Numéro ordre C.N.R.S.
A.O 11350

THÈSE

présentée à

L'UNIVERSITE SCIENTIFIQUE ET MEDICALE ET L'INSTITUT NATIONAL POLYTECHNIQUE DE GRENOBLE

pour obtenir le grade

DOCTEUR ES-SCIENCES PHYSIQUES

par

Jean-Louis PORTESEIL

SUJET

Quelques aspects semi-microscopiques des mécanismes d'aimantation et d'hystérésis dans les ferromagnétiques

(Figures)

Soutenue le 2 Juillet 1975 devant la commission d'Examen

MM.	L. NÉEL	Président
	J.C. BARBIER	Examinateurs
	N. BOCCARA	
	P. BRISSONNEAU	
	R. VERGNE	
	A. FERRO-MILONE	Invité

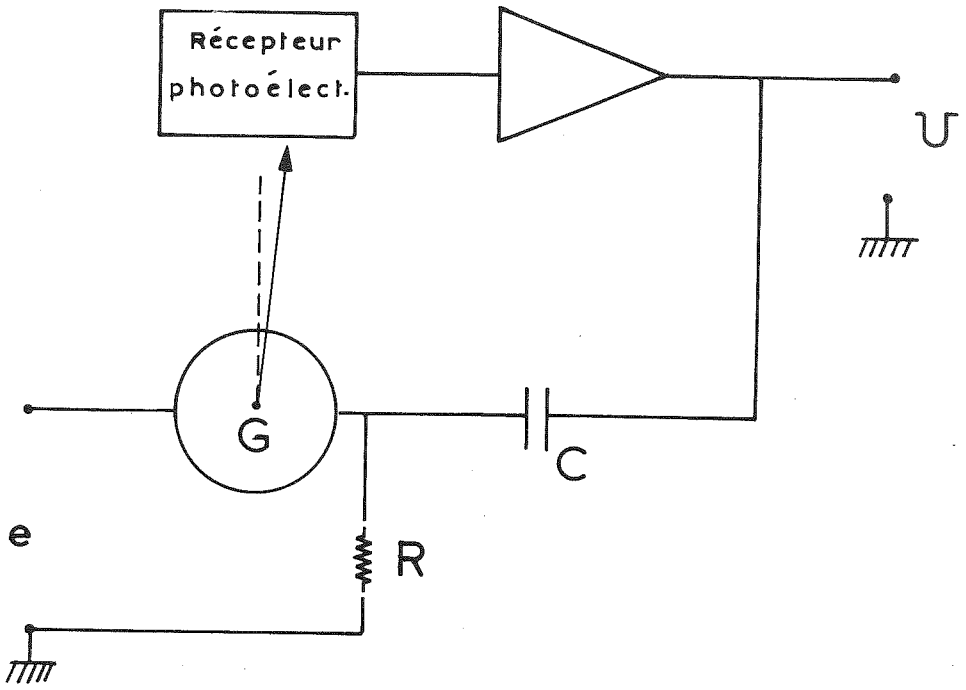

Récepteur
photoélect.
U
G
C
e
R

Fig. 1

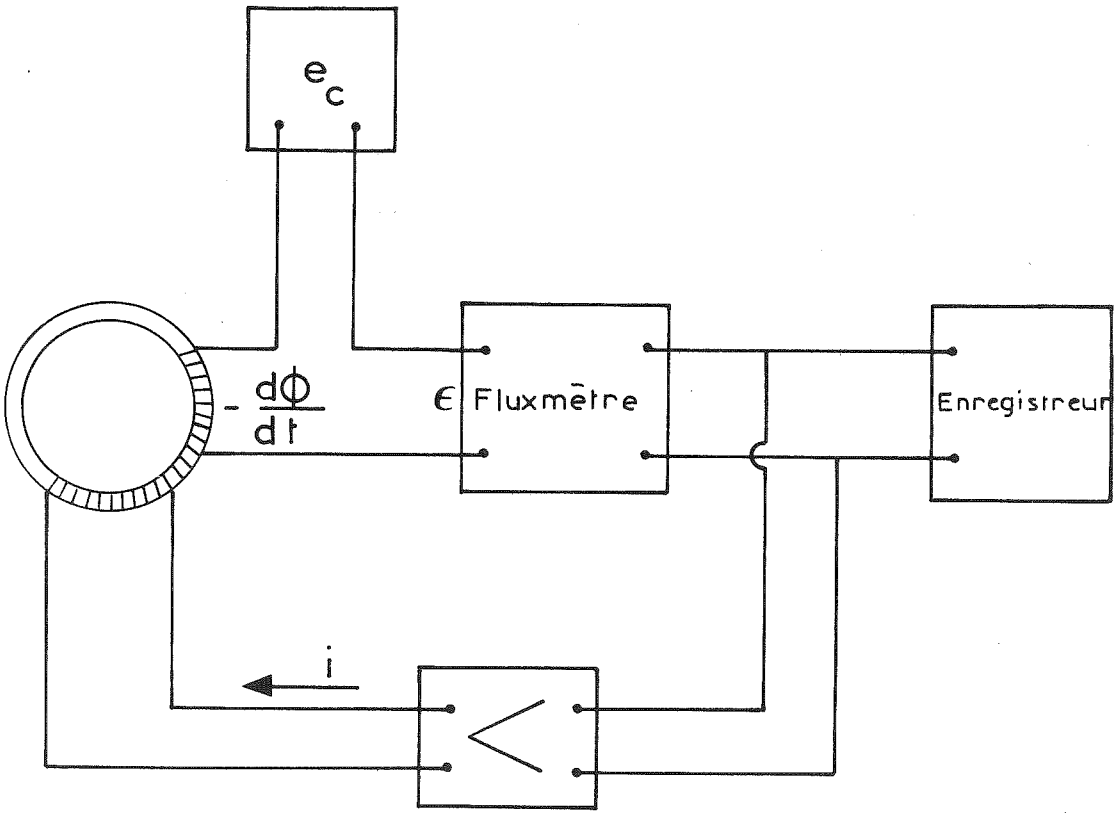
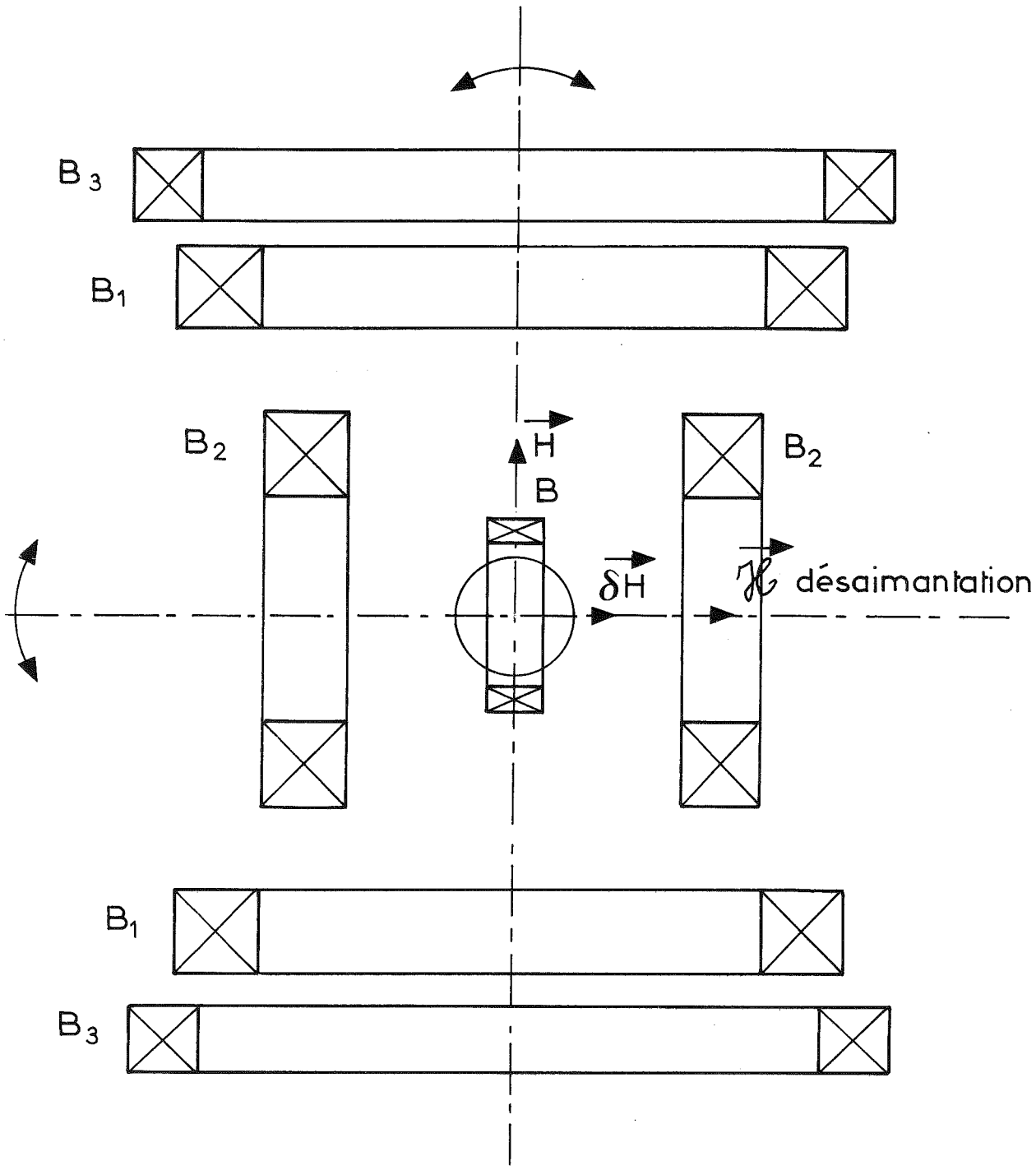

e_c
$-\frac{d\Phi}{dt}$
ϵ Fluxmètre
Enregistreur
i

Fig. 2



B_1 Bobines de champ principal H

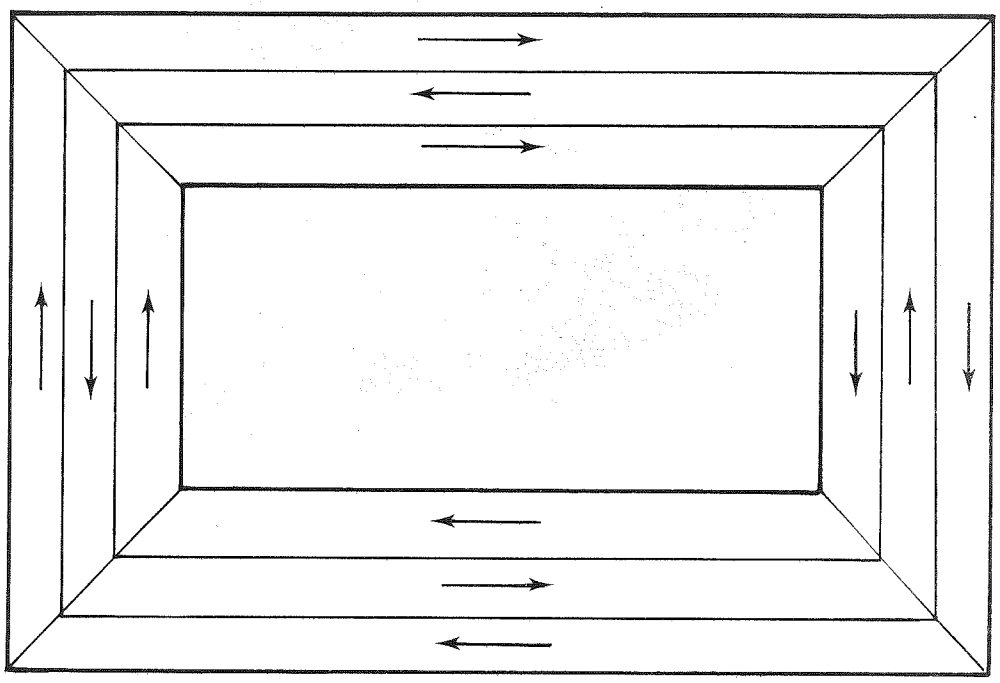
B_2 Bobines de champ additionnel h et de désaimantation

B_3 Bobines de champ compensation du champ terrestre

B Ensemble des bobines de mesure

Le plan de figure est le plan du disque

Fig.3



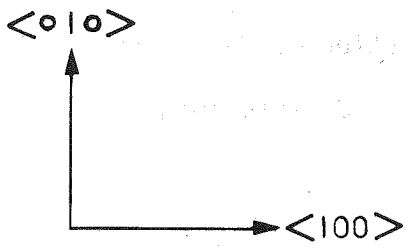
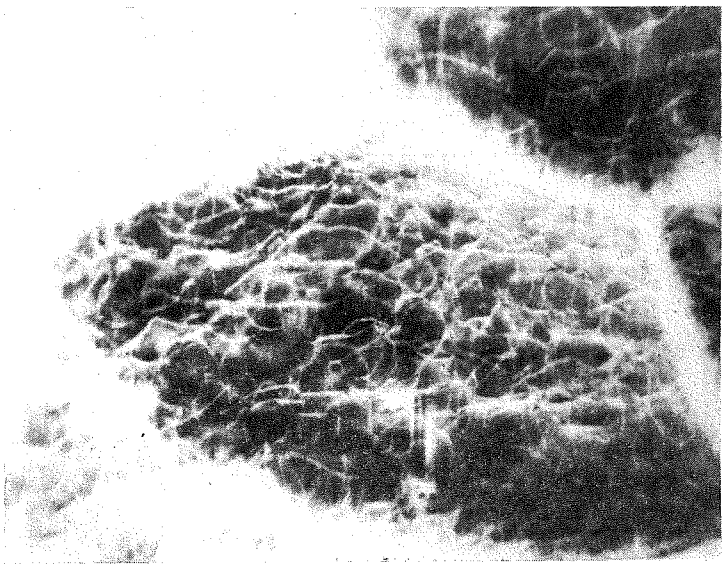


Fig. 4



Topographie aux rayons-X du cadre A

Radiation Mo $K\alpha_1$ - Réflexion 020

Grossissement 58

Fig. 5

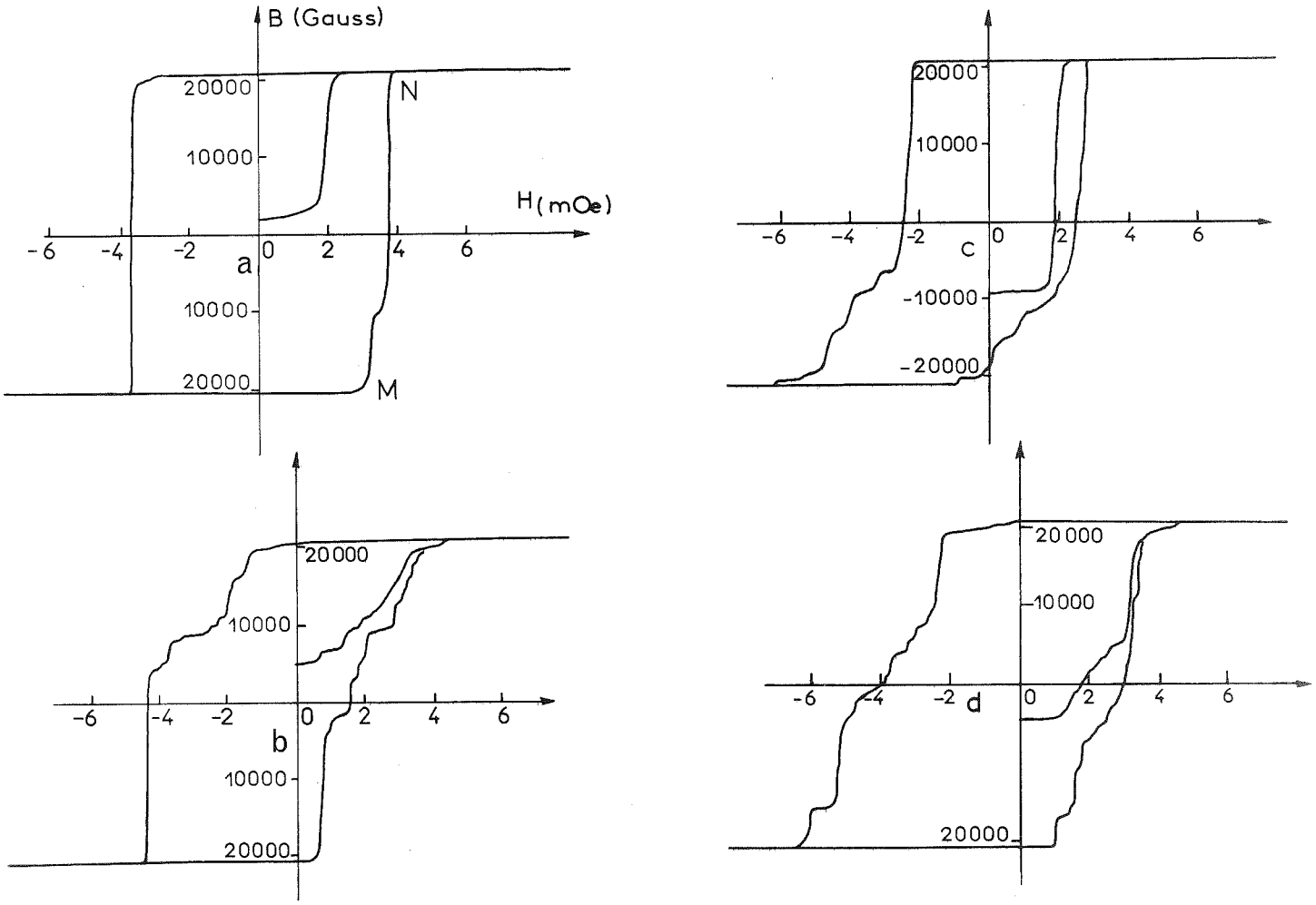

B (Gauss)
20000
10000
N
H(mOe)
-6
-4
-2
a
0
2
4
6
10000
20000
M
20000
10000
-6
-4
-2
c
0
2
4
6
-10000
-20000
20000
10000
-6
-4
-2
b
0
2
4
6
10000
20000
20000
10000
-6
-4
-2
d
0
2
4
6
20000

