

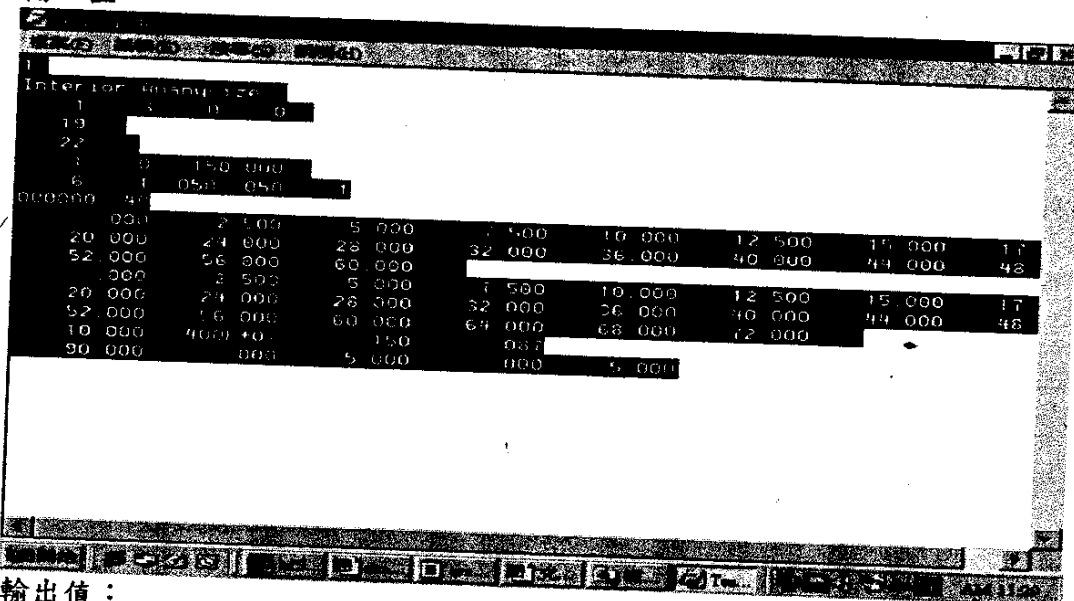
一、假設有一剛性鋪面版，其相關基本性質與荷重資料如下：Slab size(長×寬)= 12ft × 12ft，Slab thickness=10in.，Slab $E_c = 4,000,000$ psi， $\mu = 0.15$ ， $P = 9,000$ lbs，Loaded area = 10 in. × 10 in.， $k = 100$ pci，Interior / Edge / Corner loading。請利用 ILLI-SLAB 有限元素程式，求解其最大應力與撓度值，並與 Westergaard 理論解公式相比較，另請與 ILLISTRs 程式所得之應力相比較。

答：

1. 利用 ILLI-SLAB 有限元素程式，求解其最大應力與撓度值：

(1) ILLI-SLAB 中央應力分析：假設應力狀態為對稱 X 軸與 Y 軸，在 X 方向分 19 個結點與 Y 方向分 22 個結點。

輸入值：



輸出值：

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MAXIMUM OR MINIMUM VALUES OF (COMPRESSION IS POSITIVE)
DEFLECTION = .006156 AT NODE 1 AND .000000 AT NODE 0
SUBGRADE STRESS = .923 AT NODE 1
RANGE OF X-STRESS AT BOTTOM OF LAYER 1: FROM -125.061 AT NODE 1 TO 2.492 AT NODE 331
RANGE OF Y-STRESS AT BOTTOM OF LAYER 1: FROM -133.665 AT NODE 1 TO 1.751 AT NODE 19
RANGE OF MINOR PRINC. STRESS BOT. LAYER 1: FROM -133.665 AT NODE 1 TO .000 AT NODE 418
RANGE OF MAJOR PRINC. STRESS BOT. LAYER 1: FROM -125.061 AT NODE 1 TO 2.492 AT NODE 331

NOTE:- X-STRESS TOP = -(X-STRESS BOTTOM)
        Y-STRESS TOP = -(Y-STRESS BOTTOM)
        MINOR PRINC. STRESS TOP = -(MAJOR PRINC. STRESS BOTTOM)
        MINOR PRINC. STRESS BOTTOM = -(MAJOR PRINC. STRESS TOP)

SUM OF REACTION FORCES = 2249.29
SUM OF EXTERNAL FORCES AND SELF-WEIGHT (IF ANY) = 2250.00
Stop - Program terminated.
    
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ILLI-SLAB 角隅分析：假設應力狀態無對稱，在 X 方向分 34 個結點與 Y 方向分 40 個結點。

輸入值：

Corner Anaysize							
1	0	0	0				
34							
40							
1	0	150.000					
6	1	.050	.050	1			
000000	40						
.000	2.500	5.000	7.500	10.000	12.500	15.000	17.000
20.000	24.000	28.000	32.000	36.000	40.000	44.000	48.000
52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
84.000	88.000	92.000	96.000	100.000	104.000	108.000	112.000
116.000	120.000						
.000	2.500	5.000	7.500	10.000	12.500	15.000	17.000
20.000	24.000	28.000	32.000	36.000	40.000	44.000	48.000
52.000	56.000	60.000	64.000	68.000	72.000	76.000	80.000
84.000	88.000	92.000	96.000	100.000	104.000	108.000	112.000
116.000	120.000	124.000	128.000	132.000	136.000	140.000	144.000
10.000	400E+07	.150	.007				
90.000	0.000	10.000	.000	10.000			

輸出值：

MAXIMUM OR MINIMUM VALUES OF (COMPRESSION IS POSITIVE):

