L^3)



MOMENT (M/q_0L^2)



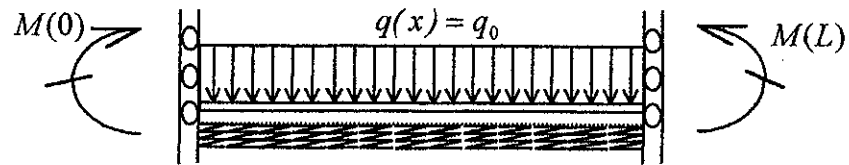
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	———	----	———	----	———	----	———	----	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 25



เงื่อนไขขอบ

$$w'(0) = 0$$

$$w'(L) = 0$$

$$V(0) = 0$$

$$V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \frac{q_0}{4\beta^4 EI}$$

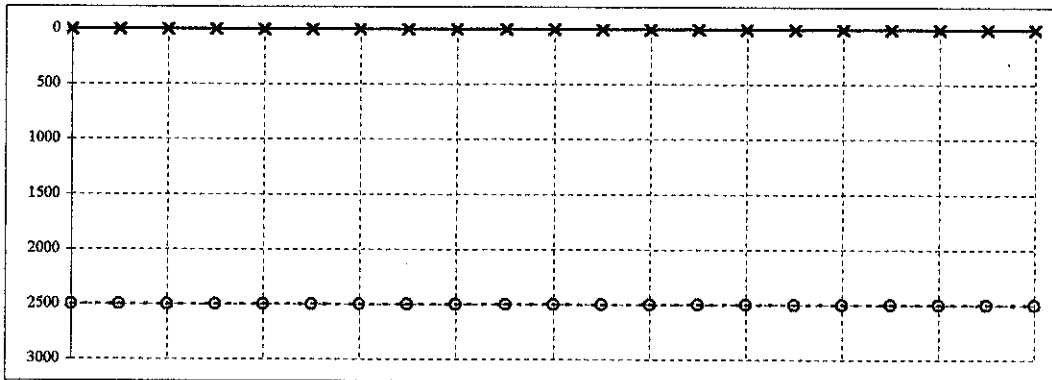
$$M(0) = 0$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

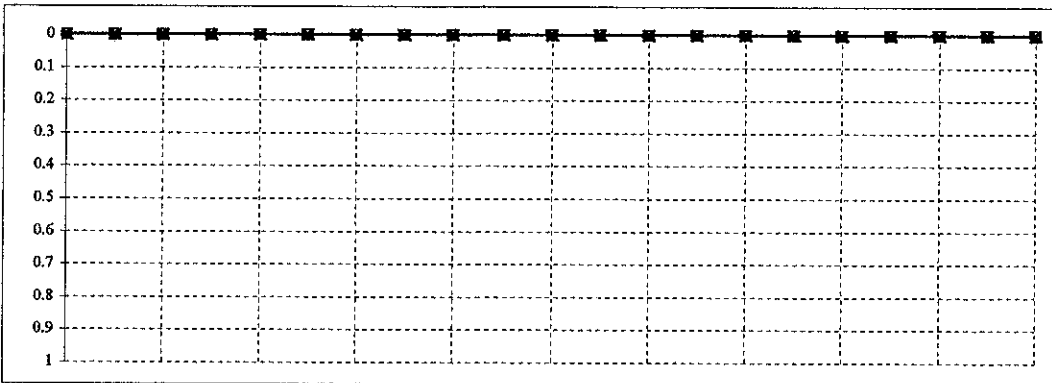
$$M(L) = 0$$

กราฟแสดงผลการวิเคราะห์ที่ 25

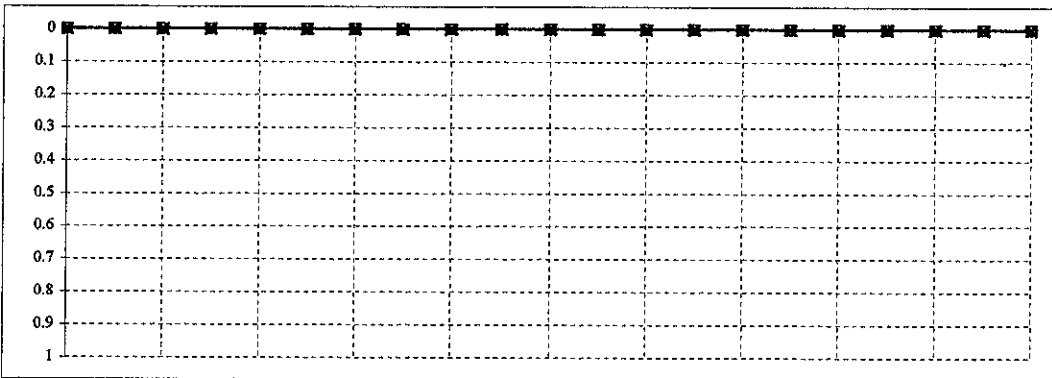
DEFLECTION (EIw/q_0L^4)



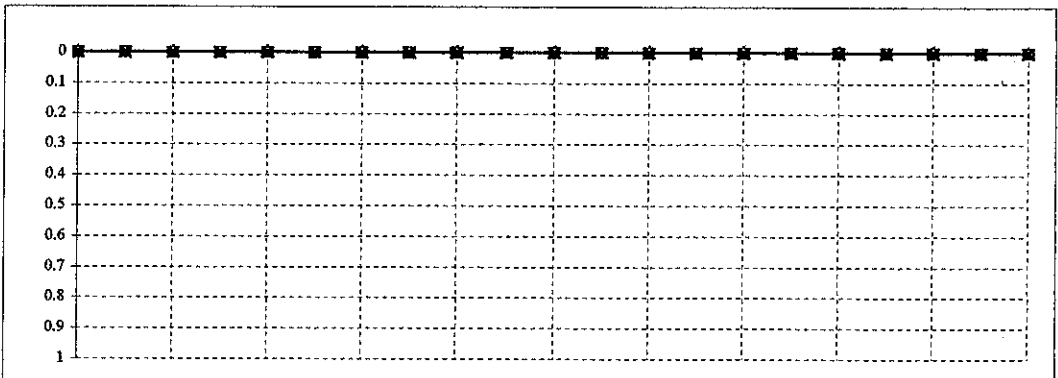
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