Fig.6

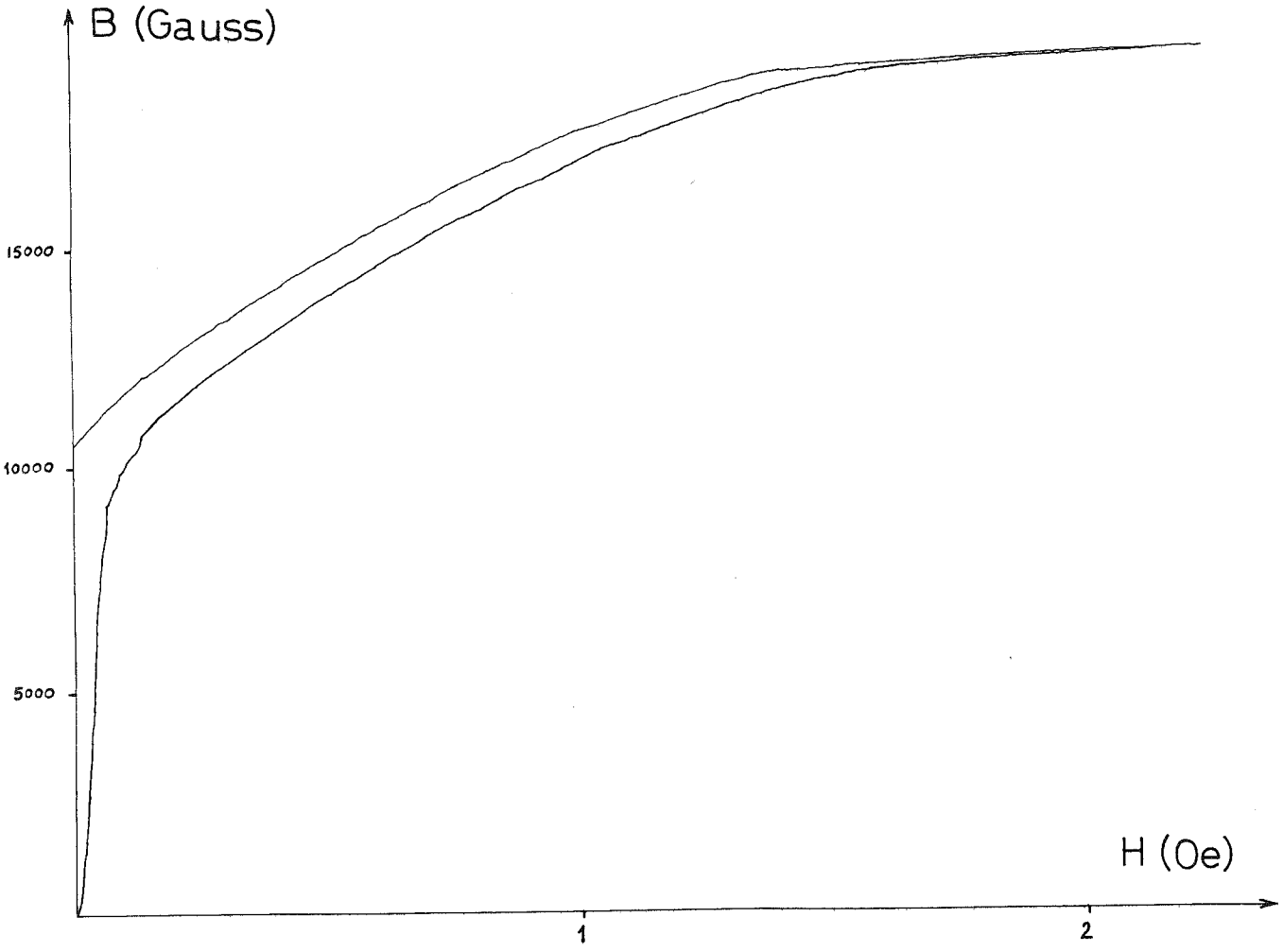


Fig.7

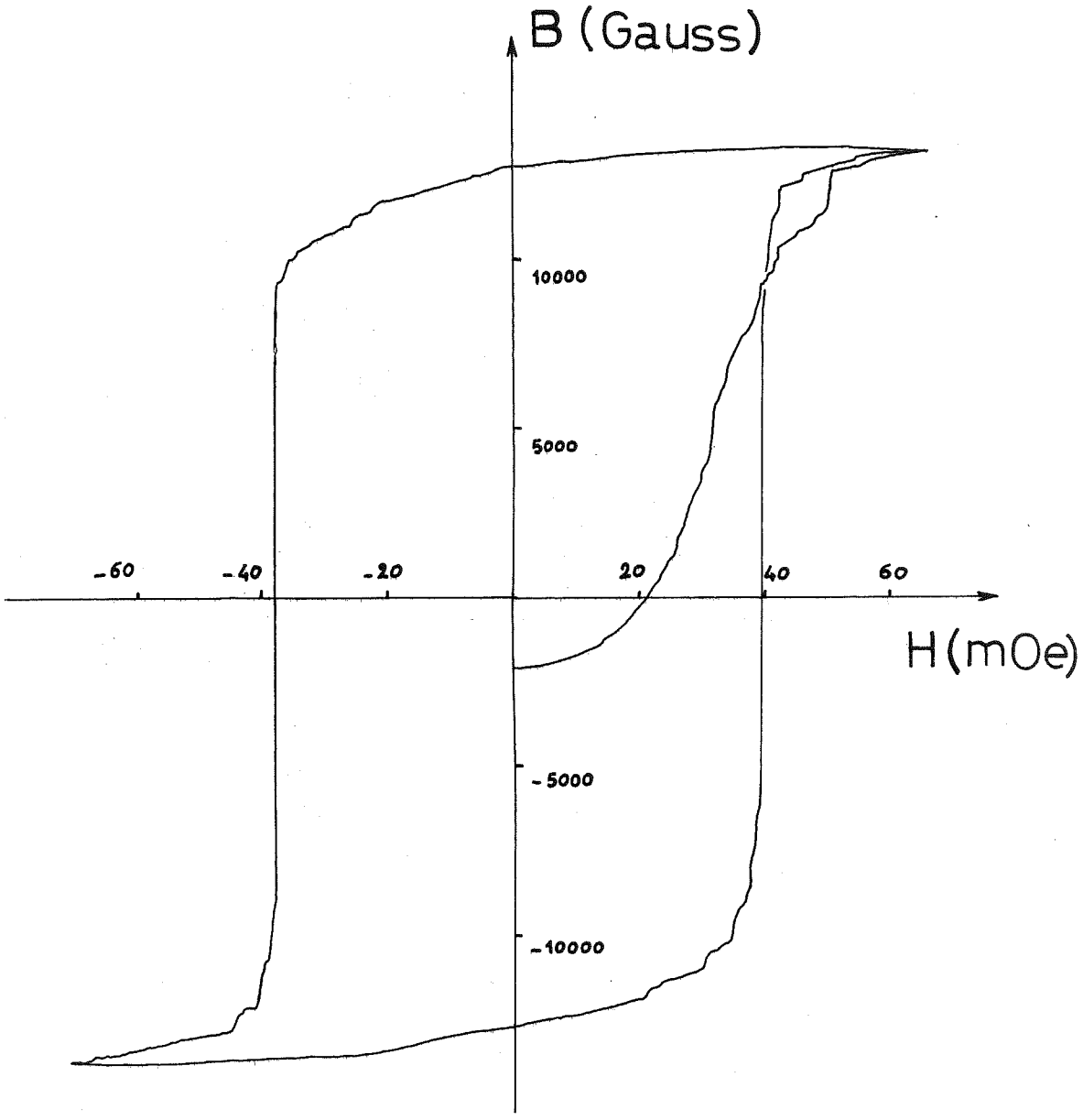


Fig. 8

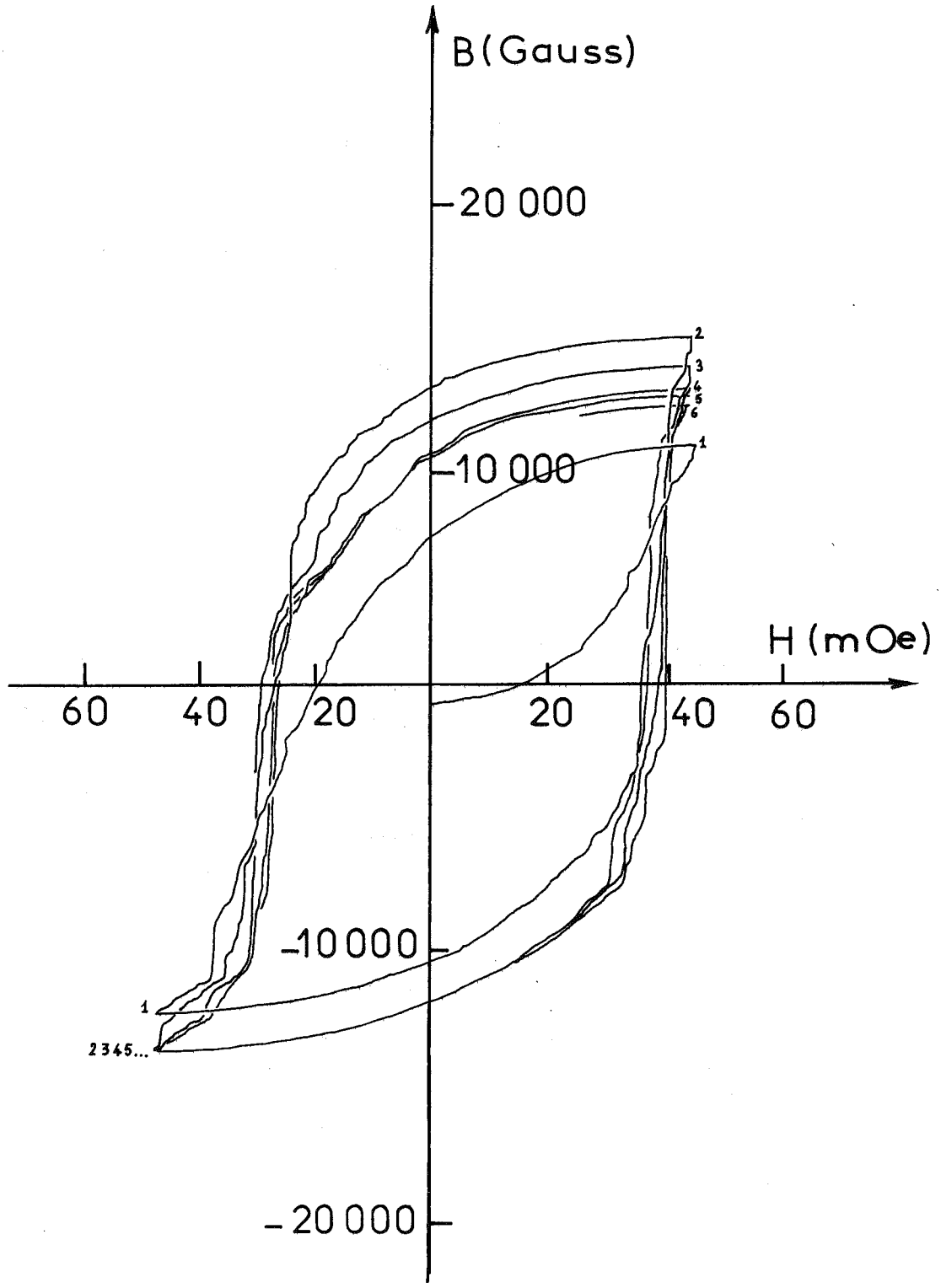

B(Gauss)
20 000
10 000
-10 000
-20 000
H (mOe)
60
40
20
20
40
60
1
2
3
4
5
6
1
1
2345...

