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COLUMBUS PROJECT

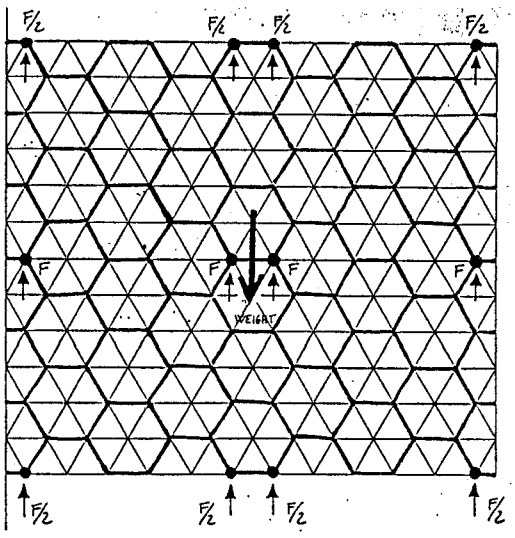
MIRROR BLANK 8.0 DIAM

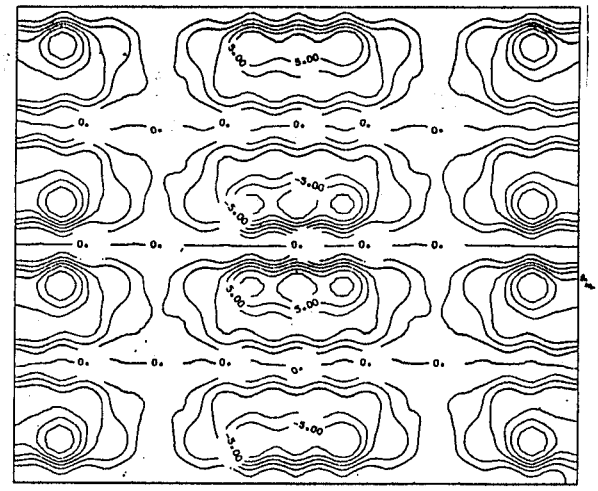
PRELIMINARY ANALYSIS ON 8 MT MIRROR BLANK

MIRROR IN VERTICAL POSITION

INFINITE PLATE ANALYSIS

REPORT N. 103
REV. 0
MILANO, 1987, SEPTEMBER 15TH





1. INTRODUCTION

In order to study the behaviour of the mirror in vertical position, at first we have performed the analysis on the infinite plate, as it was described in the report n. 102 for the mirror in horizontal position.

The geometrical characteristics of the vertical plate are:

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sides:	1194.00 mm	x 1034.04 mm
height:	600 mm	
dead weight:	4746 N	
front plate thickness:		25.399 mm
back plate "		21.700 mm
ribs "		~~9.525~~ 19,05 mm

In the figure 1 you can see the F.E. mesh, having 5 levels of nodes.

To represent the infinite plate we have put symmetrical or asymmetrical constraints on the four sides, as it is described in the figure 2:

the weight acts along the -y direction, so that the sides parallel to the x axis are asymmetrical planes.
On the contrary the sides parallel to the y axis are symmetrical planes.

In the figure 2 you can see the constraints that have been used.
[1 = fixed d.o.f. 0 = free d.o.f.]

We have considered two different actuators densities, as you can see in the figure 3 and 4.

Actuators have been applied to the front plate (z = 600 mm) and to the back plate (z = 0.00 mm) for both the cases.

The actuators forces have been determined imposing the rotational equilibrium of the plate.
We have found the following values:

DENSITY 1 (see figure 3)

Back plate	---->	F = 581.044 N	
front plate	---->	F = 605.456 N	

DENSITY 2 (see figure 4)

Back plate	---->	F = 290.522 N	F/2 = 145.261
Front plate	---->	F = 302.728 N	F/2 = 151.364

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2. RESULTS

Results, for both the cases, consist of:

- Table of the plate surface z-displacements
- Displacements isocontours lines (interval = 1 nm)

We have found the following values:

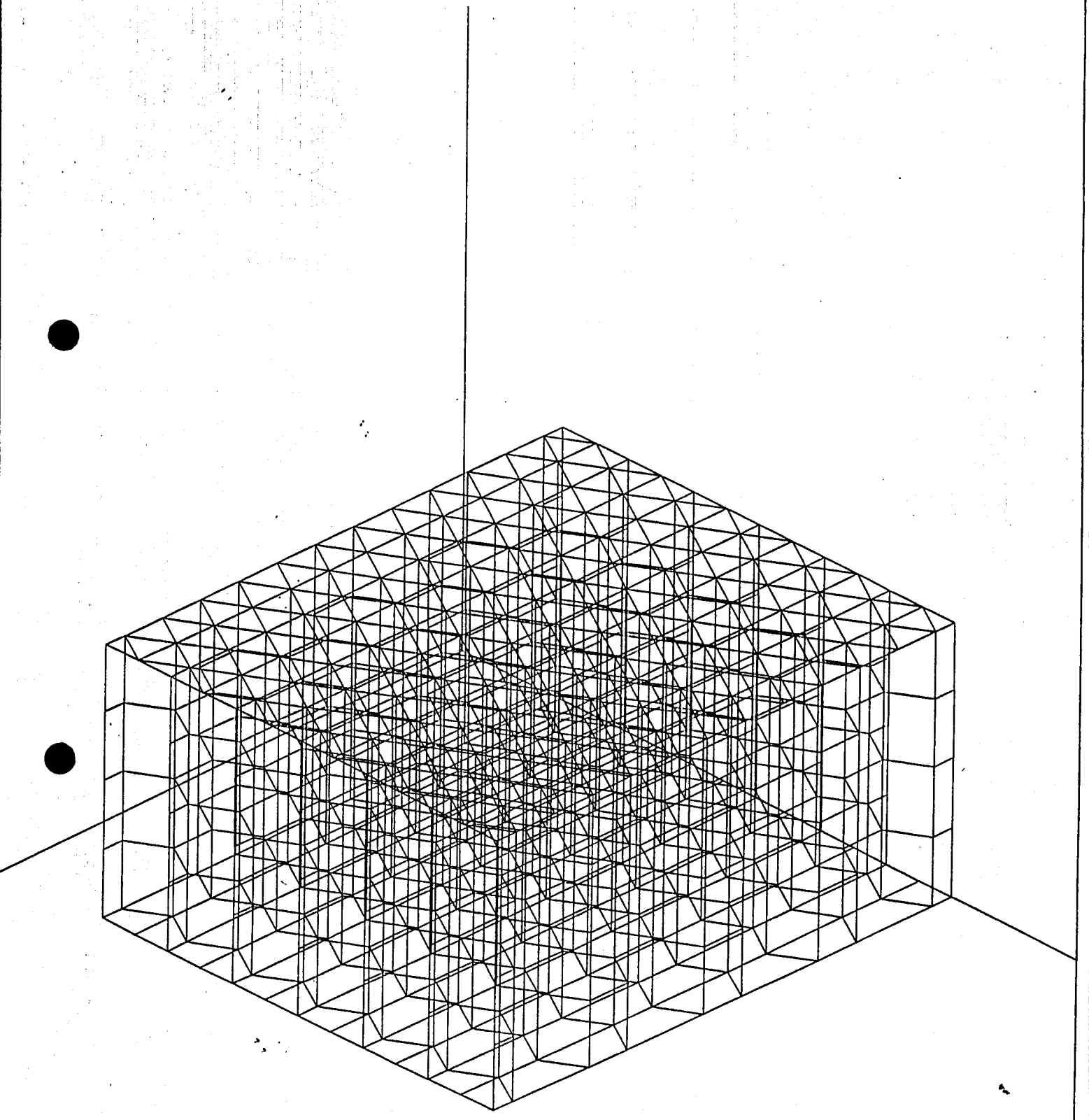
TABLE 1

	DENSITY 1	DENSITY 2
Average Z disp.	-0.0089 nm	-0.0011 nm
Minimum Z disp.	-26.43 nm	-6.59 nm
Maximum Z disp.	26.33 nm	6.60 nm
Peak to peak	52.76 nm	13.19 nm
RMS	7.14 nm	3.12 nm

In the figure 5 you can see the isocontours lines for density 1.