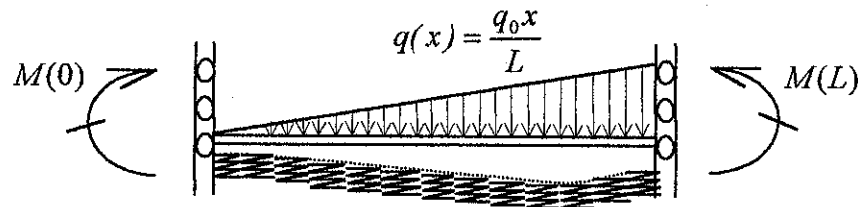
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	—	---	—	---	—	---	—	---	—x---
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที่ 26



เงื่อนไขสภาพขอบ

$$w'(0) = 0 \qquad w'(L) = 0$$

$$V(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0 (1 + e^{\beta L} \cos(\beta L) - e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$B = \left[\frac{-q_0 (1 + e^{\beta L} \cos(\beta L) + e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 (e^{\beta L} + \cos(\beta L) + \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$D = \left[\frac{-e^{\beta L} q_0 (e^{\beta L} + \cos(\beta L) - \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0 (-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

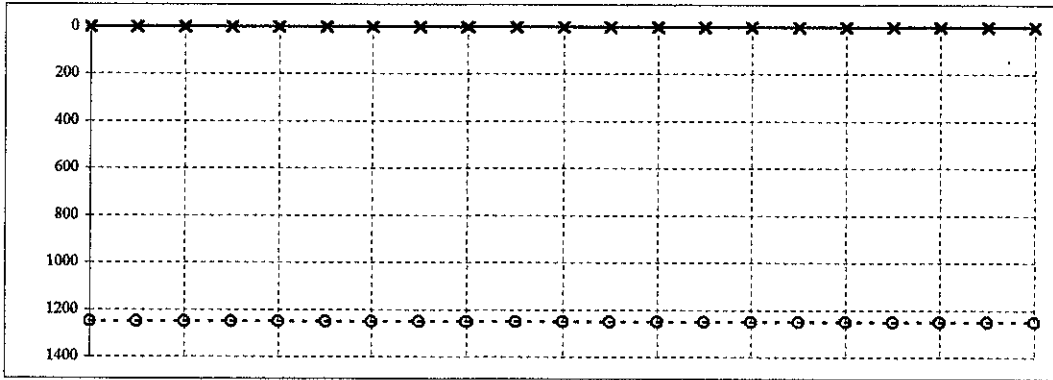
$$M(0) = \left[\frac{q_0 (1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{4\beta^3 L(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 (1 - e^{2\beta L} + 2\beta L + 2e^{2\beta L} \beta L + 4e^{\beta L} \beta L \cos(\beta L) - 2e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

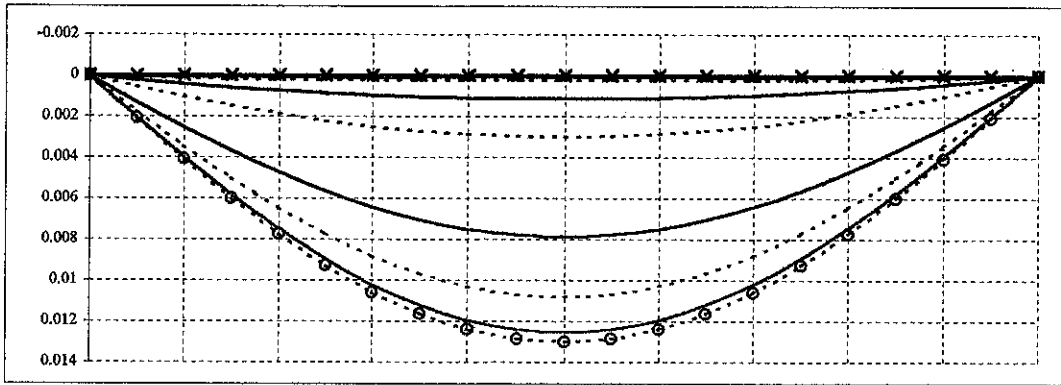
$$M(L) = \left[\frac{q_0 (-1 + e^{2\beta L} - 2e^{\beta L} \sin(\beta L))}{4\beta^3 L(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 26

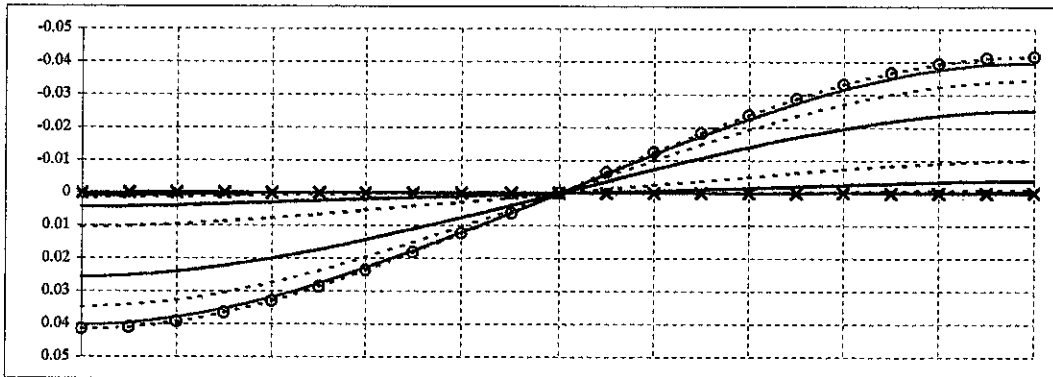
DEFLECTION (EIw/q_0L^4)



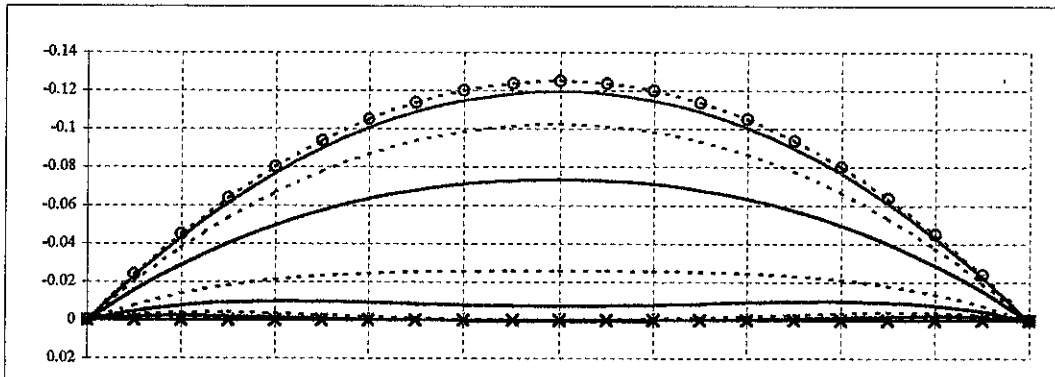
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