Fig. 9

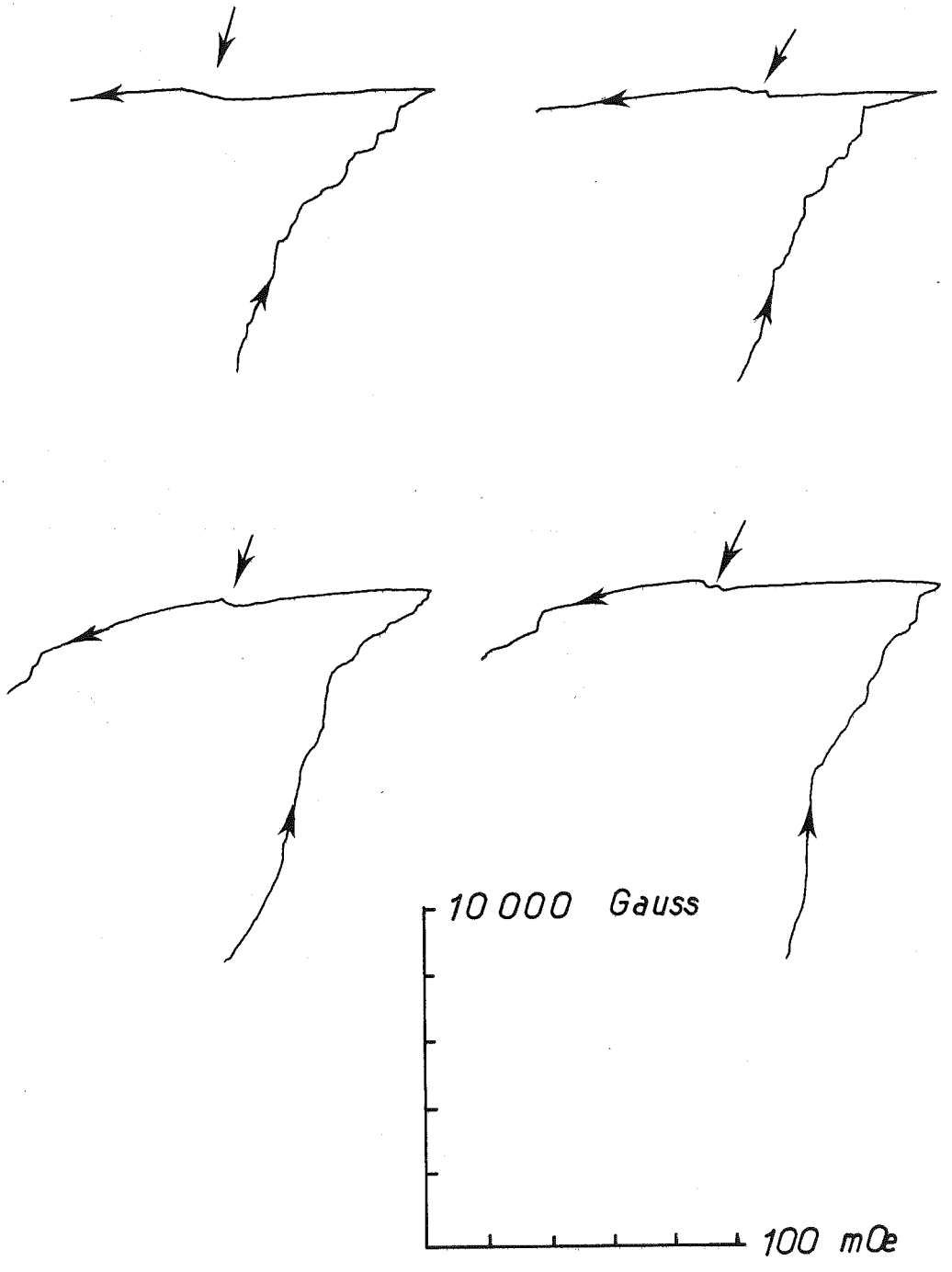


Fig. 10

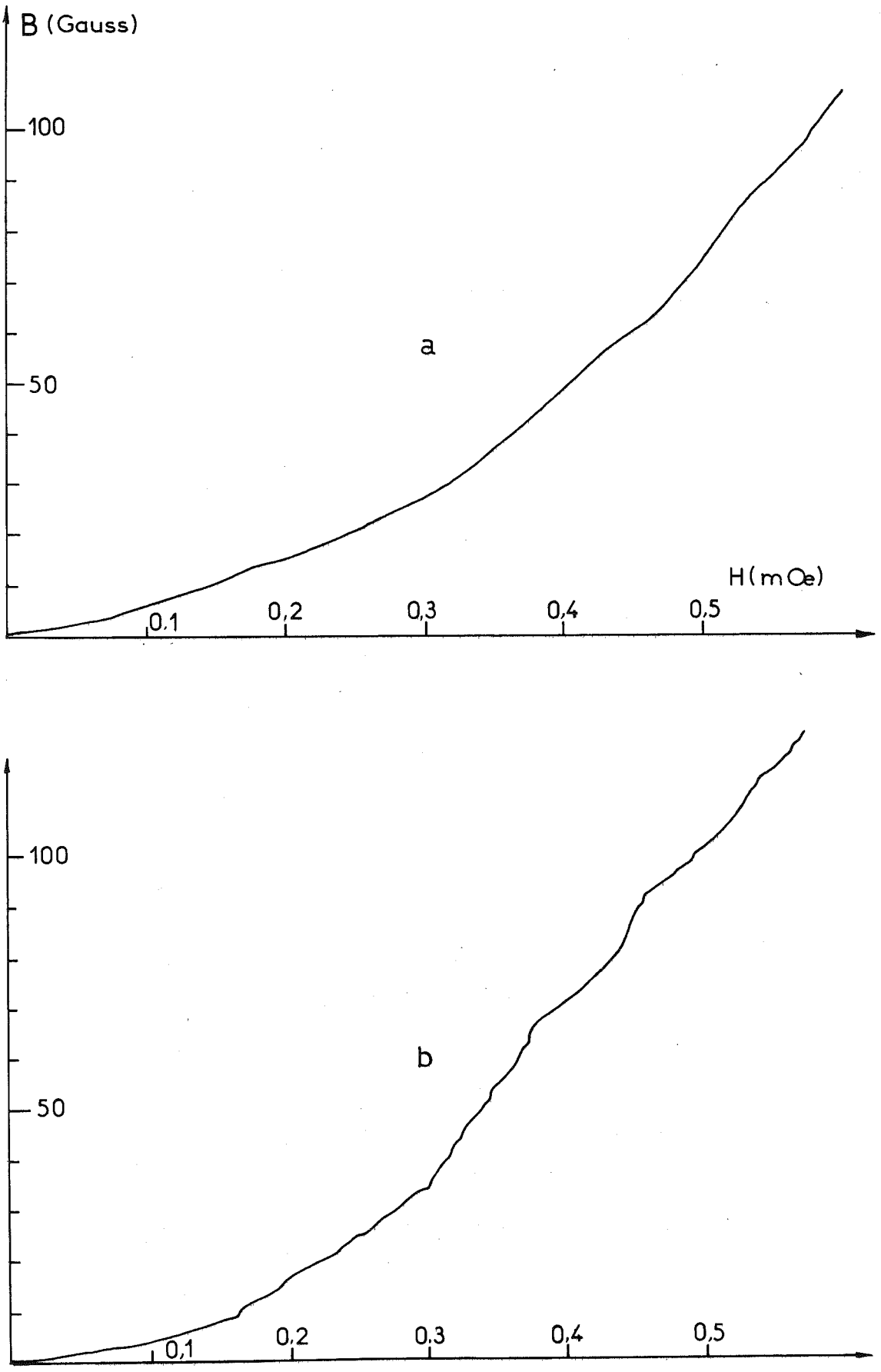
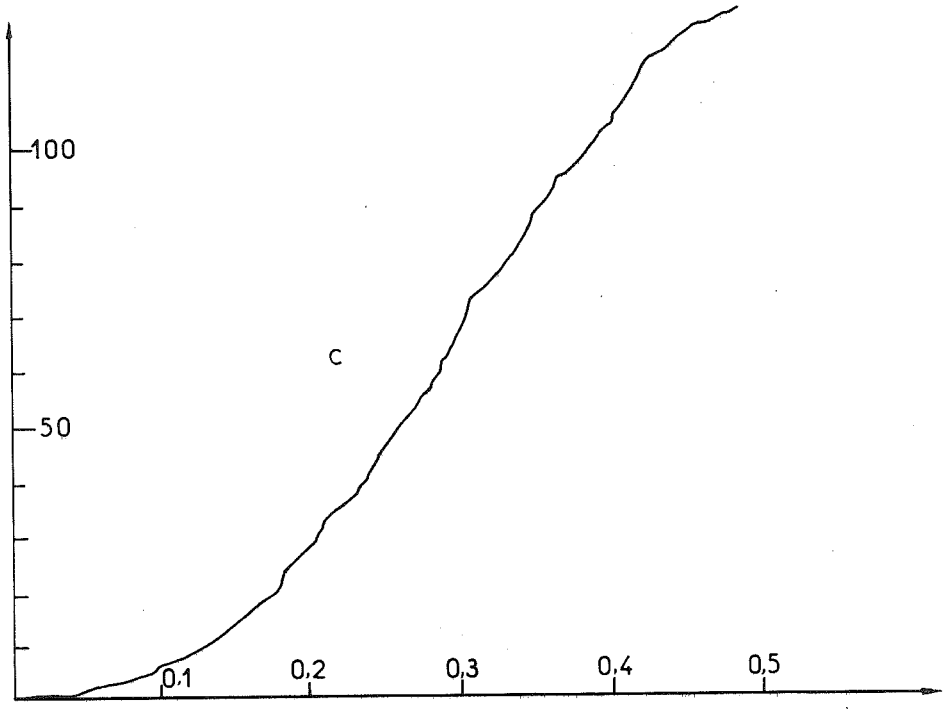


Fig. 11



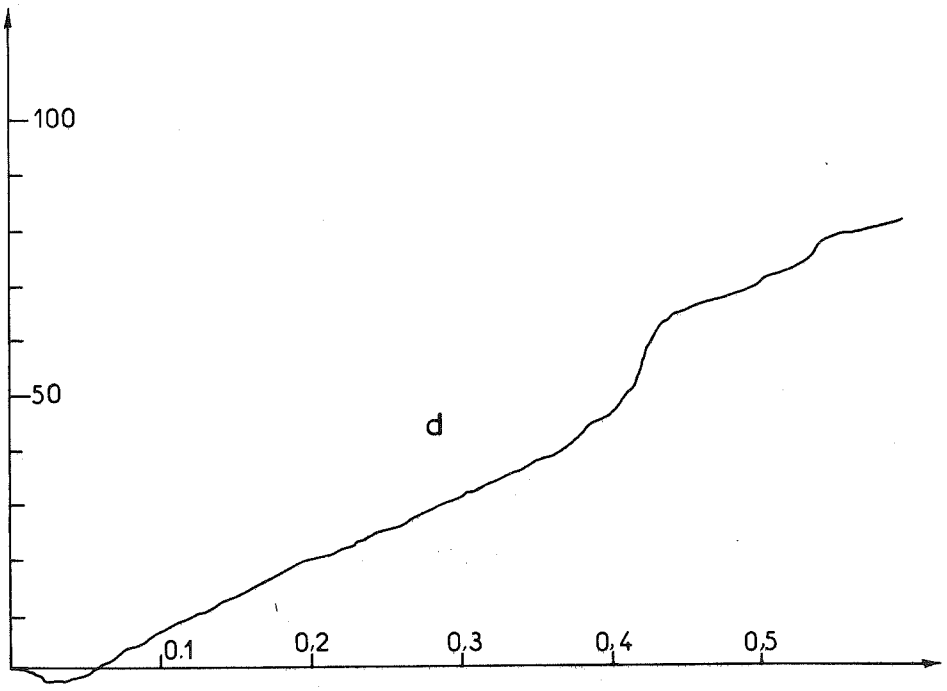


Fig.11 (Suite)

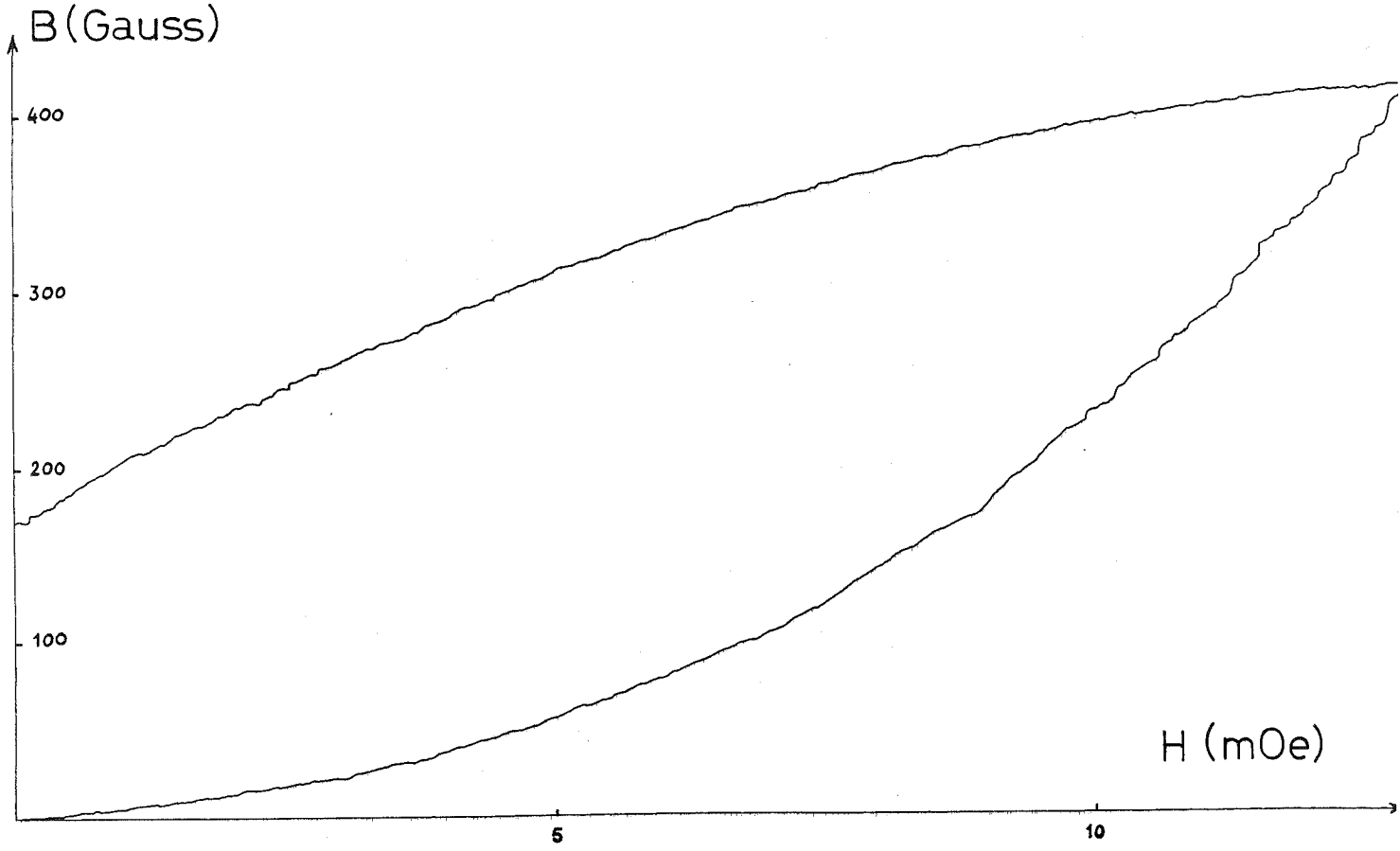
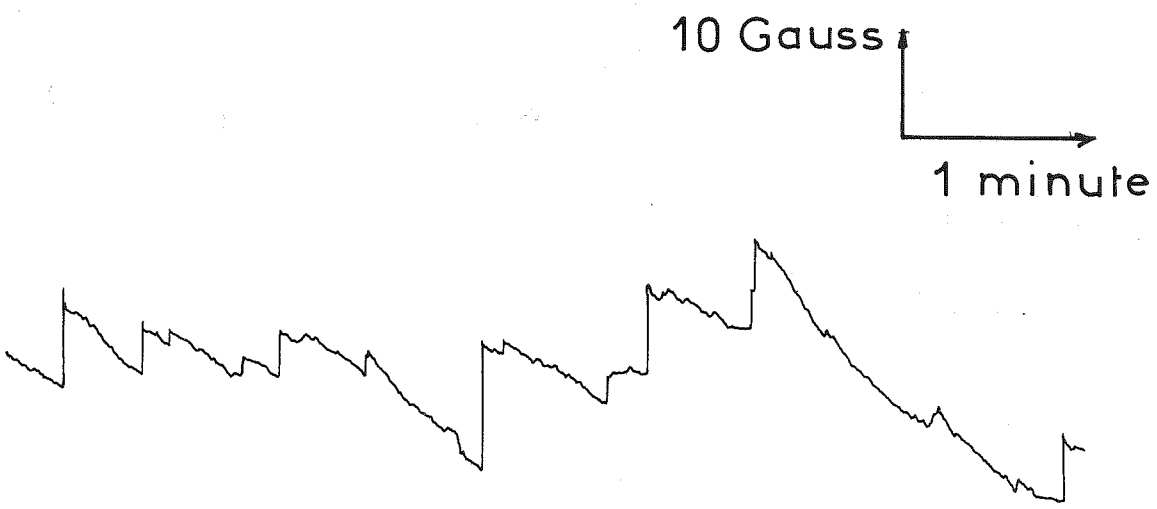
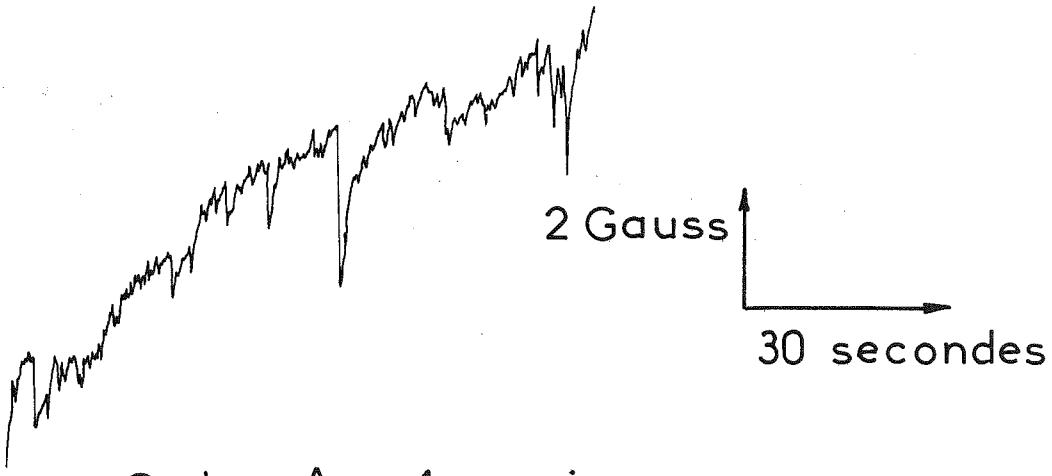