In the figure 6 you can see the isocontours lines for density 2.

Infinite plate - h=60. cm.-first hexagonal act. pattern (4 el. layer)
undeformed shape
18:53:34 18/ 9/1987
Iaxis= 3 alpha= 30.00 beta= 45.00

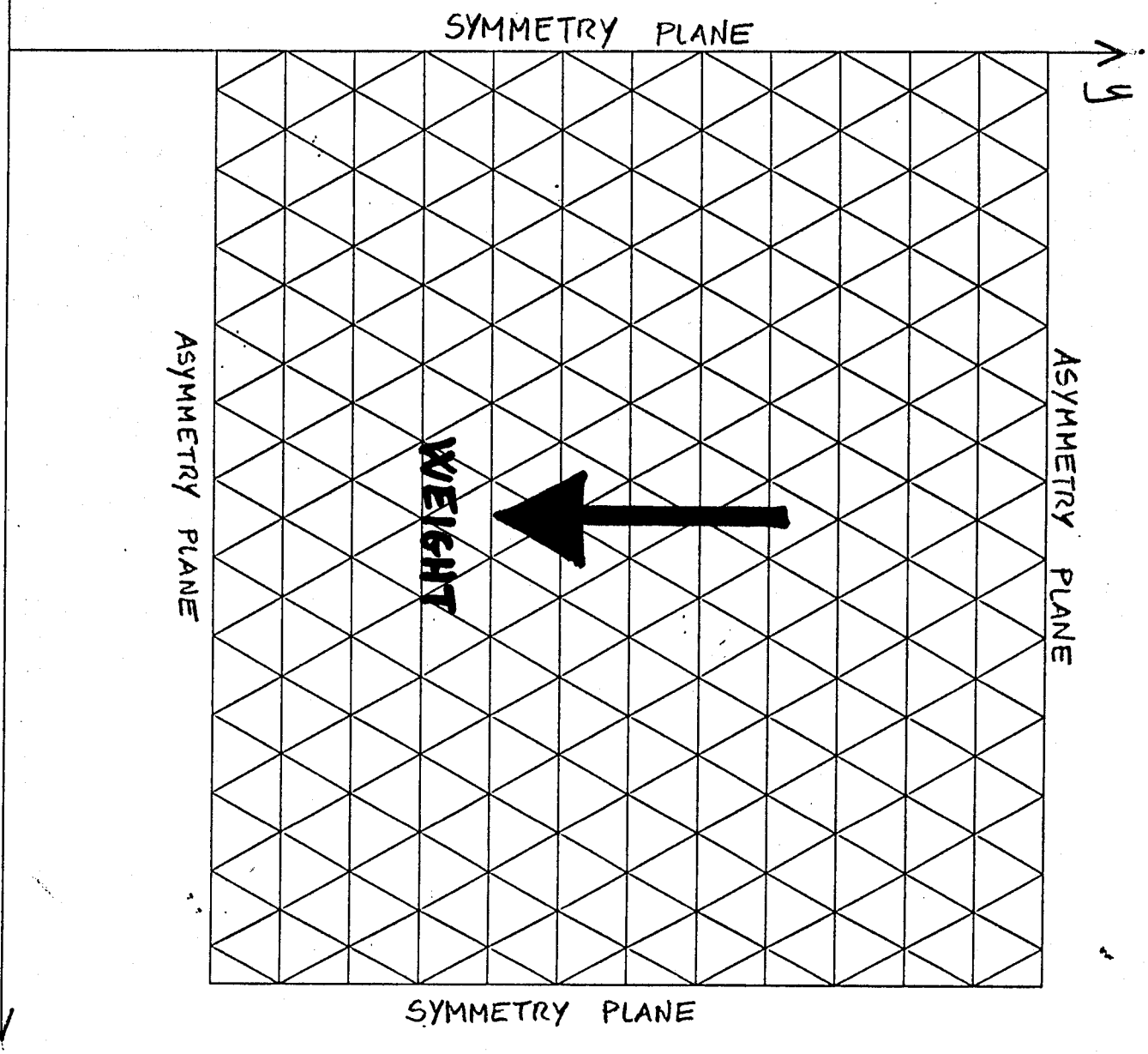


[FIGURE 1]

Infinite plate - h=60. cm.-first hexagonal act. pattern (4 el. layer)
undeformed shape
18:53:34 18/ 9/1987
taxis= 3 alpha= 90.00 beta= 0.