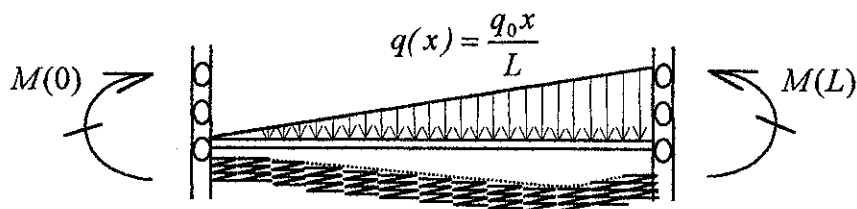
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณีที26



เงื่อนไขขอบ

$$w'(0) = 0 \qquad w'(L) = 0$$

$$V(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0(1 + e^{\beta L} \cos(\beta L) - e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$B = \left[\frac{-q_0(1 + e^{\beta L} \cos(\beta L) + e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 (e^{\beta L} + \cos(\beta L) + \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$D = \left[\frac{-e^{\beta L} q_0 (e^{\beta L} + \cos(\beta L) - \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

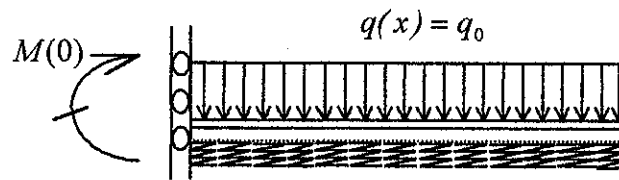
$$w(0) = \left[\frac{q_0(-1 + e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$M(0) = \left[\frac{q_0(1 - e^{2\beta L} + 2e^{\beta L} \sin(\beta L))}{4\beta^3 L(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$w(L) = \left[\frac{q_0(1 - e^{2\beta L} + 2\beta L + 2e^{2\beta L} \beta L + 4e^{\beta L} \beta L \cos(\beta L) - 2e^{\beta L} \sin(\beta L))}{8\beta^5 EIL(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

$$M(L) = \left[\frac{q_0(-1 + e^{2\beta L} - 2e^{\beta L} \sin(\beta L))}{4\beta^3 L(1 + e^{2\beta L} + 2e^{\beta L} \cos(\beta L))} \right]$$

กรณีที่ 27



เงื่อนไขสภาพขอบ

$$w'(0) = 0$$

$$M(L) = 0$$

$$V(0) = 0$$

$$V(L) = 0$$

" Value of A , B , C and D "

$$A , B , C , D = 0$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \frac{q_0}{4\beta^4 EI}$$

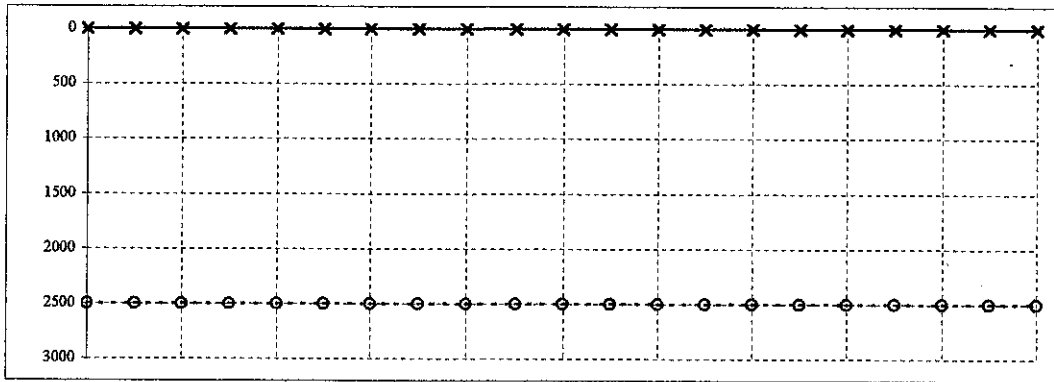
$$M(0) = 0$$

$$w(L) = \frac{q_0}{4\beta^4 EI}$$

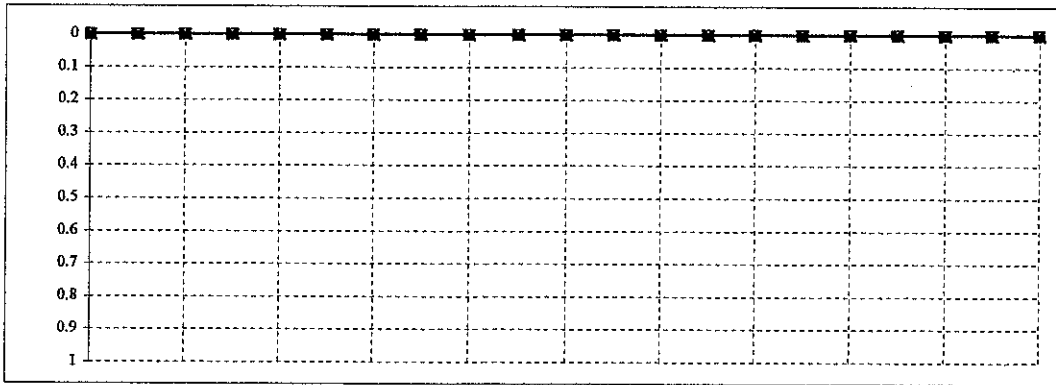
$$w'(L) = 0$$

กราฟแสดงผลการวิเคราะห์ที่ 27

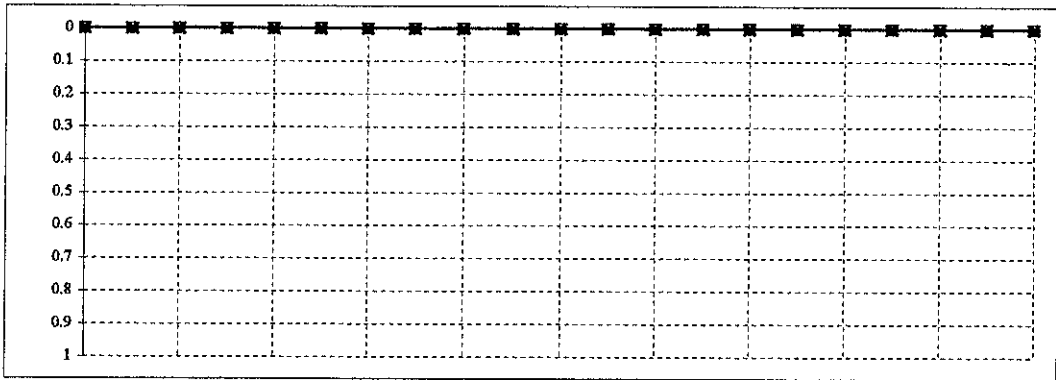
DEFLECTION (EIw/q_0L^4)