Fig. 12



Cadre A. 1 paroi

Fig. 13



Cadre A - 1 paroi

Traînage de fluctuation

Fig. 14

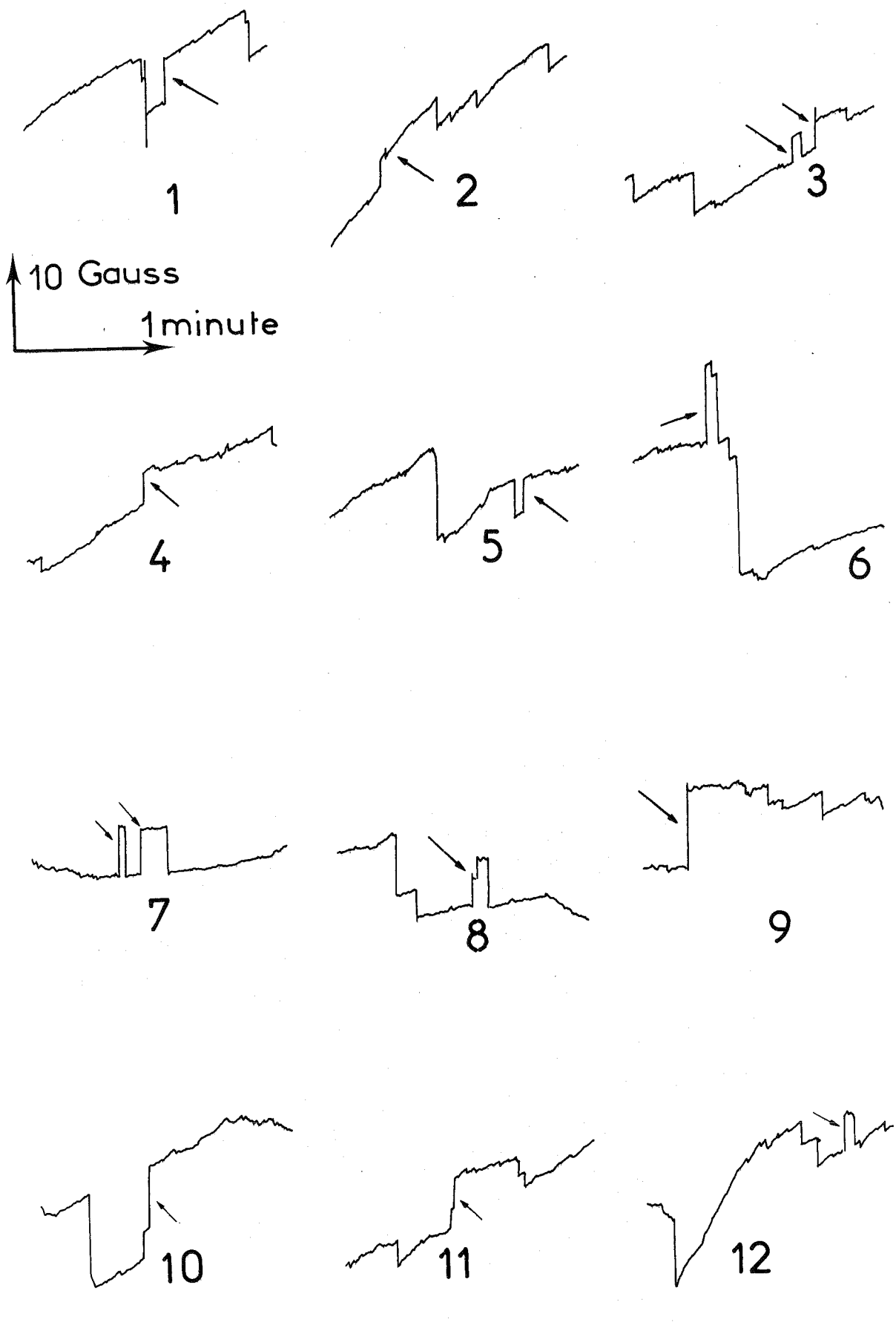


Fig. 15

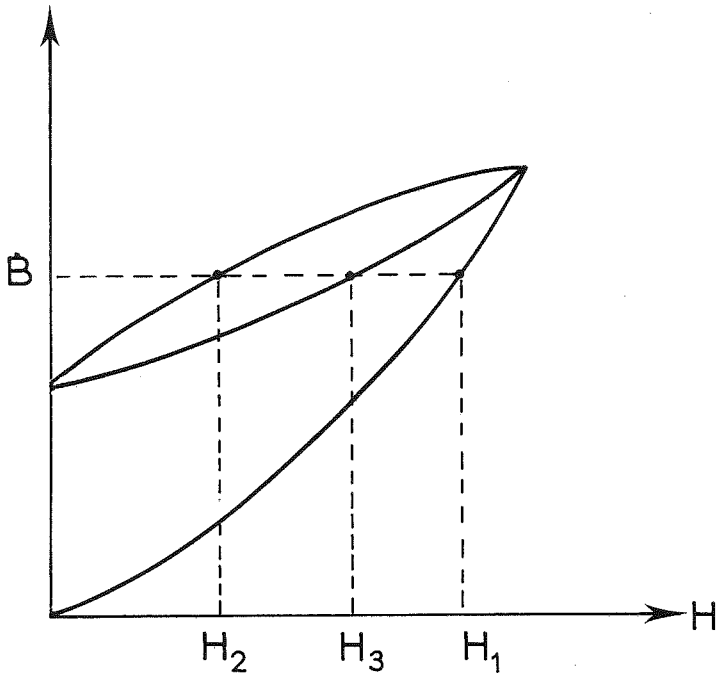


Fig. 16

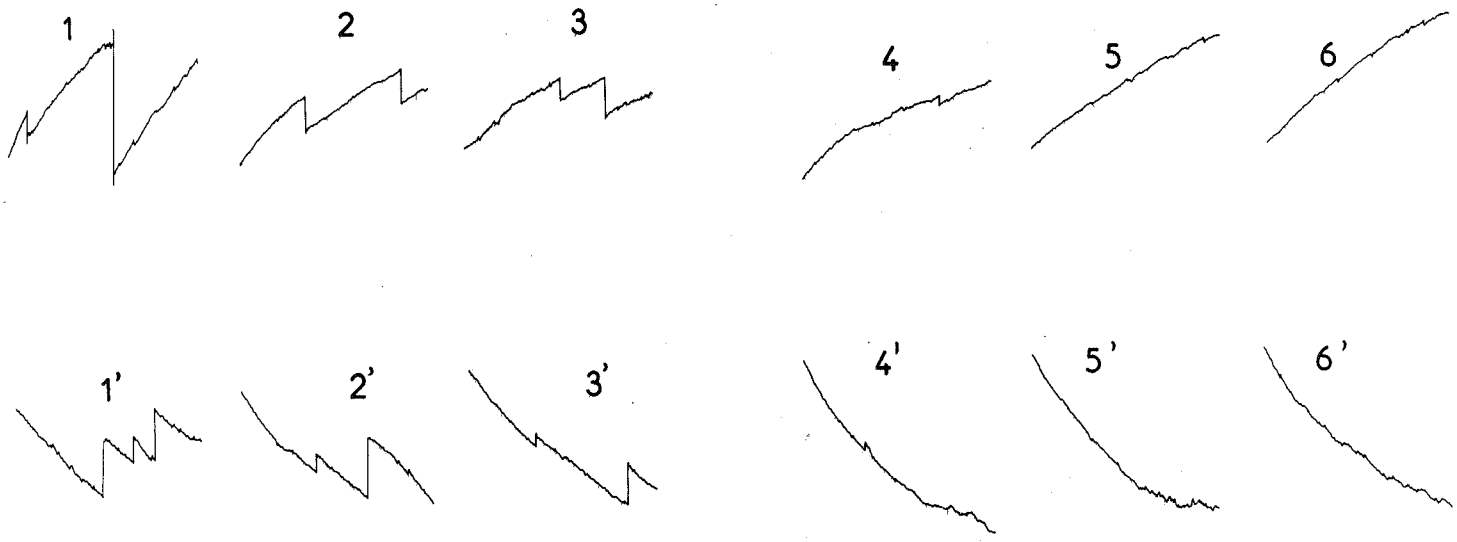
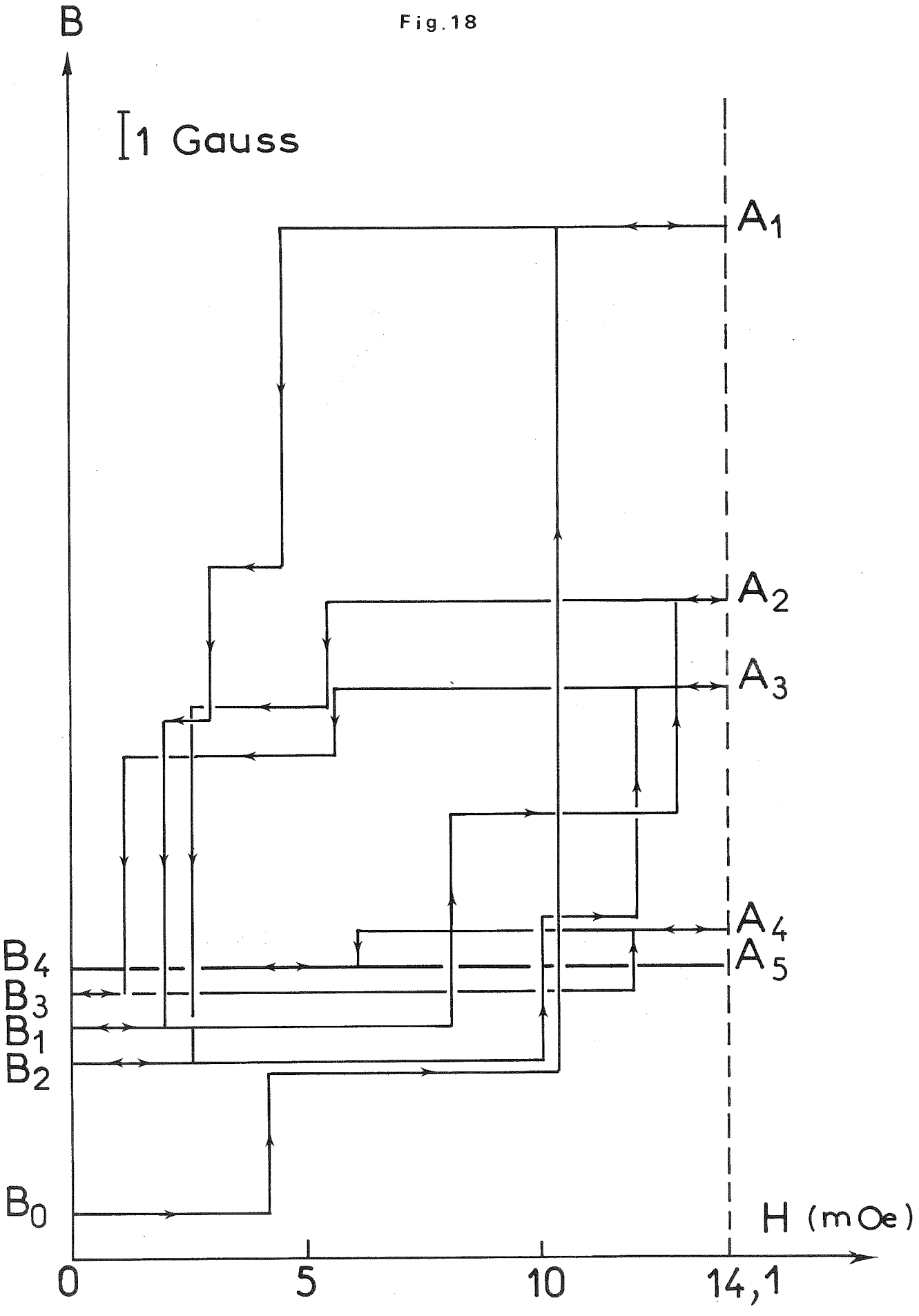


Fig.17

Fig.18



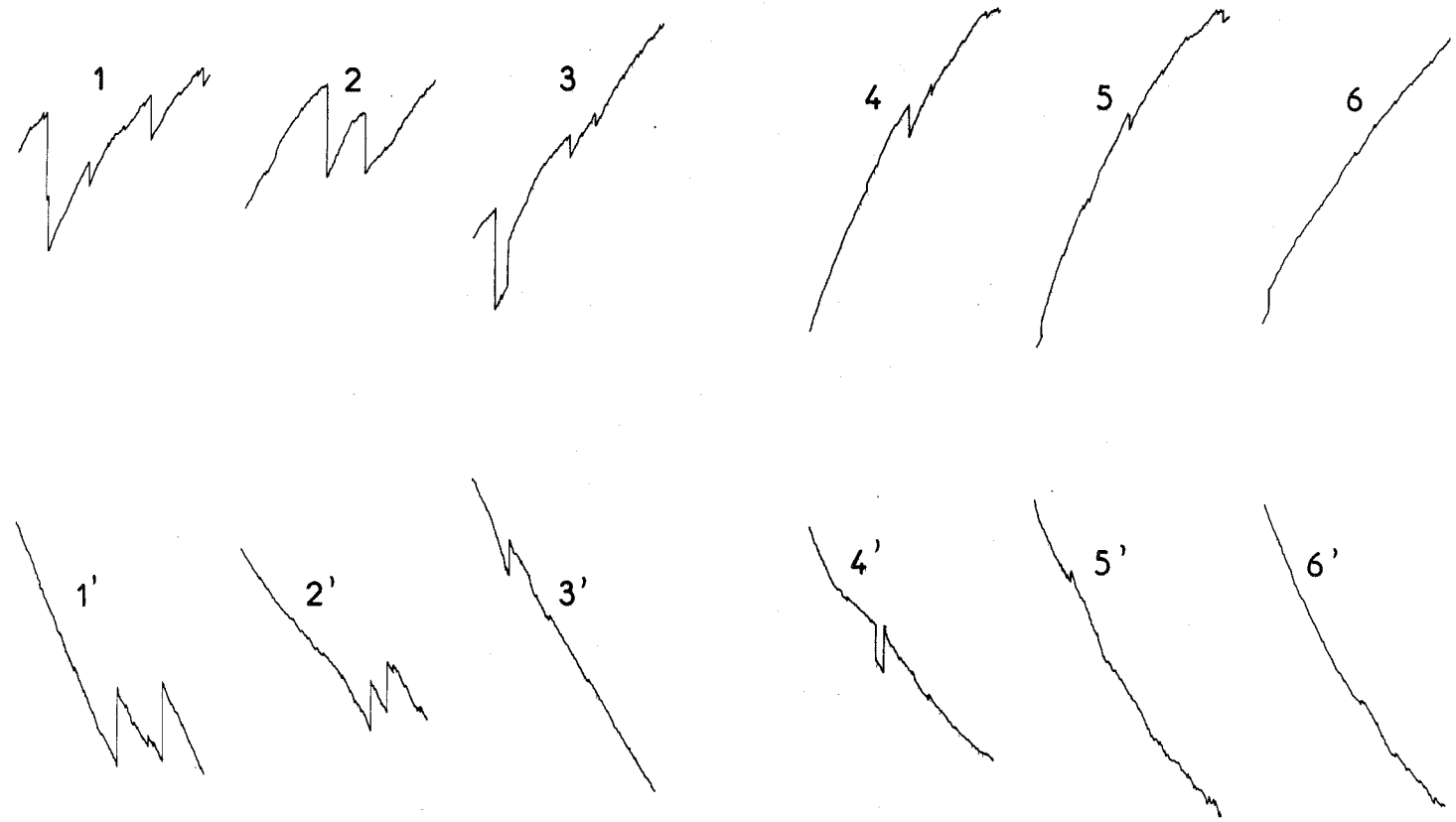


Fig.19

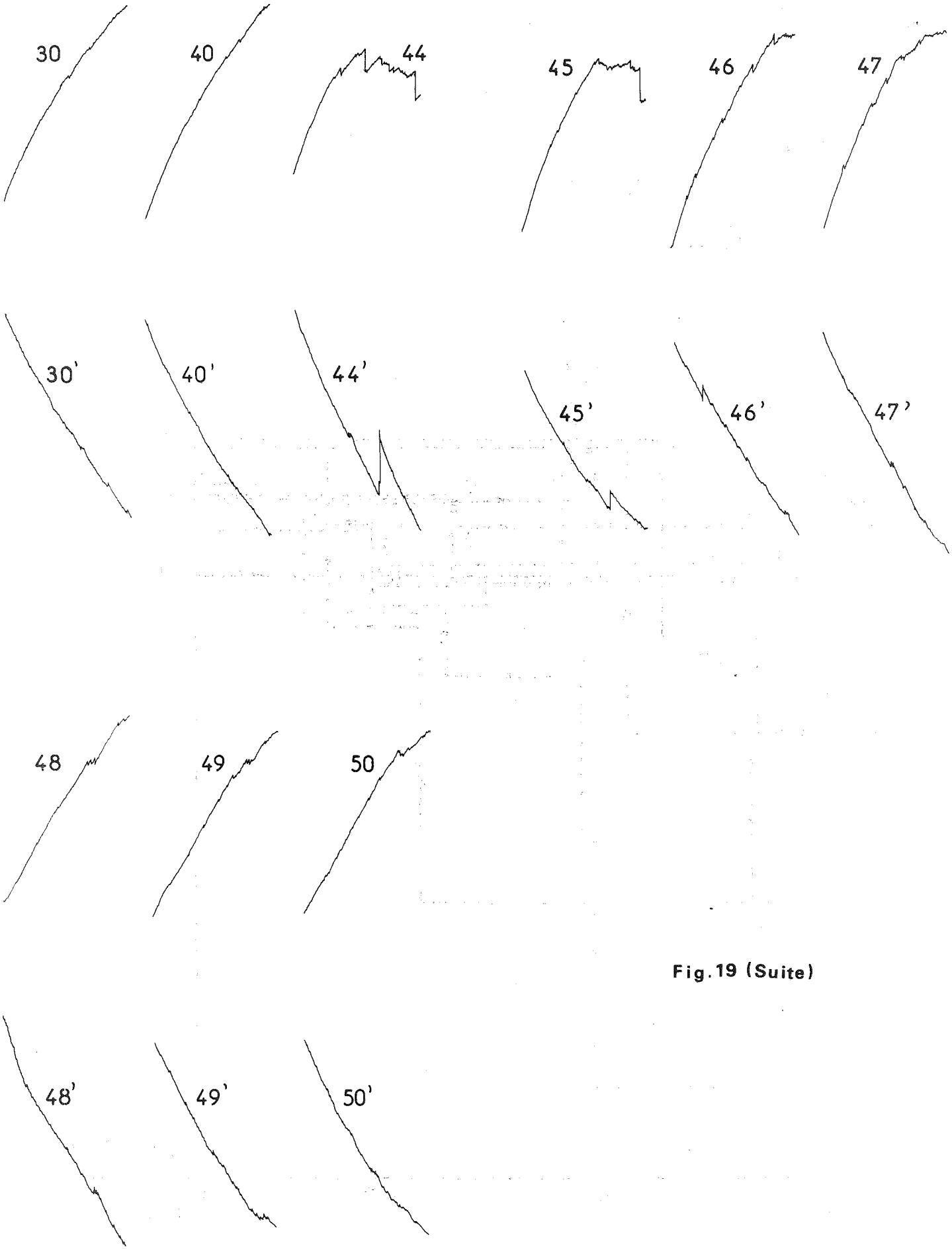


Fig.19 (Suite)

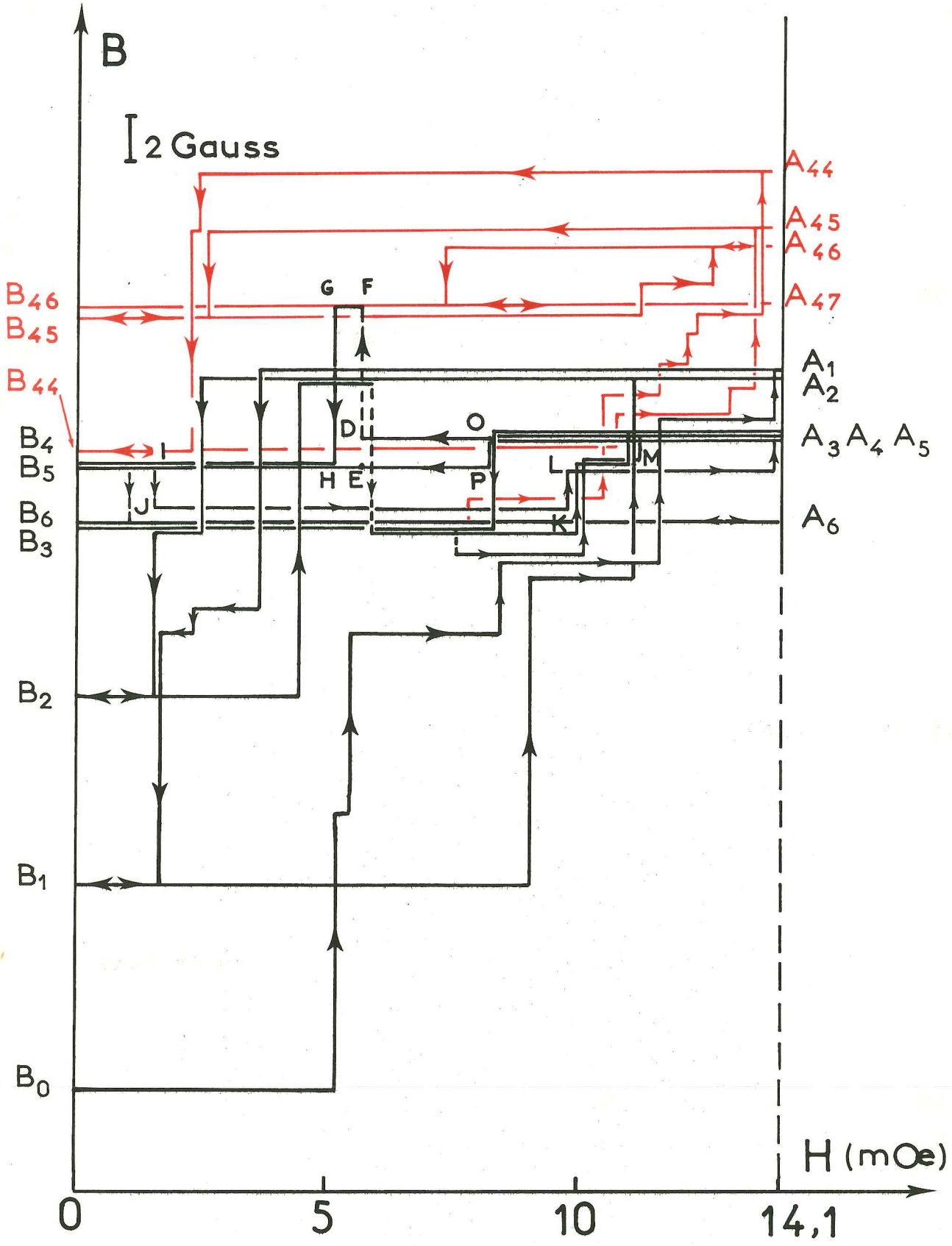
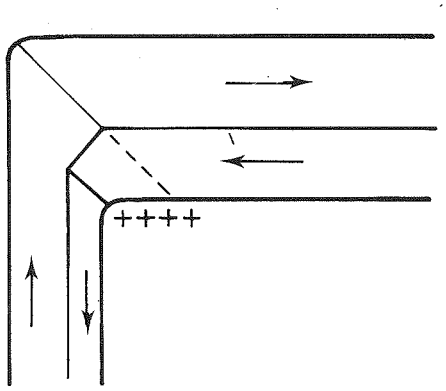