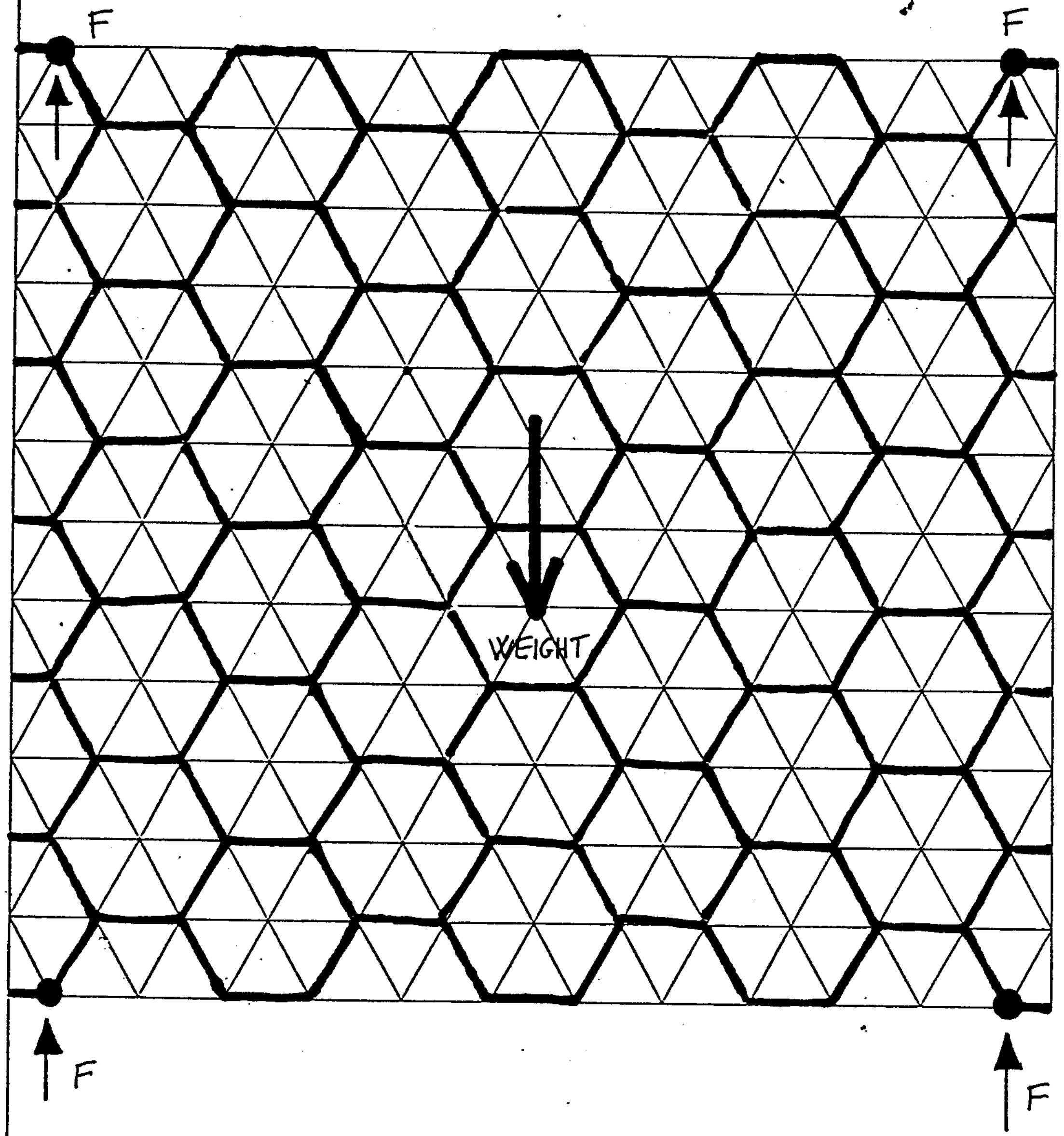
CONSTRAINTS :