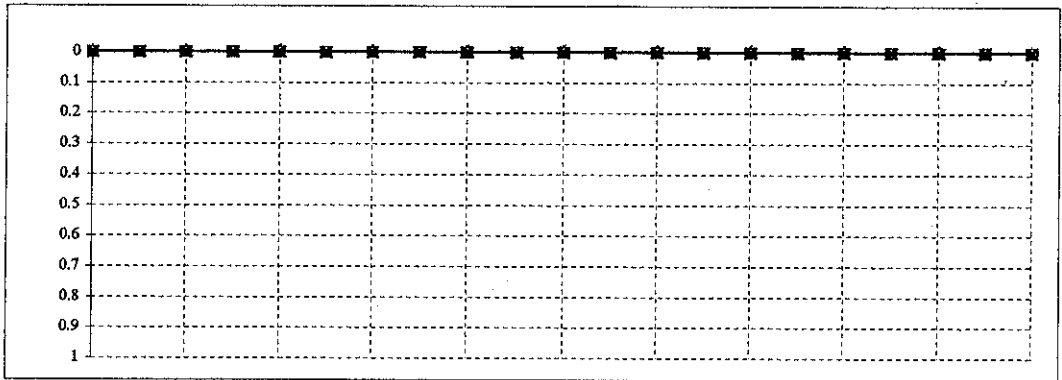
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



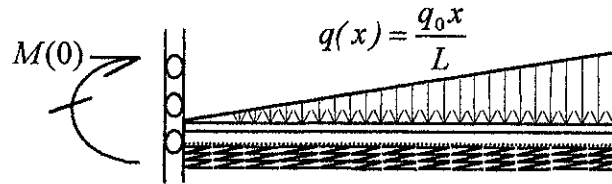
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	- - -	—	- - -	—	- - -	—	- - -	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 28



เงื่อนไขขอบ

$$w'(0) = 0 \qquad M(L) = 0$$

$$V(0) = 0 \qquad V(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{q_0 (-1 + e^{2\beta L} \cos(2\beta L) + e^{2\beta L} \sin(2\beta L))}{8\beta^5 EIL (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{q_0 (1 - 2e^{2\beta L} + e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L))}{8\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{2\beta L} q_0 (e^{2\beta L} - \cos(2\beta L) + \sin(2\beta L))}{8\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{-e^{2\beta L} q_0 (-2 + e^{2\beta L} + \cos(2\beta L) + \sin(2\beta L))}{8\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0 (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{8\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

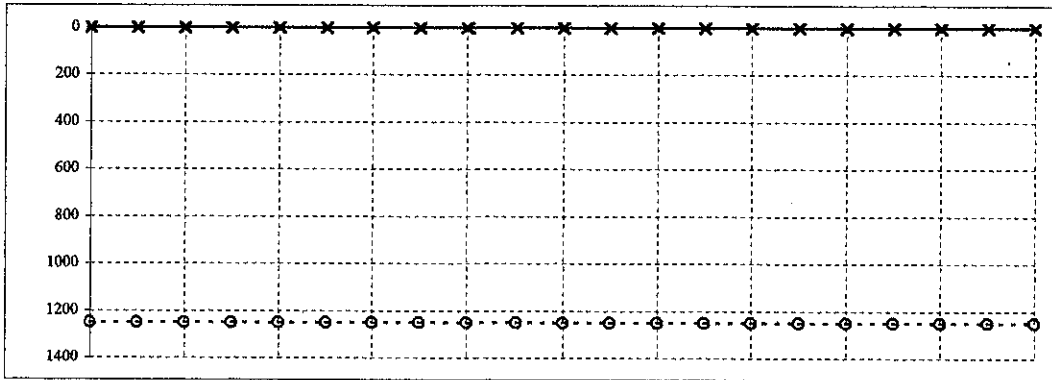
$$M(0) = \left[\frac{q_0 (1 - 4e^{2\beta L} + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))}{4\beta^3 L (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$w(L) = \left[\frac{q_0 (-\beta L + e^{4\beta L} \beta L + 2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \beta L \sin(2\beta L))}{4\beta^5 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

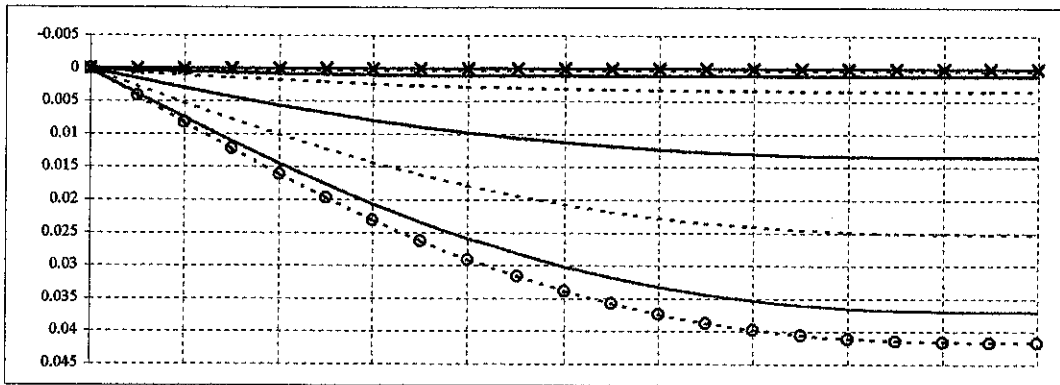
$$w'(L) = \left[\frac{q_0 \begin{pmatrix} -1 + e^{4\beta L} + 2e^{\beta L} \cos(\beta L) - 2e^{3\beta L} \cos(\beta L) \\ -2e^{\beta L} \sin(\beta L) - 2e^{3\beta L} \sin(\beta L) + 2e^{2\beta L} \sin(2\beta L) \end{pmatrix}}{4\beta^4 EIL (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 28