B
2 Gauss
A44
A45
A46
A47
B46
B45
B44
G
F
A1
A2
B4
B5
D
O
I
A3 A4 A5
H
E
P
L
M
J
B6
B3
K
A6
B2
B1
B0
H (mOe)
0
5
10
14,1

Fig. 20

Fig. 21a



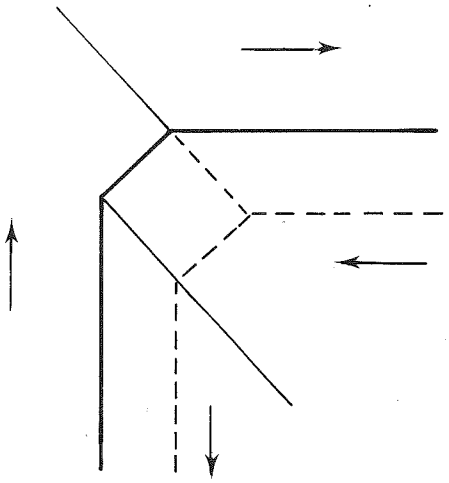


Fig. 21b

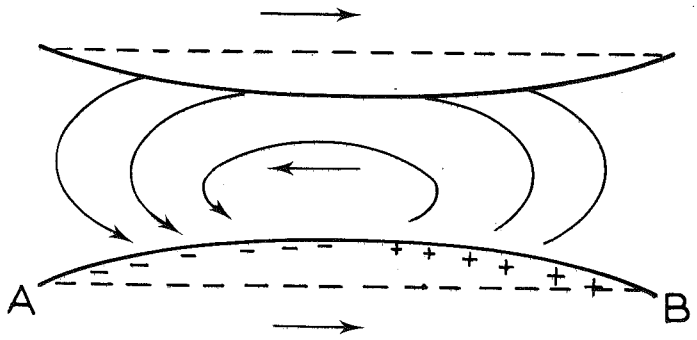


Fig. 22

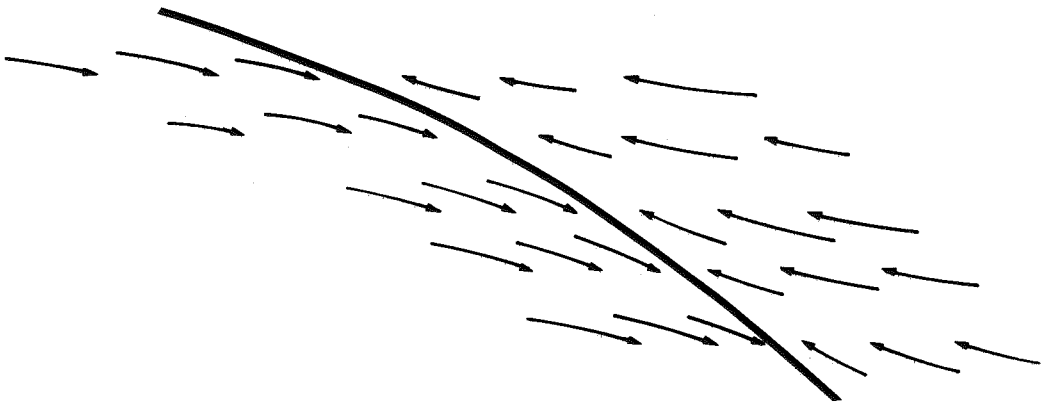


Fig. 23

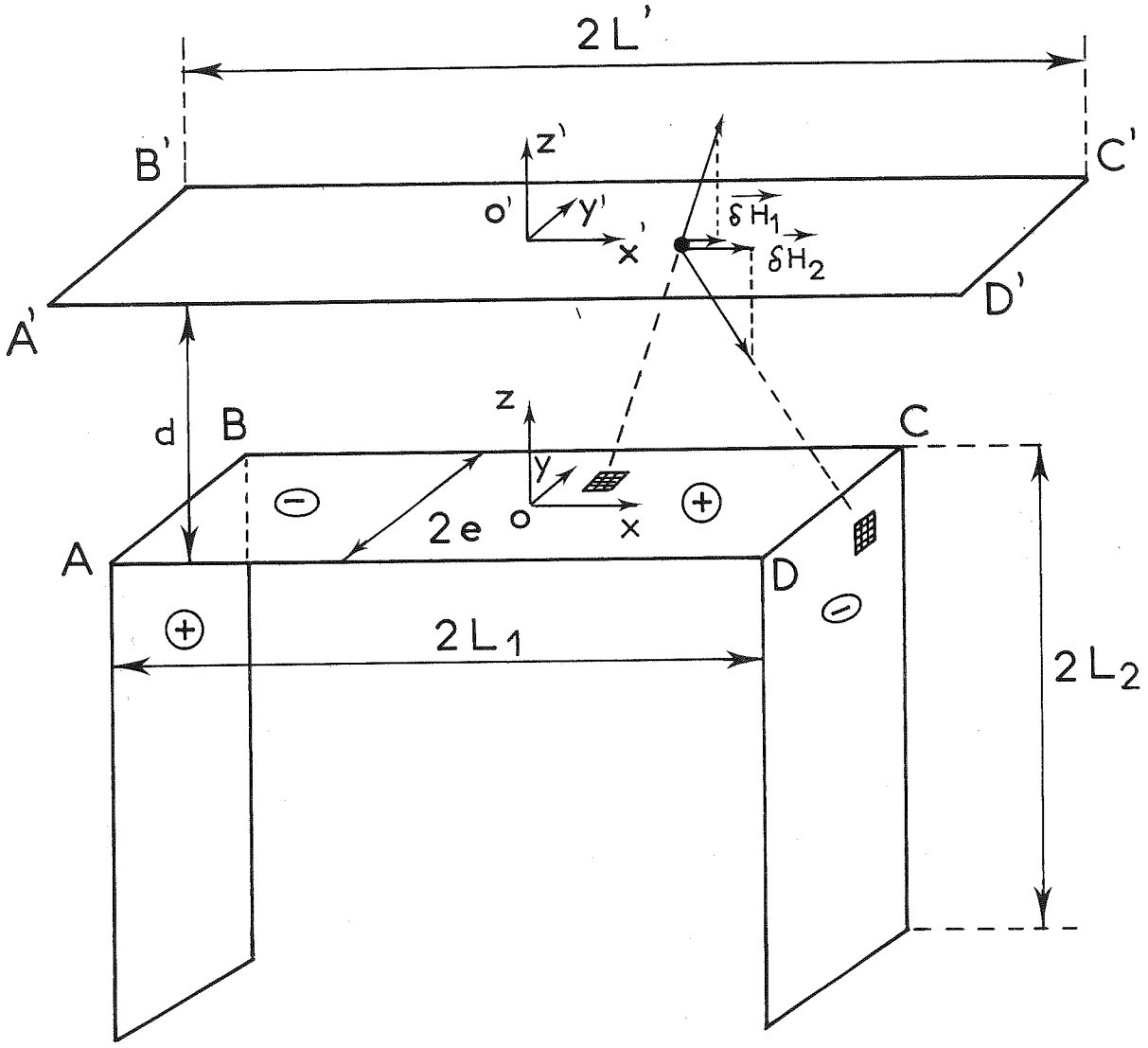


Fig. 24

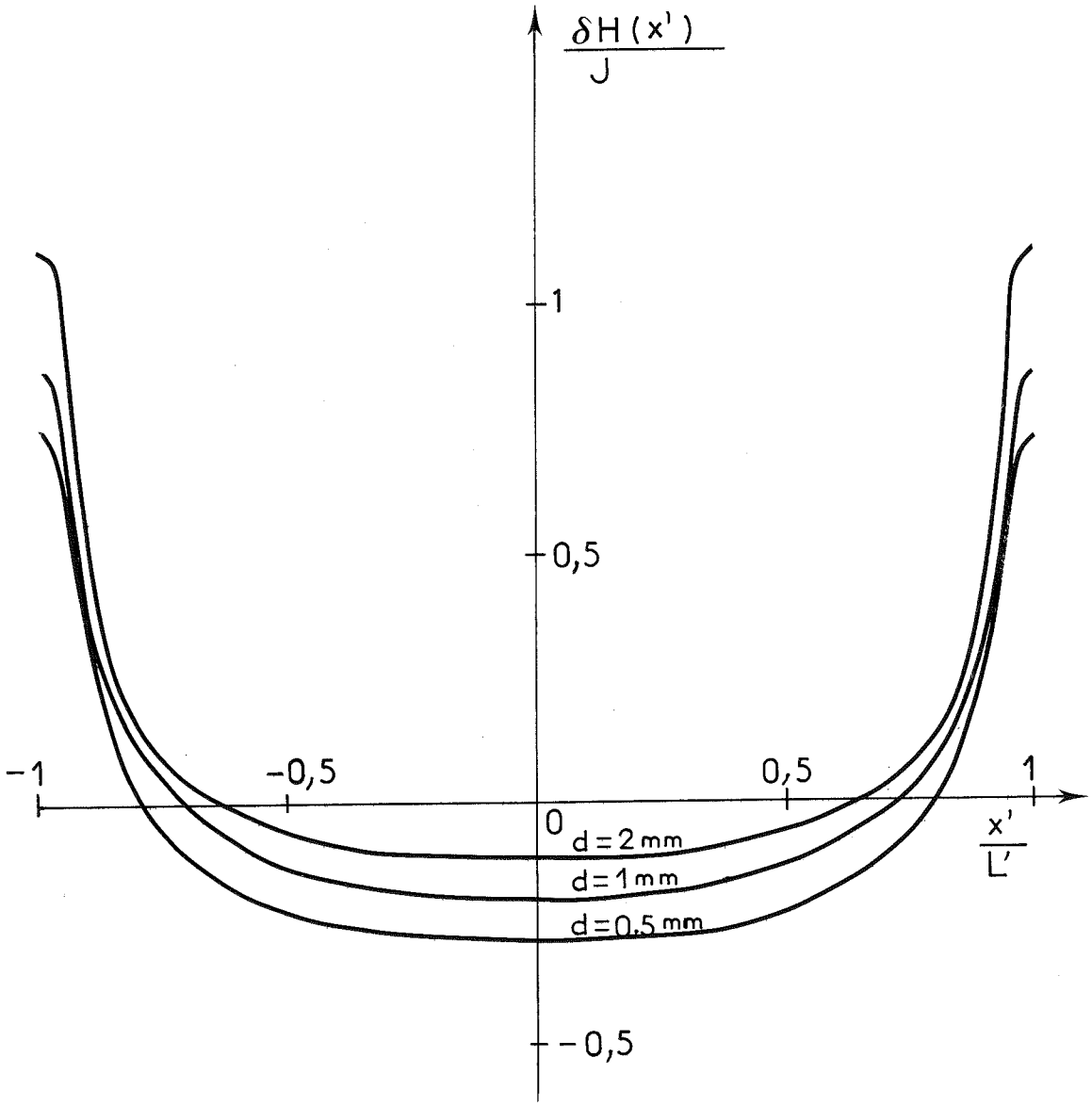


Fig. 25