	x	y	z	φ_x	φ_y	φ_z
SYM	1	0	0	0	1	1
ASYM	1	0	1	0	1	0



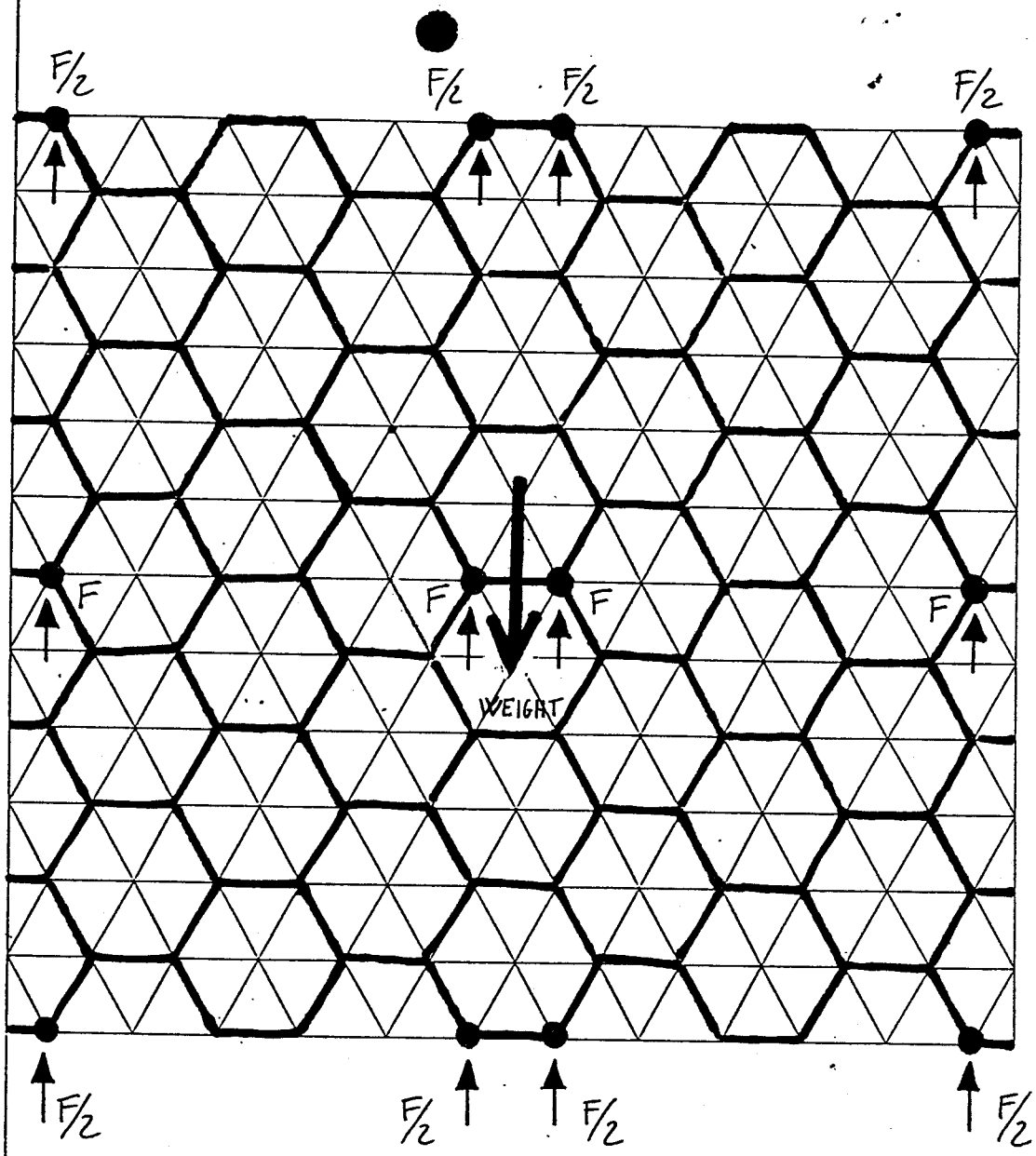
[FIGURE 2]

DENSITY 1



infinite plate - h=60. cm.-first hexagonal act. pattern (4 ol. layer)
undeformed shape
18:53:34 18/ 9/1987
scale= 3 alpha= 90.00 beta= 0.