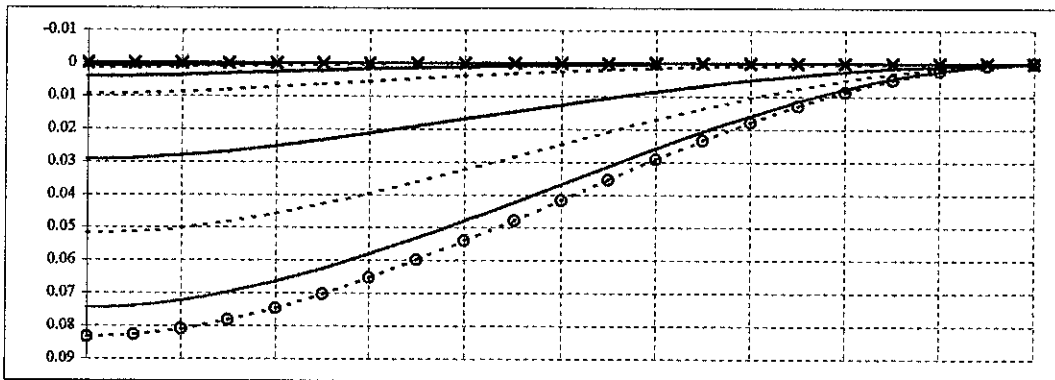
DEFLECTION (EIw/q_0L^4)



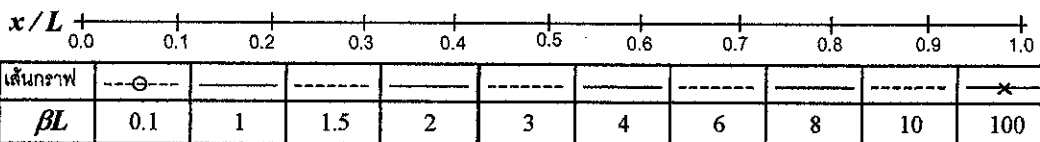
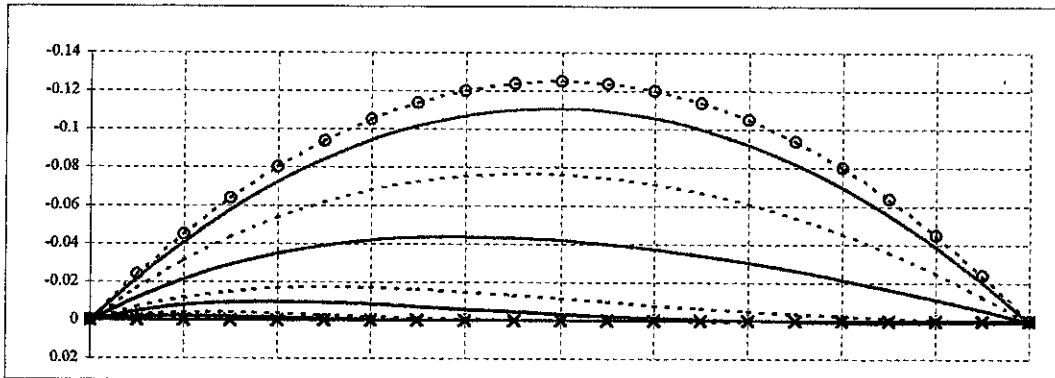
SLOPE (EIw/q_0L^3)



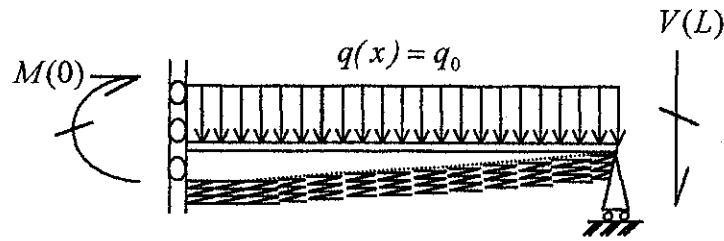
MOMENT (M/q_0L^2)



SHEAR (V/q_0L)



กรณี 29



เงื่อนไขสภาพขอบ

$$w'(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-e^{\beta L} (1 + e^{2\beta L}) q_0 \cos(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$B = \left[\frac{e^{\beta L} (1 - e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{-e^{\beta L} (1 + e^{2\beta L}) q_0 \cos(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \sin(\beta L)}{4\beta^4 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0}{4\beta^4 EI} - \frac{e^{\beta L} (1 + e^{2\beta L}) q_0 \cos(\beta L)}{2\beta^4 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

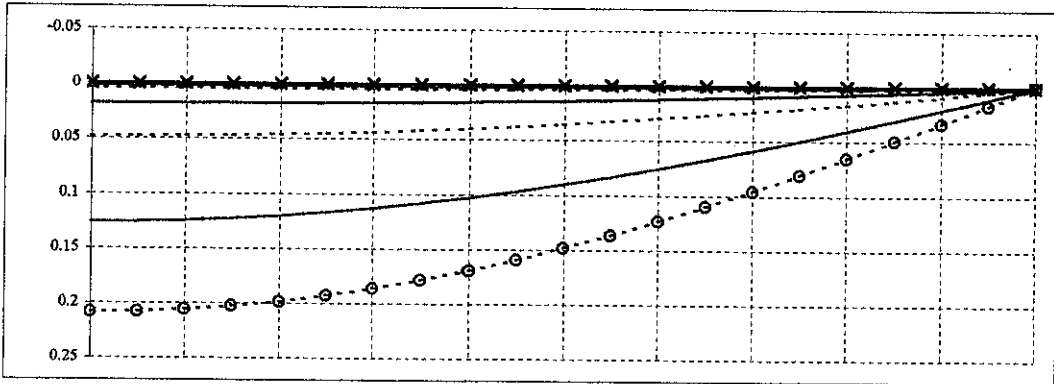
$$M(0) = \left[\frac{e^{\beta L} (-1 + e^{2\beta L}) q_0 \sin(\beta L)}{\beta^2 (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$w'(L) = \left[\frac{q_0 (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{4\beta^3 EI (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