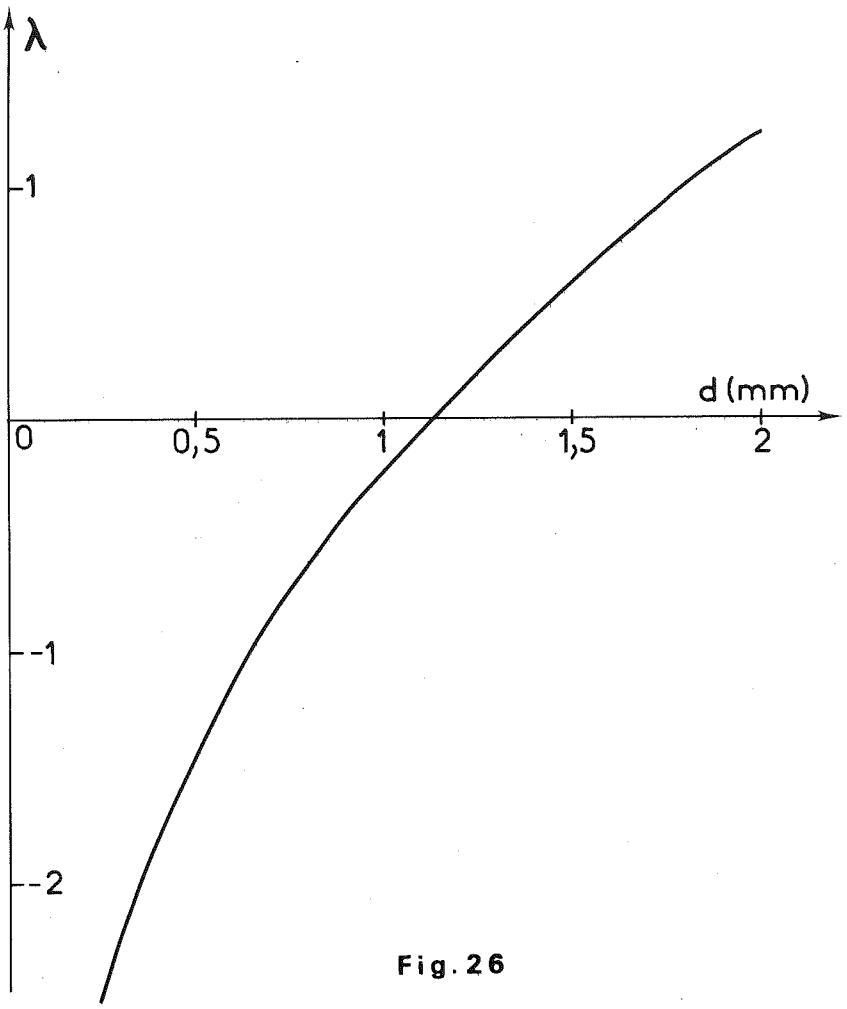


Fig. 26

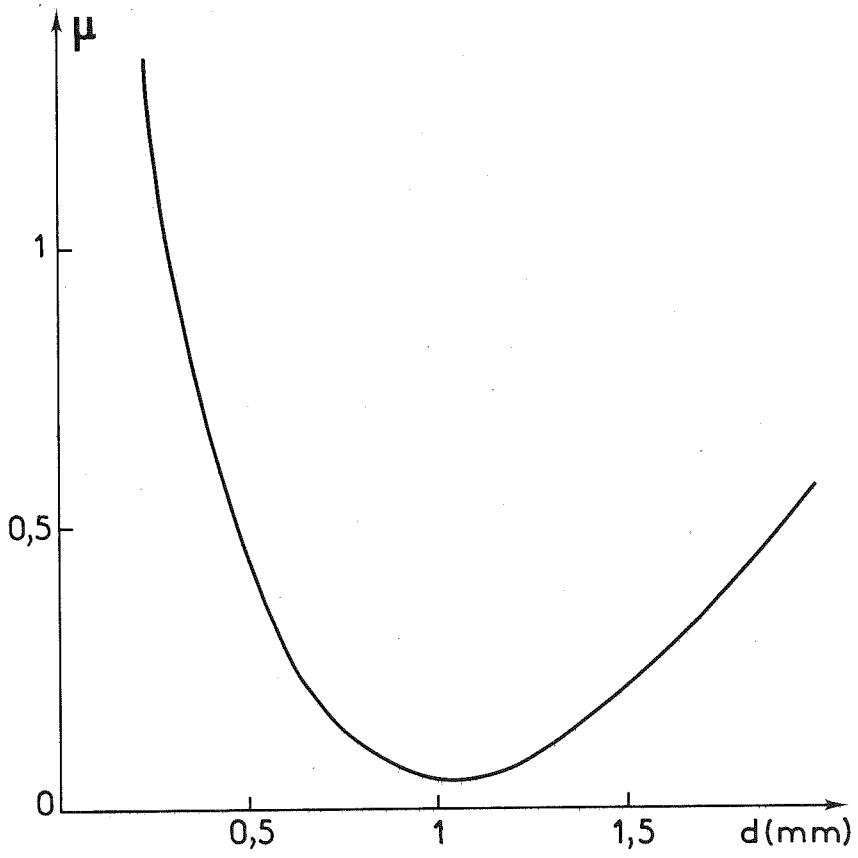


Fig. 27

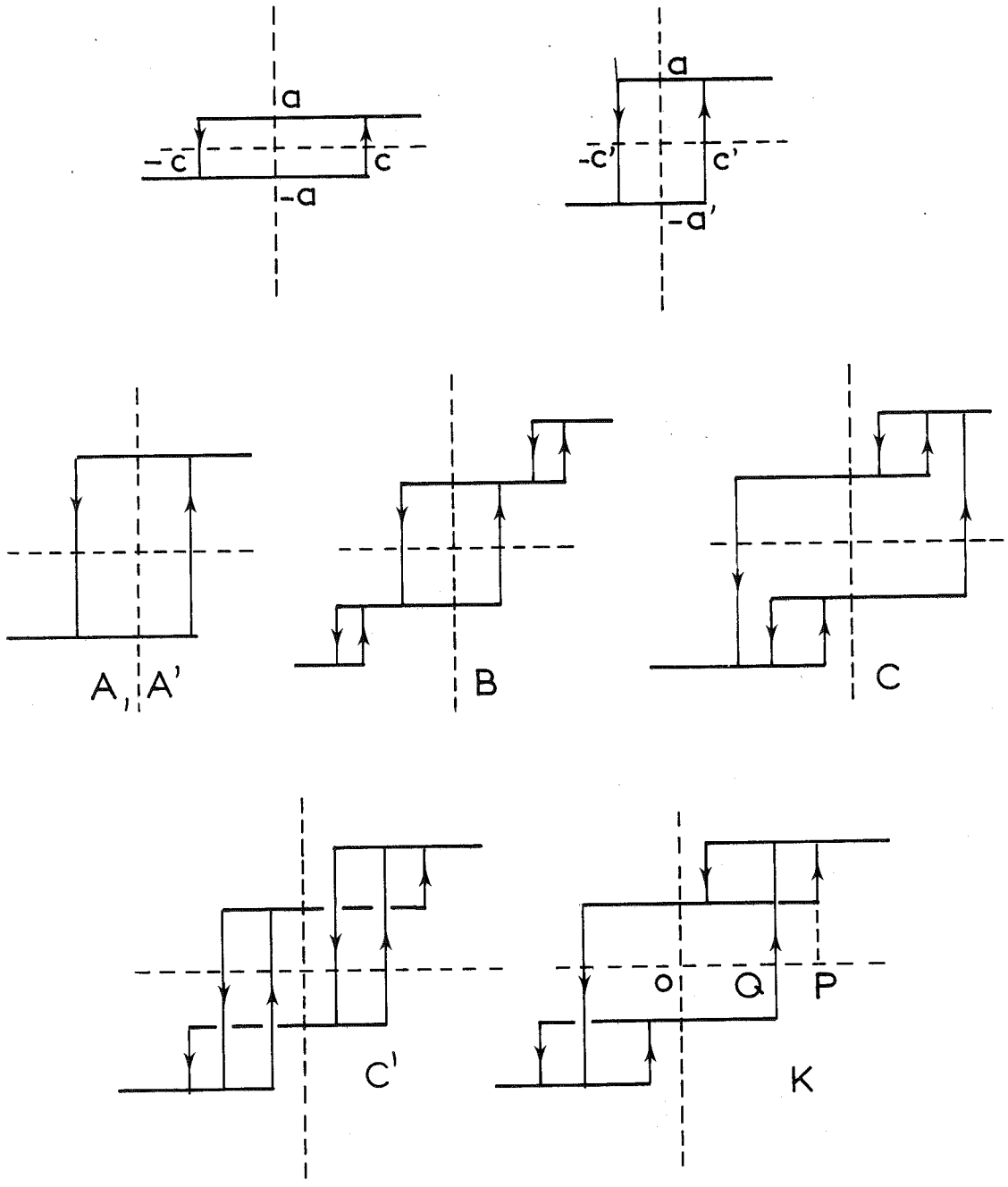


Fig. 28

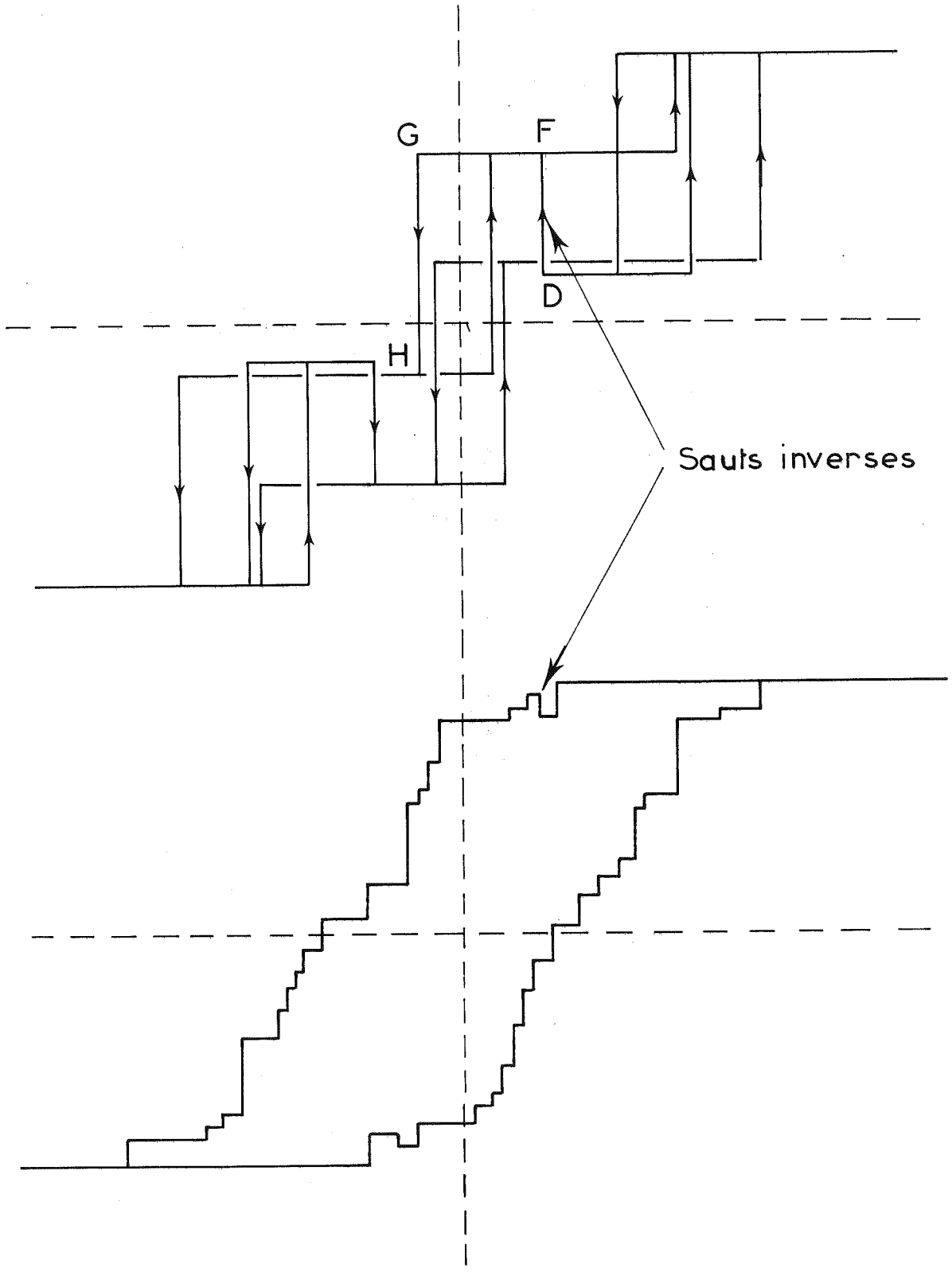


Fig. 29

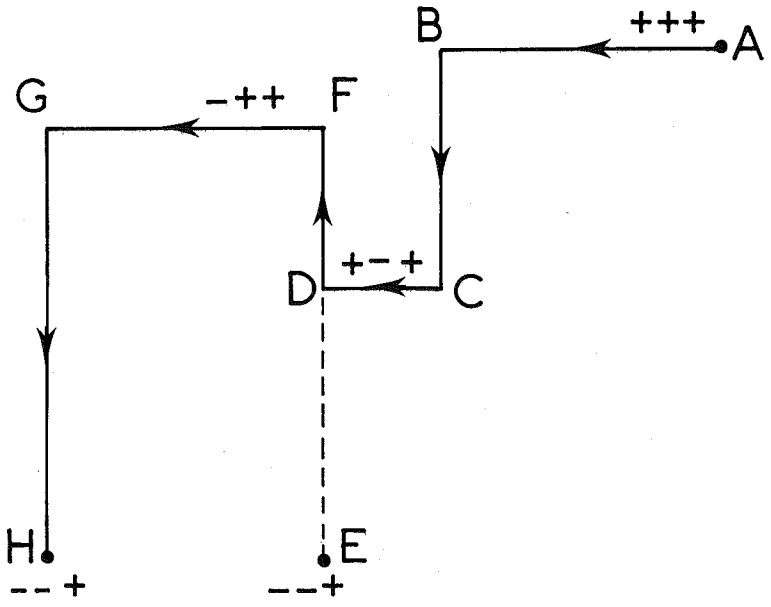


Fig.30

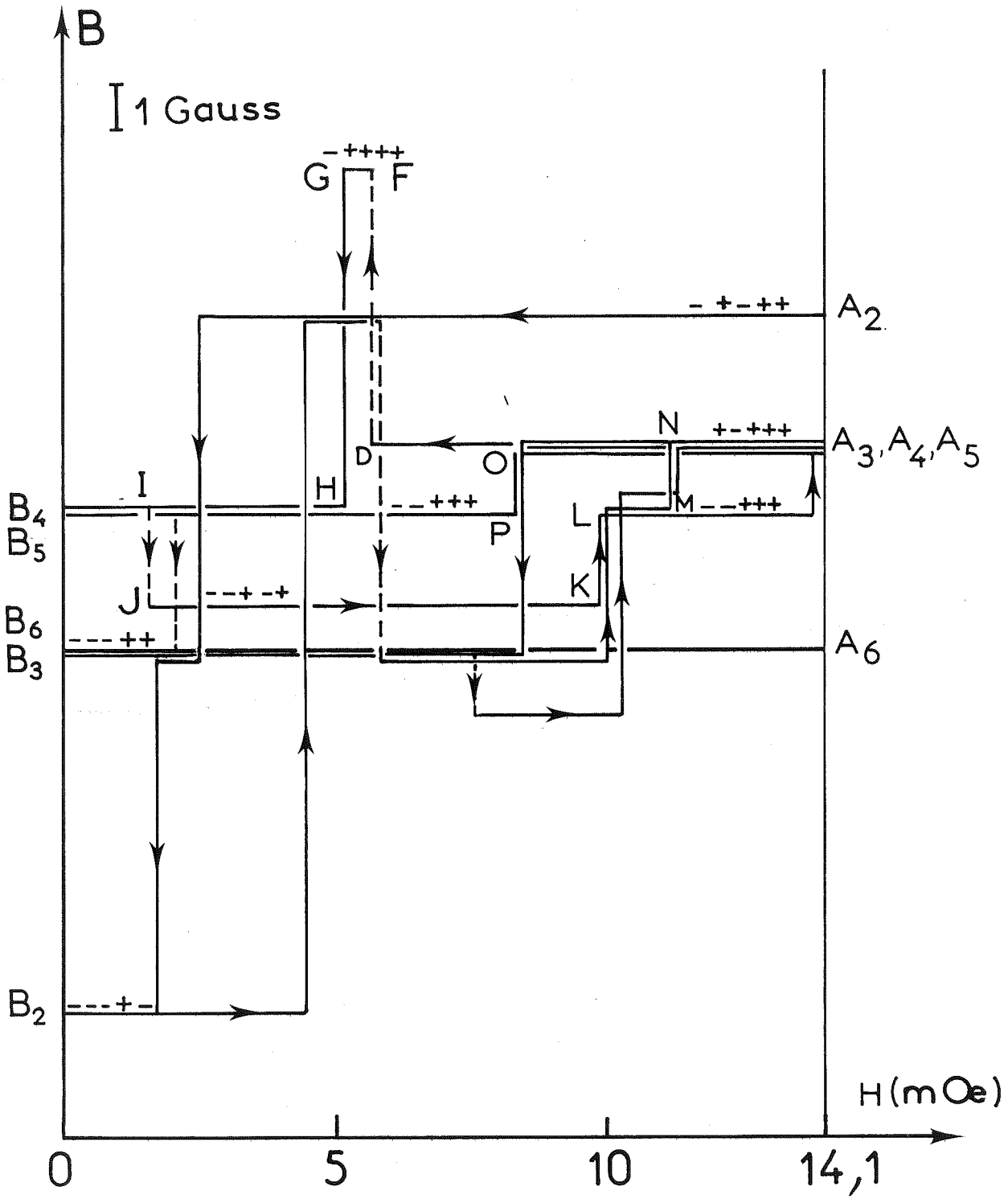

B
1 Gauss
G
F
- ++++
- +- ++
A2
N
+-+++
A3, A4, A5
D
O
I
H
B4
B5
--+++
M --+++
L
P
J
--+ -+
K
B6
B3
---++
A6
B2
---+-
H(mOe)
0
5
10
14,1