DEFLECTION = .043454 AT NODE 1 AND -.006437 AT NODE 1360

SUBGRADE STRESS = 6.518 AT NODE 1

RANGE OF X-STRESS AT BOTTOM OF LAYER 1: FROM -85.206 AT NODE 81 TO 116.103 AT NODE 561

RANGE OF Y-STRESS AT BOTTOM OF LAYER 1: FROM -84.960 AT NODE 3 TO 122.956 AT NODE 16

RANGE OF MINOR PRINC. STRESS BOT. LAYER 1: FROM -139.425 AT NODE 124 TO 3.380 AT NODE 543

RANGE OF MAJOR PRINC. STRESS BOT. LAYER 1: FROM .000 AT NODE 1360 TO 172.678 AT NODE 53

NOTE:- X-STRESS TOP = -(X-STRESS BOTTOM)

Y-STRESS TOP = -(Y-STRESS BOTTOM)

MINOR PRINC. STRESS TOP = -(MAJOR PRINC. STRESS BOTTOM)

MINOR PRINC. STRESS BOTTOM = -(MAJOR PRINC. STRESS TOP)

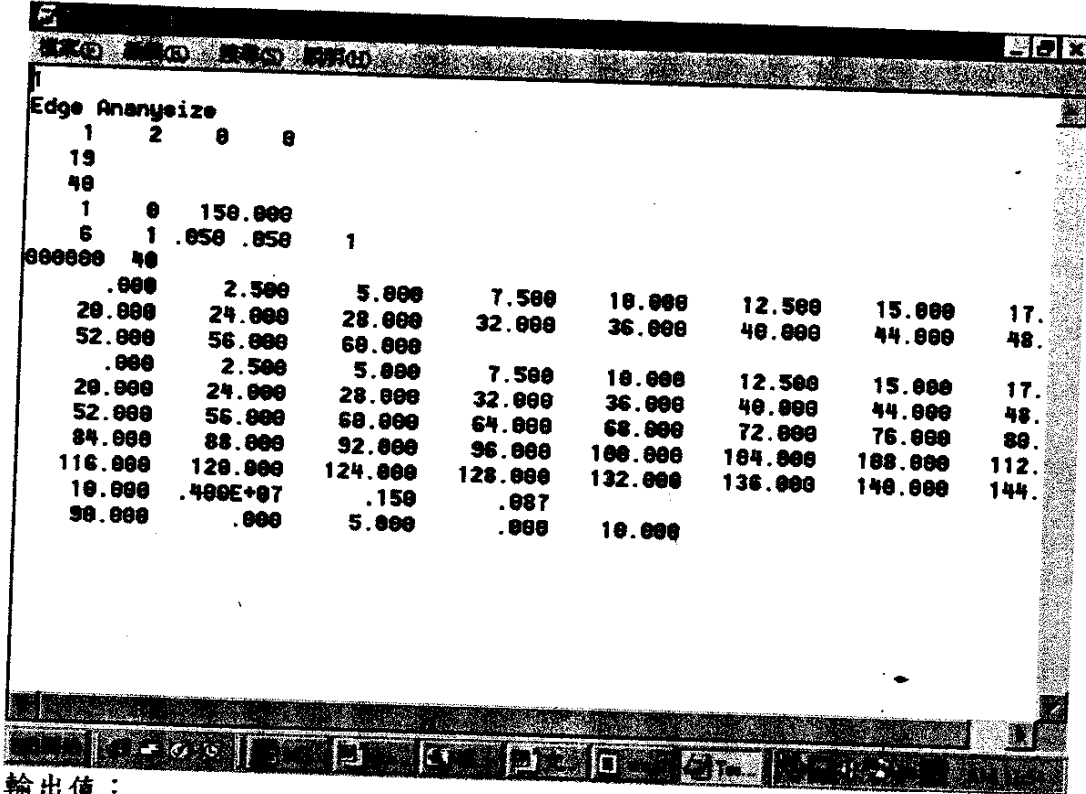
SUM OF REACTION FORCES = 9008.2

SUM OF EXTERNAL FORCES AND SELF-WEIGHT (IF ANY) = 9000.00

Stop - Program terminated.

(2) ILLI-SLAB 邊緣應力分析：假設應力狀態為對稱 Y 軸，在 X 方向分 19 個結點與 Y 方向分 40 個結點。

輸入值：



輸出值：

MAXIMUM OR MINIMUM VALUES OF (COMPRESSION IS POSITIVE):

DEFLECTION = .020284 AT NODE 1 AND -.003768 AT NODE 760

SUBGRADE STRESS = 3.043 AT NODE 1

RANGE OF X-STRESS AT BOTTOM OF LAYER 1: FROM -233.401 AT NODE 1 TO 18.691 AT NODE 601

RANGE OF Y-STRESS AT BOTTOM OF LAYER 1: FROM -30.065 AT NODE 3 TO 71.531 AT NODE 14

RANGE OF MINOR PRINC. STRESS BOT. LAYER 1: FROM -233.401 AT NODE 1 TO .000 AT NODE 760

RANGE OF MAJOR PRINC. STRESS BOT. LAYER 1: FROM -30.065 AT NODE 3 TO 71.531 AT NODE 14

NOTE:- X-STRESS TOP = -(X-STRESS BOTTOM)

Y-STRESS TOP = -(Y-STRESS BOTTOM)

MINOR PRINC. STRESS TOP = -(MAJOR PRINC. STRESS BOTTOM)

MINOR PRINC. STRESS BOTTOM = -(MAJOR PRINC. STRESS TOP)

SUM OF REACTION FORCES = 4501.73

SUM OF EXTERNAL FORCES AND SELF-WEIGHT (IF ANY) = 4500.00

Stop - Program terminated.