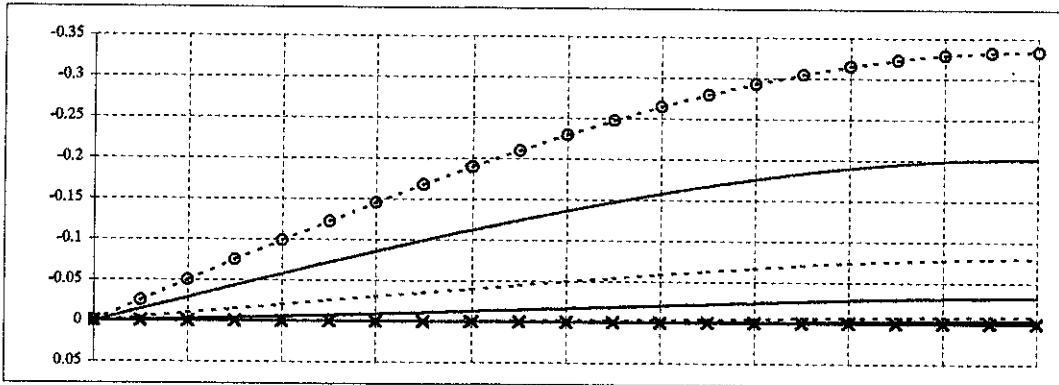
$$V(L) = \left[\frac{q_0 (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))}{2\beta (1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 29

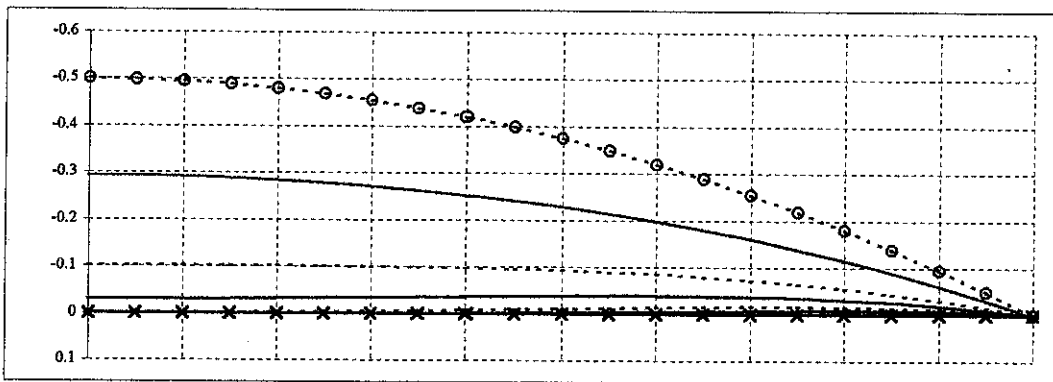
DEFLECTION (EIw/q_0L^4)



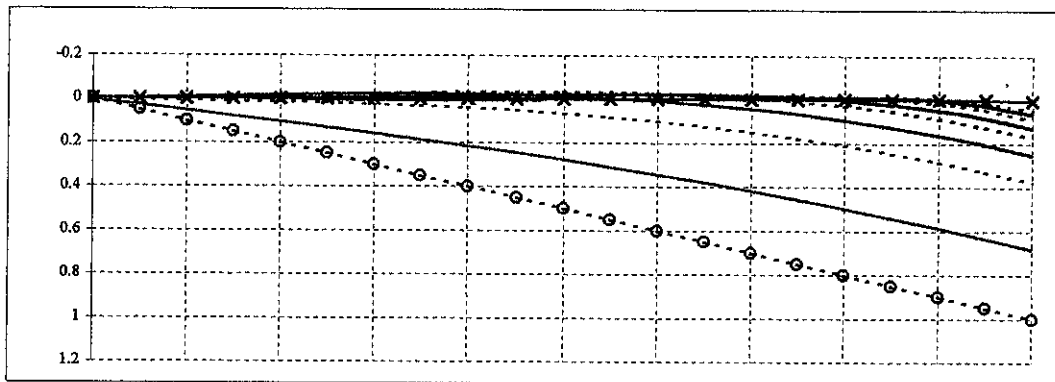
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



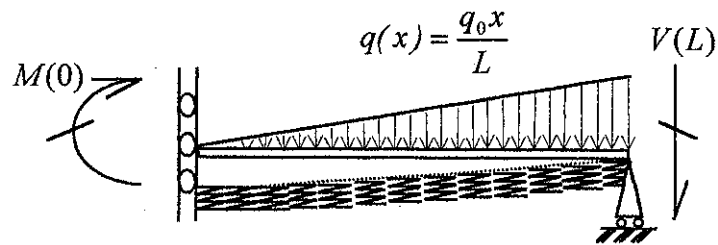
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	---○---	—	---	—	---	—	---	—	---	—x—
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 30



เงื่อนไขขอบ

$$w'(0) = 0 \qquad w(L) = 0$$

$$V(0) = 0 \qquad M(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{-q_0 \left(1 + 2e^{\beta L} \beta L \cos(\beta L) + 2e^{3\beta L} \beta L \cos(\beta L) \right) + e^{2\beta L} \cos(2\beta L) - e^{2\beta L} \sin(2\beta L)}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

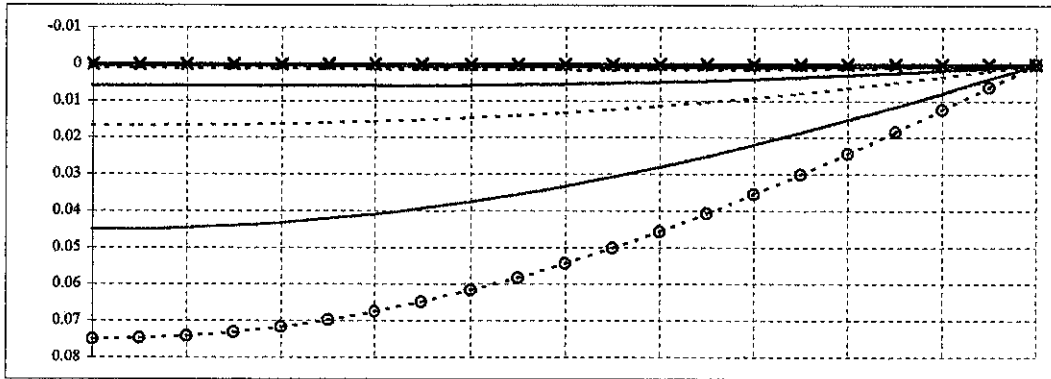
$$B = \left[\frac{-q_0 \left(1 + e^{2\beta L} \cos(2\beta L) - 2e^{\beta L} \beta L \sin(\beta L) \right) + 2e^{3\beta L} \beta L \sin(\beta L) + e^{2\beta L} \sin(2\beta L)}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 \left(e^{3\beta L} - 2\beta L \cos(\beta L) - 2e^{2\beta L} \beta L \cos(\beta L) \right) + e^{\beta L} \cos(2\beta L) + e^{\beta L} \sin(2\beta L)}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