[FIGURE 3]

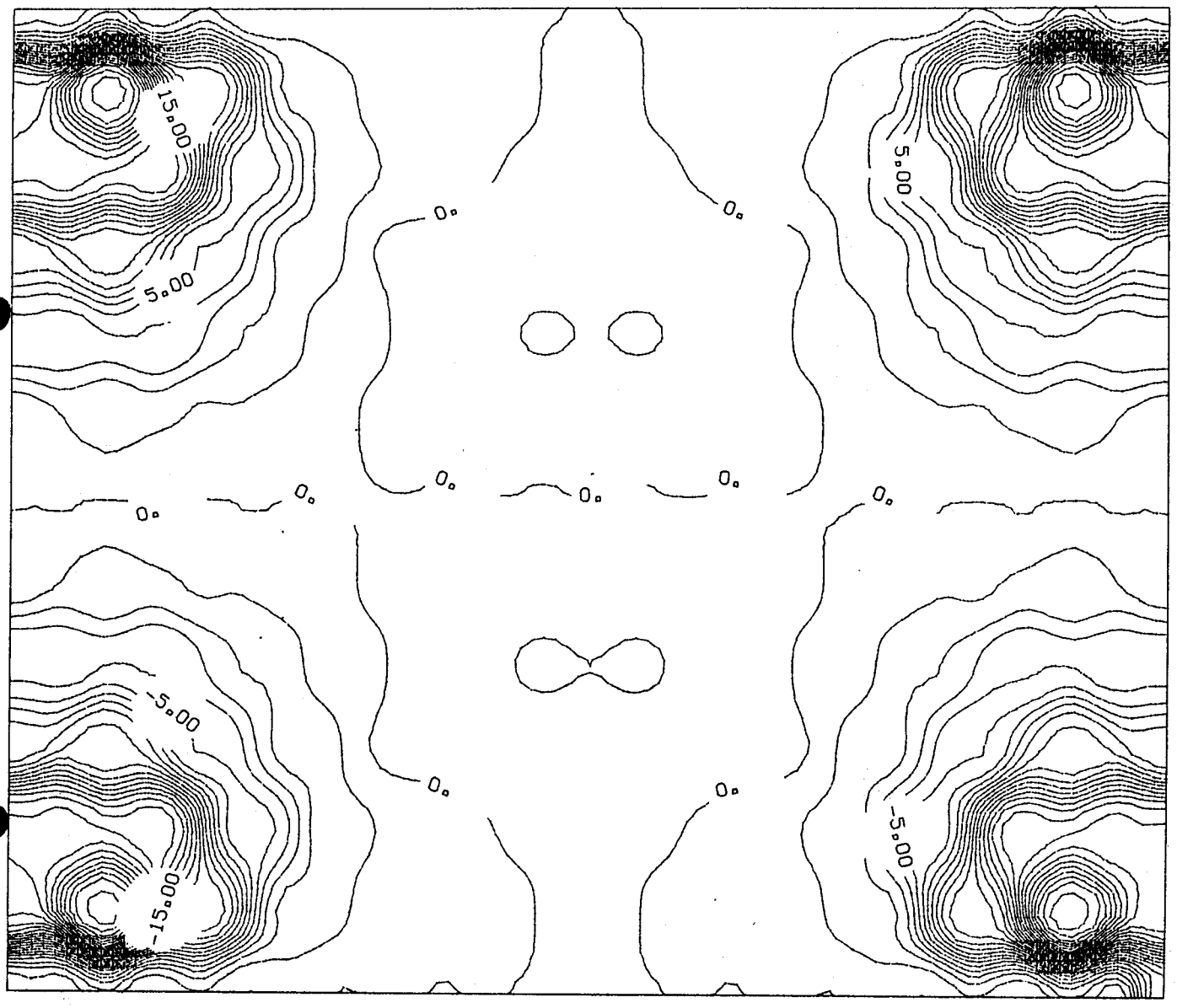


DENSITY 2

Infinite plate - h=60. cm.-first hexagonal act. pattern (4 ol. layer)
Undeformed shape
18:53:34 18/ 9/1987
Cycle= 3 alpha= 90.00 beta= 0.