Fig. 31

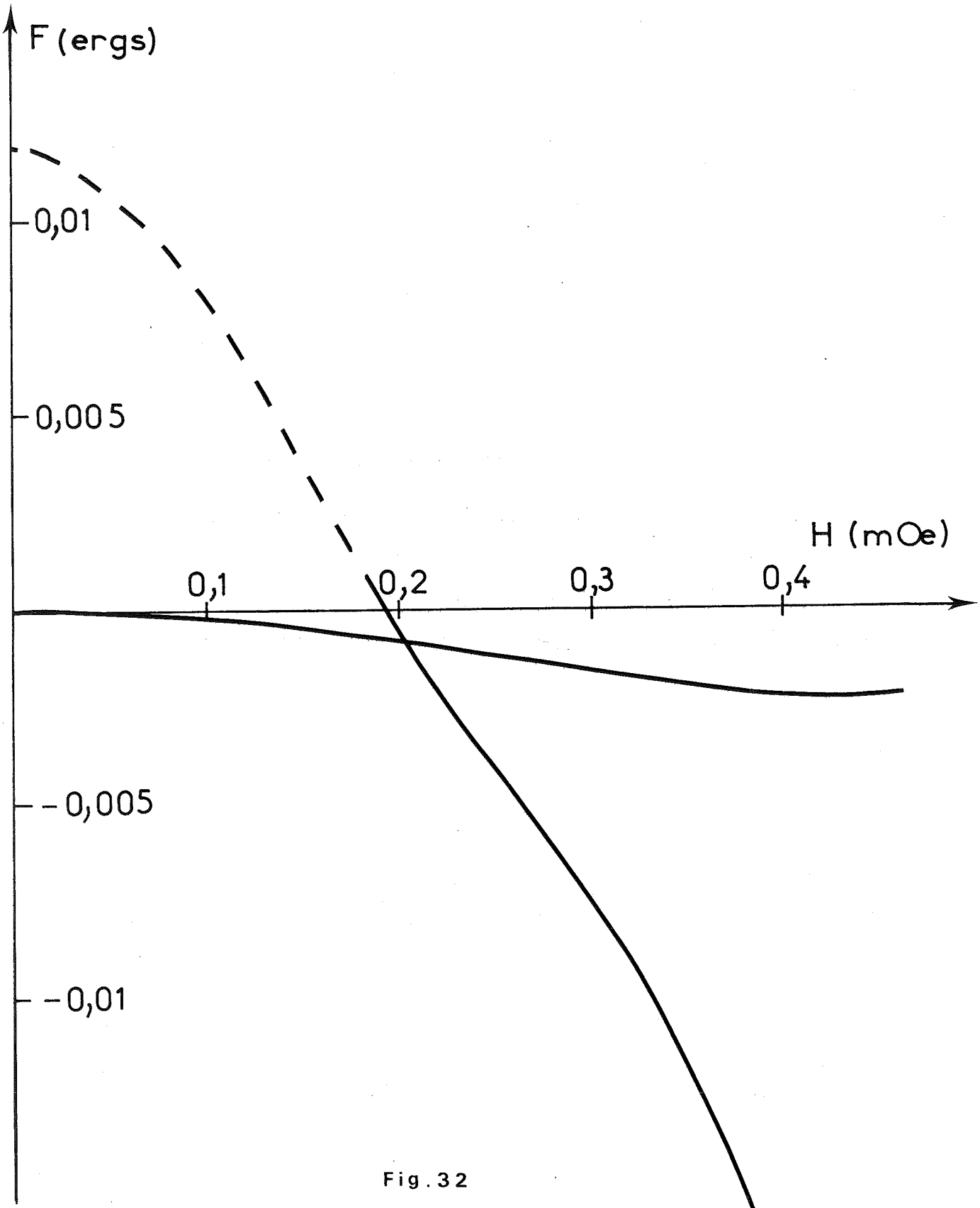


Fig. 32

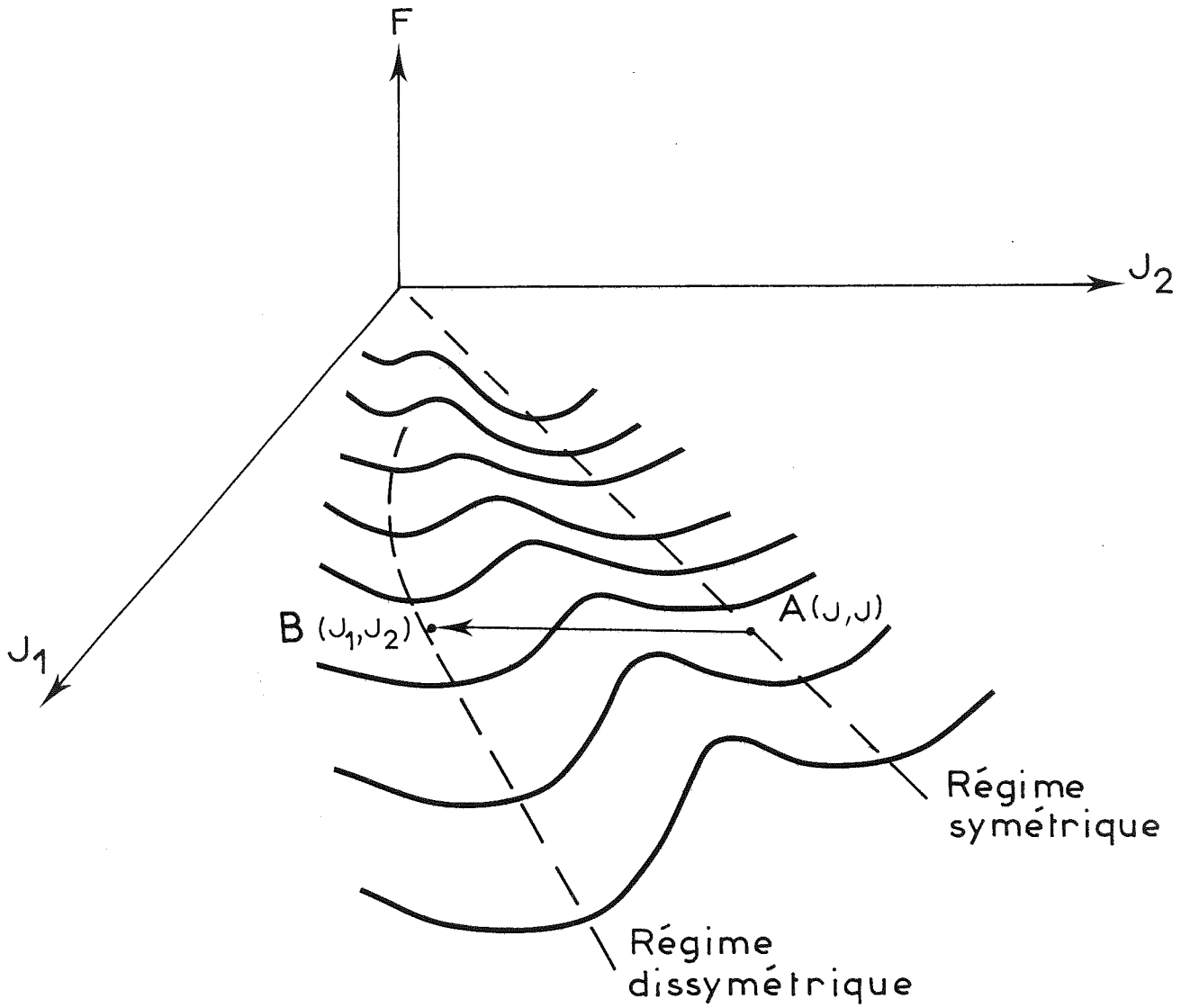


Fig. 33

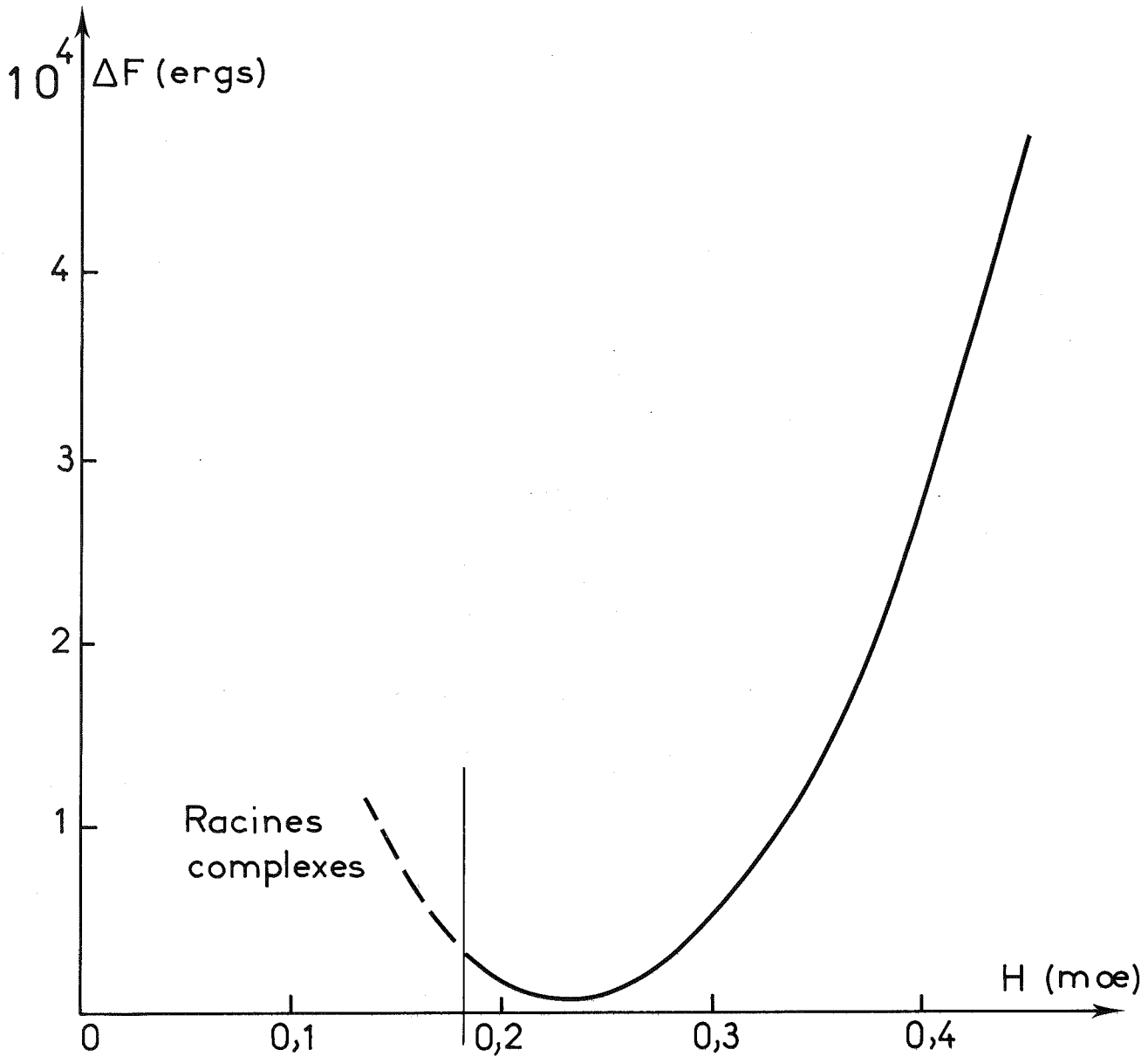


Fig.34

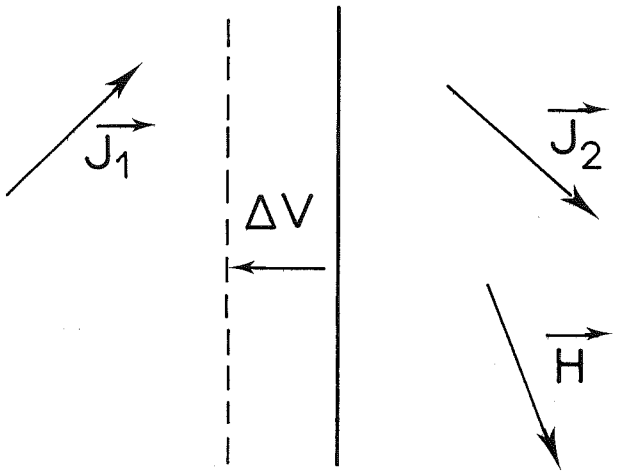


Fig. 35

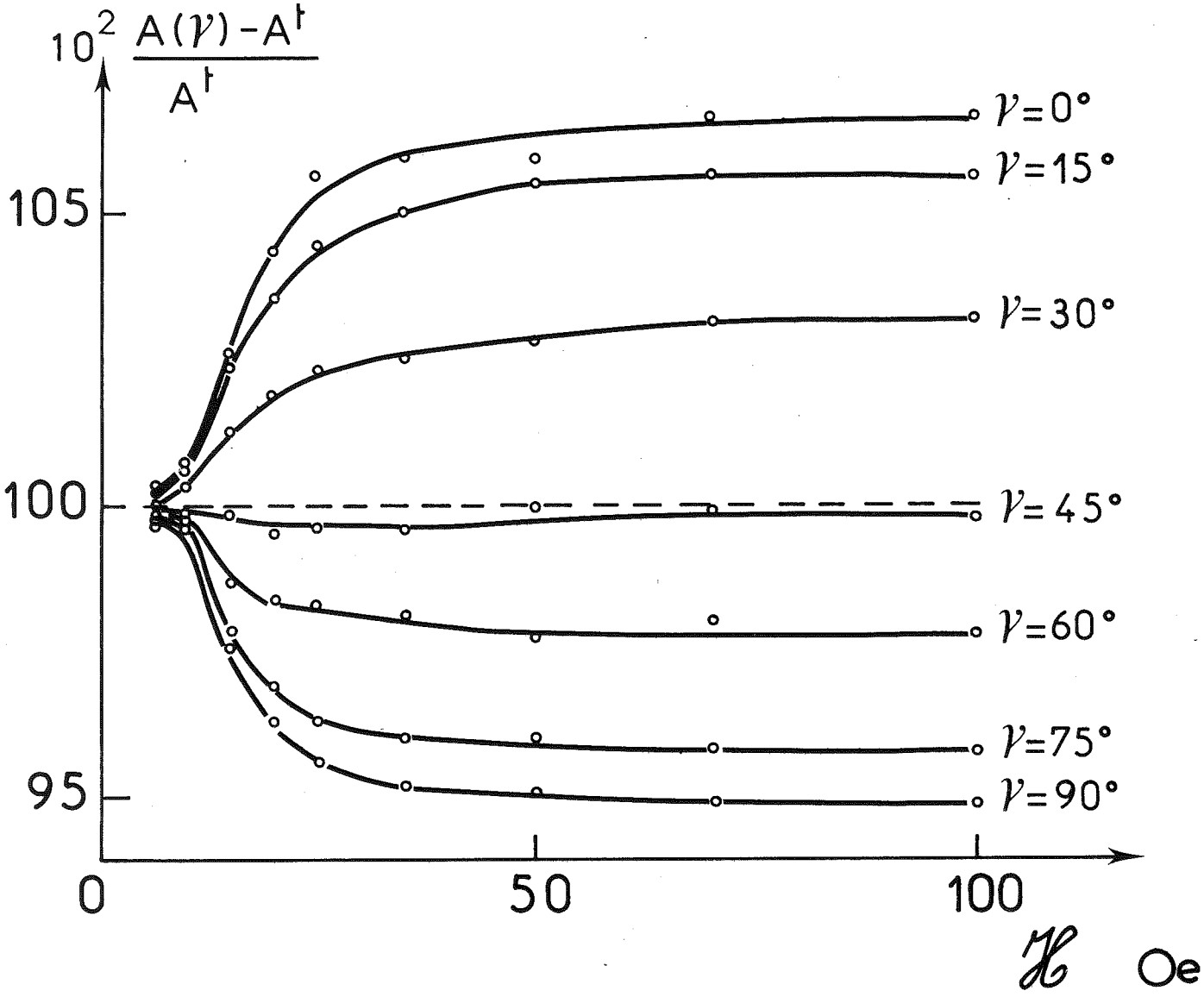

$10^2 \frac{A(\gamma)-A^{\perp}}{A^{\perp}}$
105
100
95
0
50
100
H Oe
γ=0°
γ=15°
γ=30°
γ=45°
γ=60°
γ=75°
γ=90°

Fig. 36

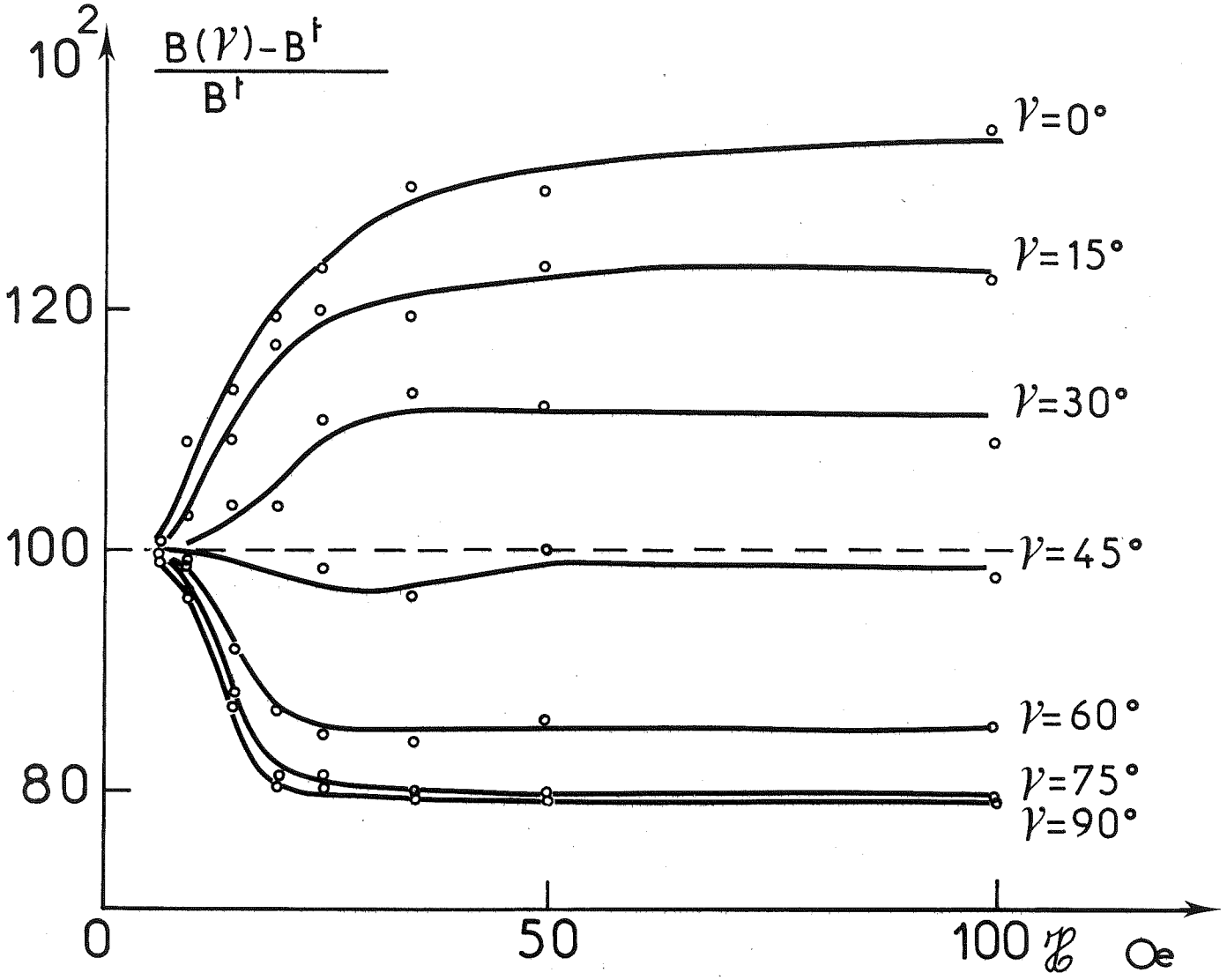

10^2
$\frac{B(\gamma)-B^t}{B^t}$
120
100
80
0
50
100
$\mathcal{H}$ Oe
$\gamma=0°$
$\gamma=15°$
$\gamma=30°$
$\gamma=45°$
$\gamma=60°$
$\gamma=75°$
$\gamma=90°$

Fig. 37

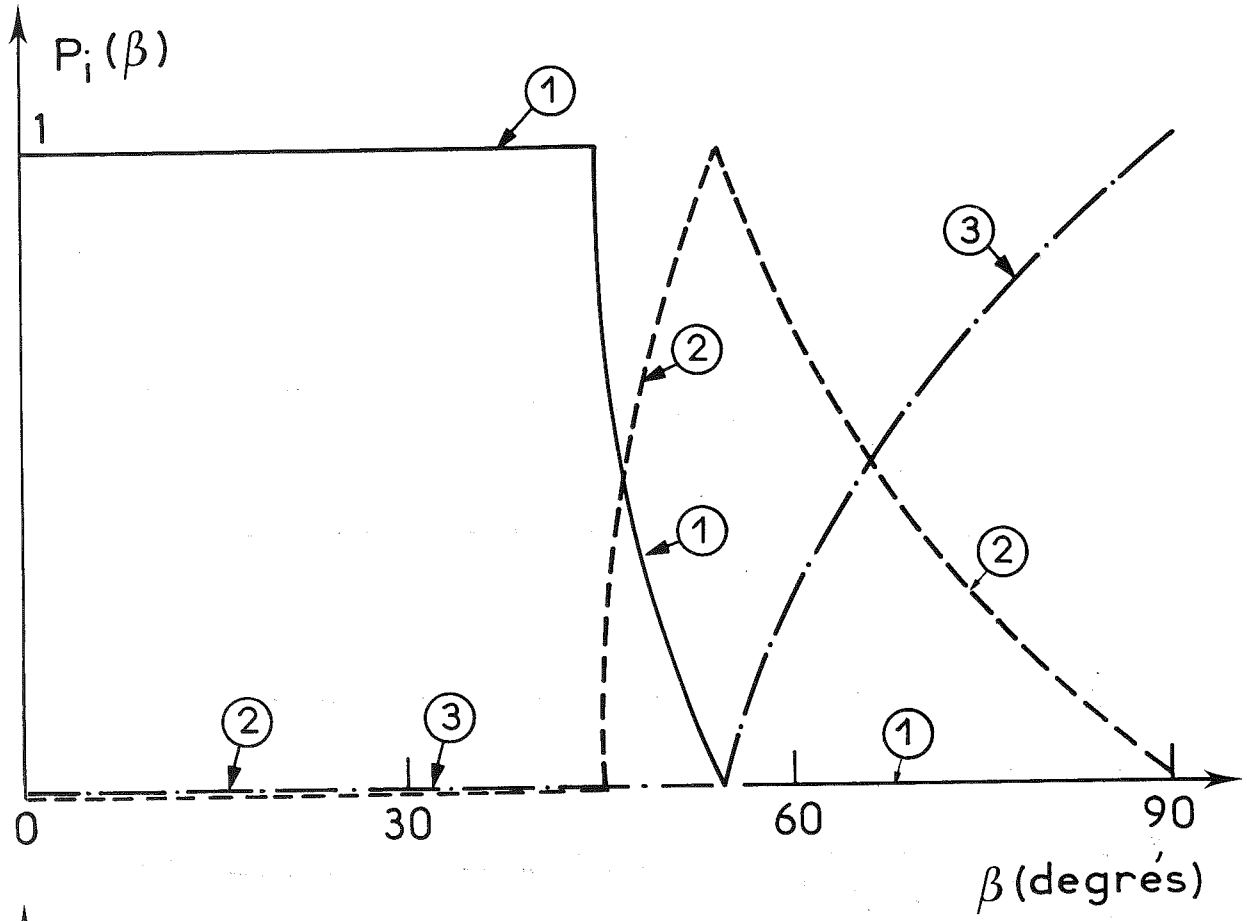

$P_i(\beta)$
1
0
30
60
90
β (degrés)