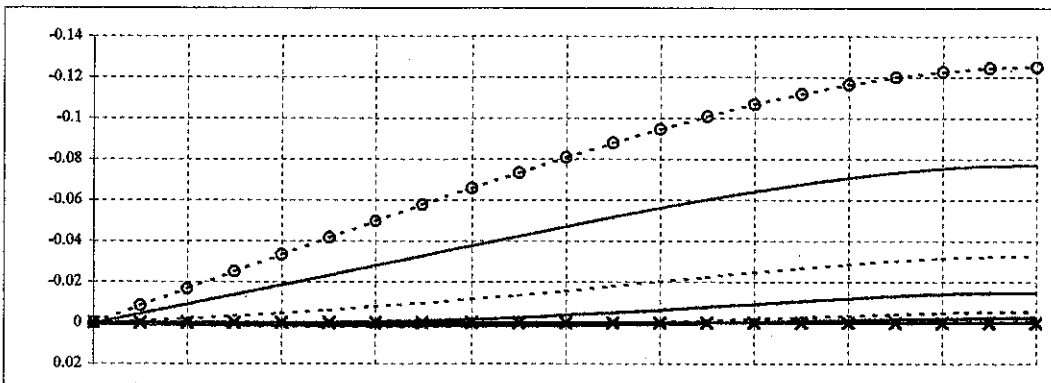
$$D = \left[\frac{-e^{\beta L} q_0 \left(e^{3\beta L} + e^{\beta L} \cos(2\beta L) + 2\beta L \sin(\beta L) \right) - 2e^{2\beta L} \beta L \sin(\beta L) - e^{\beta L} \sin(2\beta L)}{8\beta^5 EIL(1 + e^{4\beta L} + 2e^{2\beta L} \cos(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 30

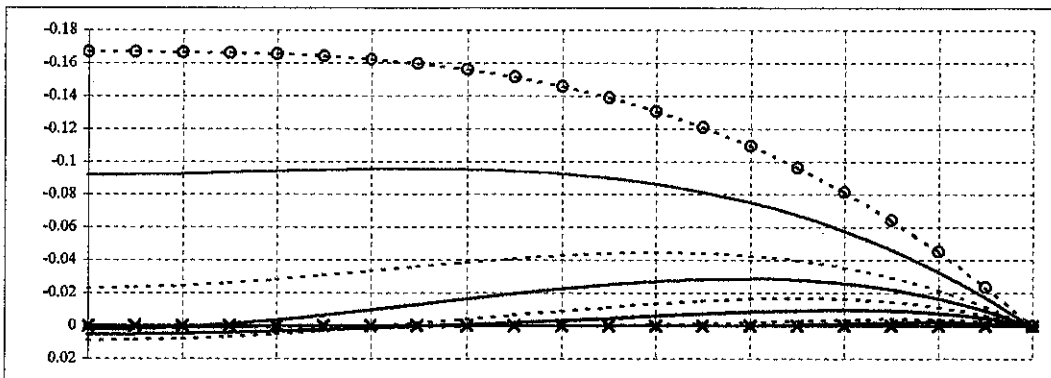
DEFLECTION (EIw/q_0L^4)



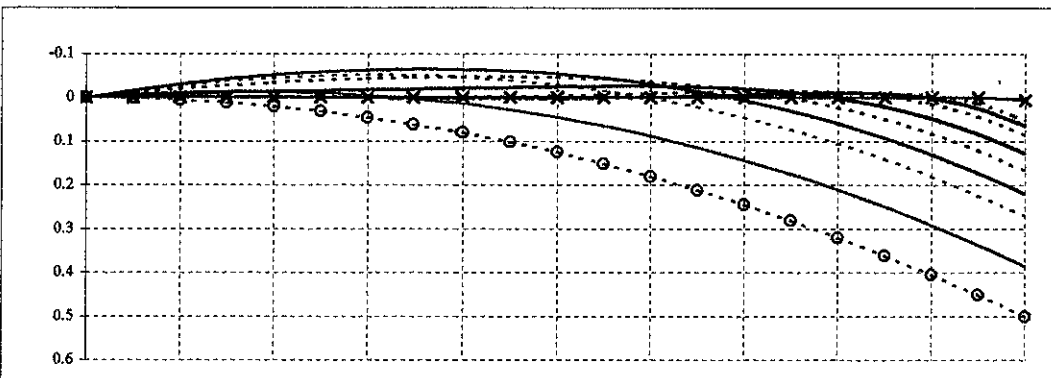
SLOPE (EIw'/q_0L^3)



MOMENT (M/q_0L^2)



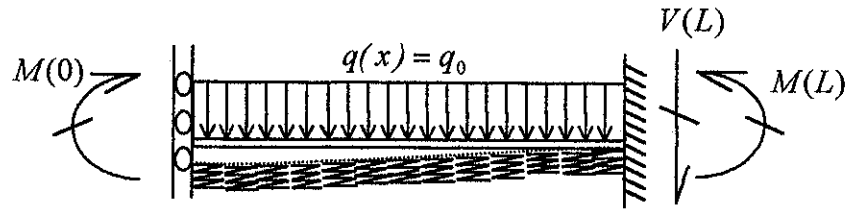
SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	---	—	---	—	---	—	---	×
βL	0.1	1	1.5	2	3	4	6	8	10	100

กรณี 31



เงื่อนไขขอบ

$$w'(0) = 0$$

$$w(L) = 0$$

$$V(0) = 0$$

$$w'(L) = 0$$

" Value of A , B , C and D "

$$A = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$B = \left[\frac{-e^{\beta L} q_0 (\cos(\beta L) - e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$C = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$D = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{4\beta^4 EI (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

ฟังก์ชันที่ปลายคาน

$$w(0) = \left[\frac{q_0}{4\beta^4 EI} + \frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) + \sin(\beta L) + e^{2\beta L} \sin(\beta L))}{2\beta^4 EI (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