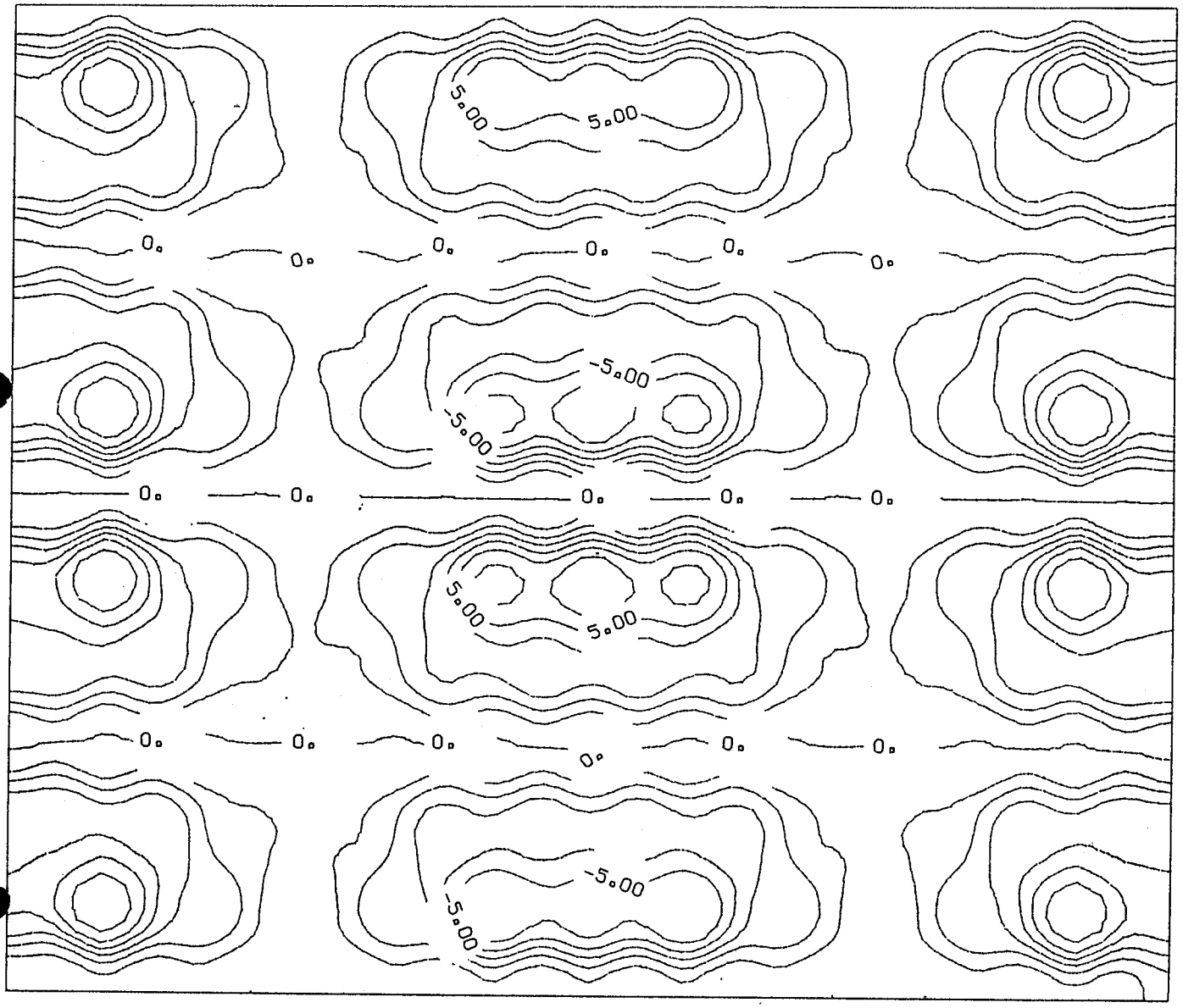
[FIGURE 4]

DENSITY 1



[FIGURE 5]

DENSITY 2



[FIGURE 6]