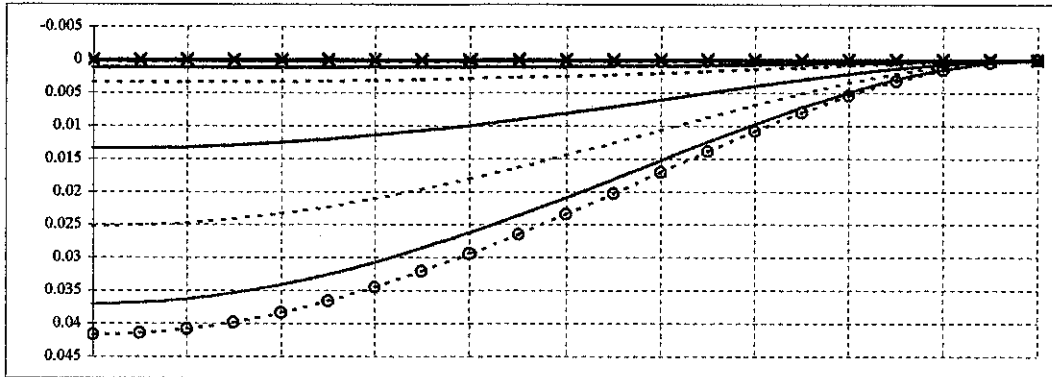
$$M(0) = \left[\frac{e^{\beta L} q_0 (-\cos(\beta L) + e^{2\beta L} \cos(\beta L) - \sin(\beta L) - e^{2\beta L} \sin(\beta L))}{\beta^2 (1 - e^{4\beta L} - 2e^{2\beta L} \sin(2\beta L))} \right]$$

$$M(L) = \left[\frac{q_0 (1 - e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))}{2\beta^2 (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

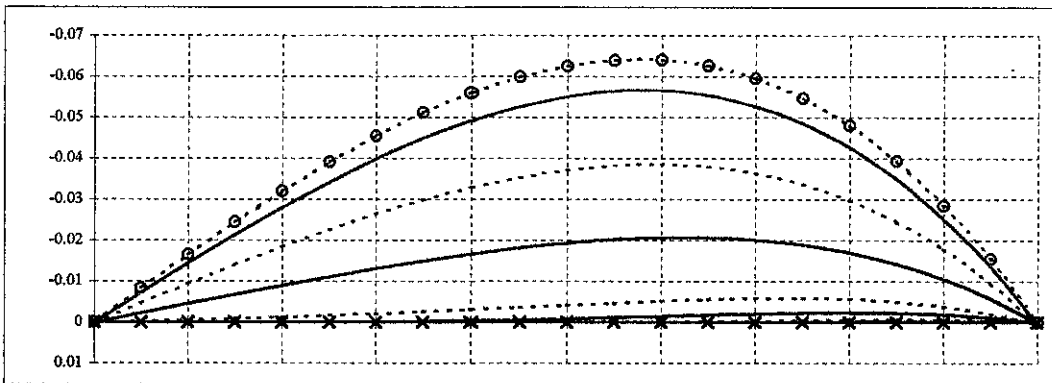
$$V(L) = \left[\frac{-q_0 (1 + e^{4\beta L} - 2e^{2\beta L} \cos(2\beta L))}{\beta (-1 + e^{4\beta L} + 2e^{2\beta L} \sin(2\beta L))} \right]$$

กราฟแสดงผลการวิเคราะห์ที่ 31

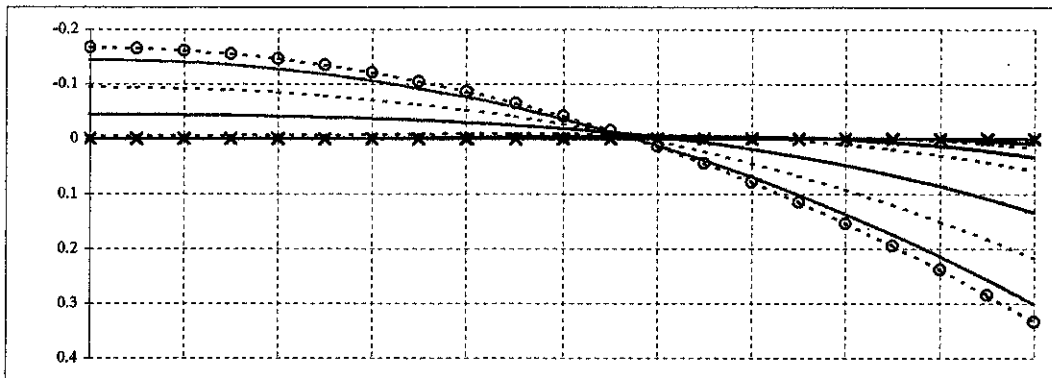
DEFLECTION (EIw/q_0L^4)



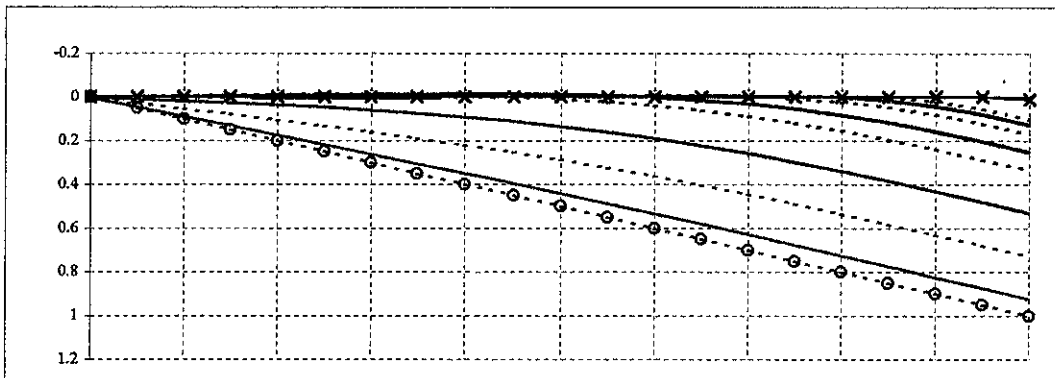
SLOPE (EIw/q_0L^3)



MOMENT (M/q_0L^2)



SHEAR (V/q_0L)



x/L 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

เส้นกราฟ	○	—	—	—	—	—	—	—	—	×
βL	0.1	1	1.5	2	3	4	6	8	10	100