Fig. 38

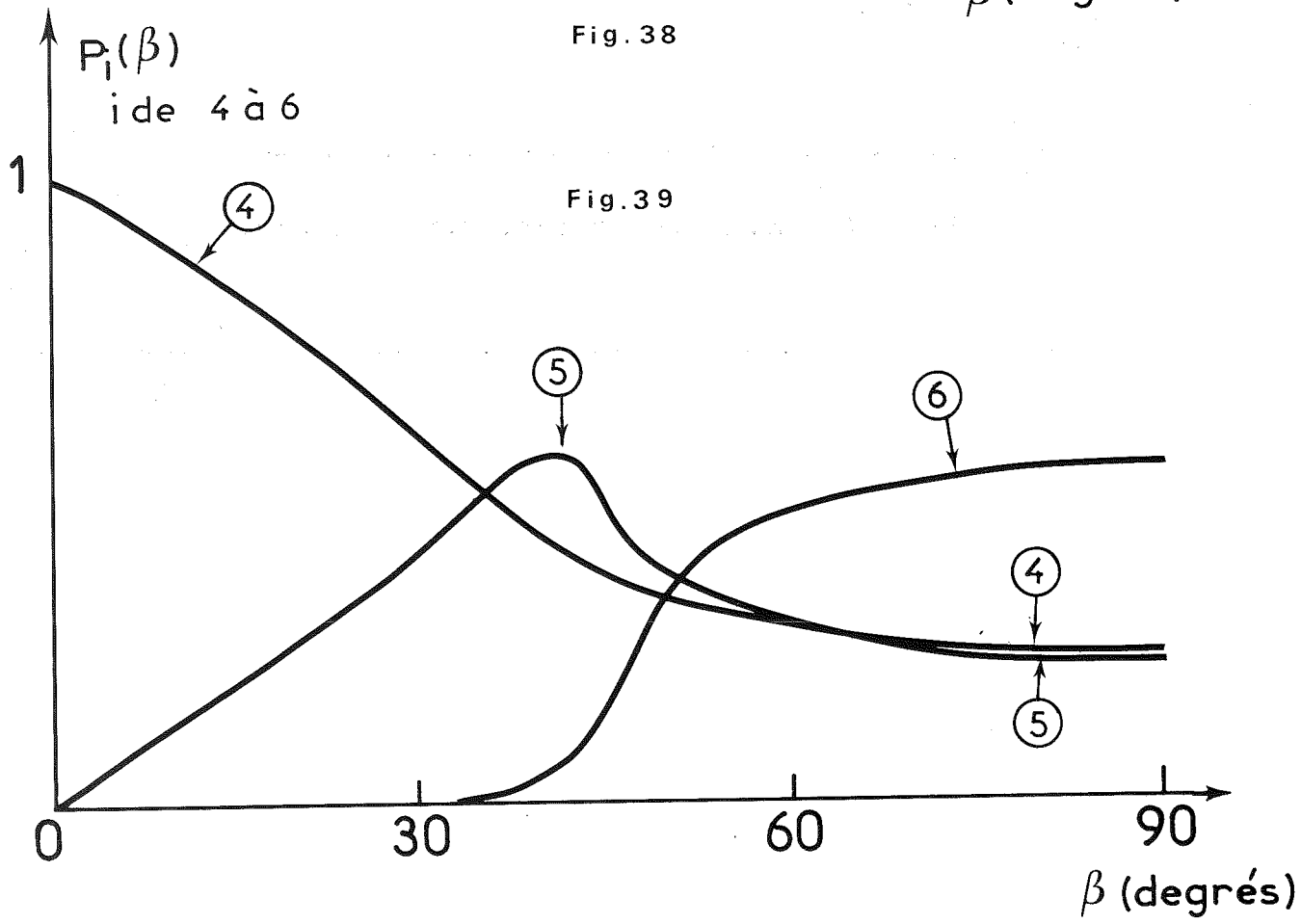

$P_i(\beta)$
i de 4 à 6
1
0
30
60
90
β (degrés)

Fig. 39

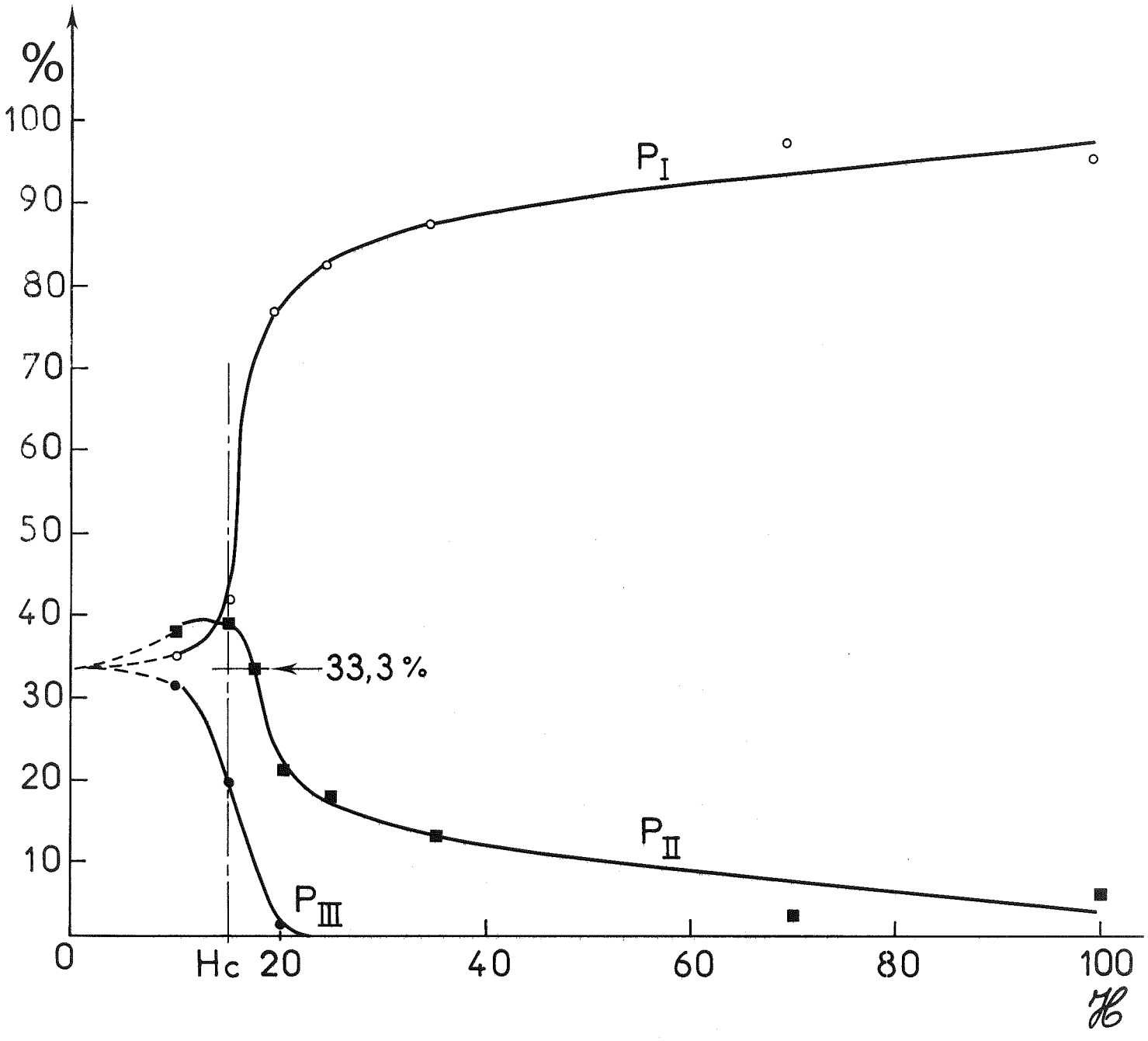


Fig.40

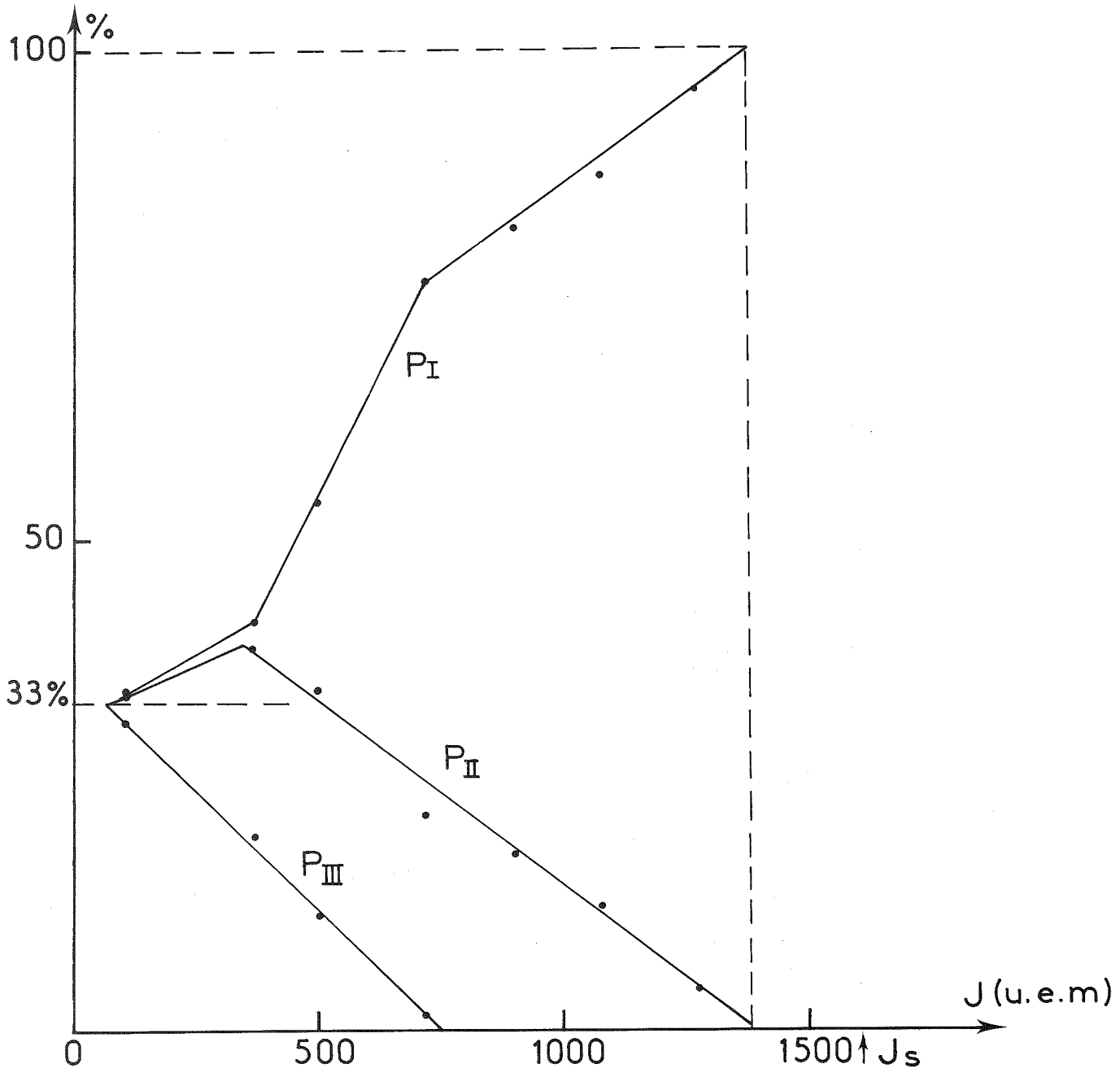


Fig. 41

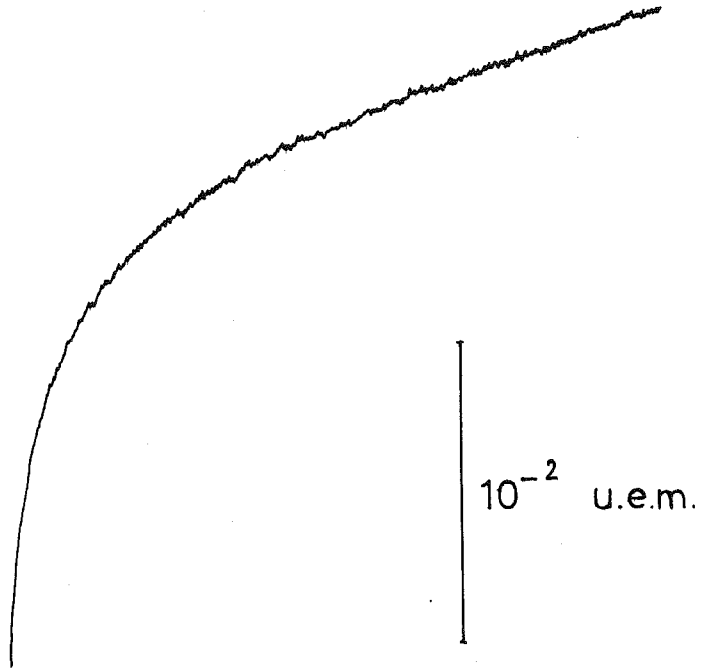


Fig. 42

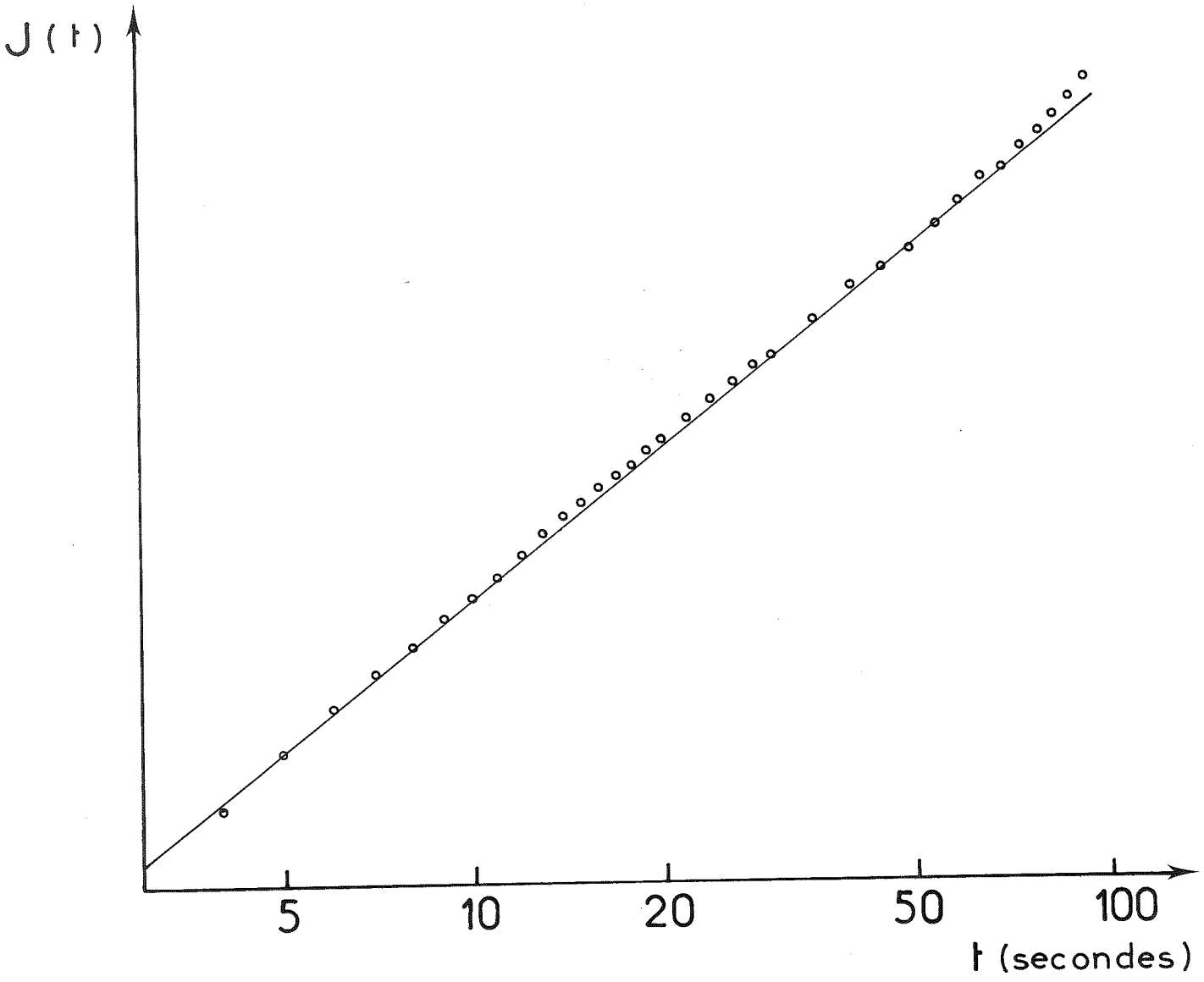


Fig. 43

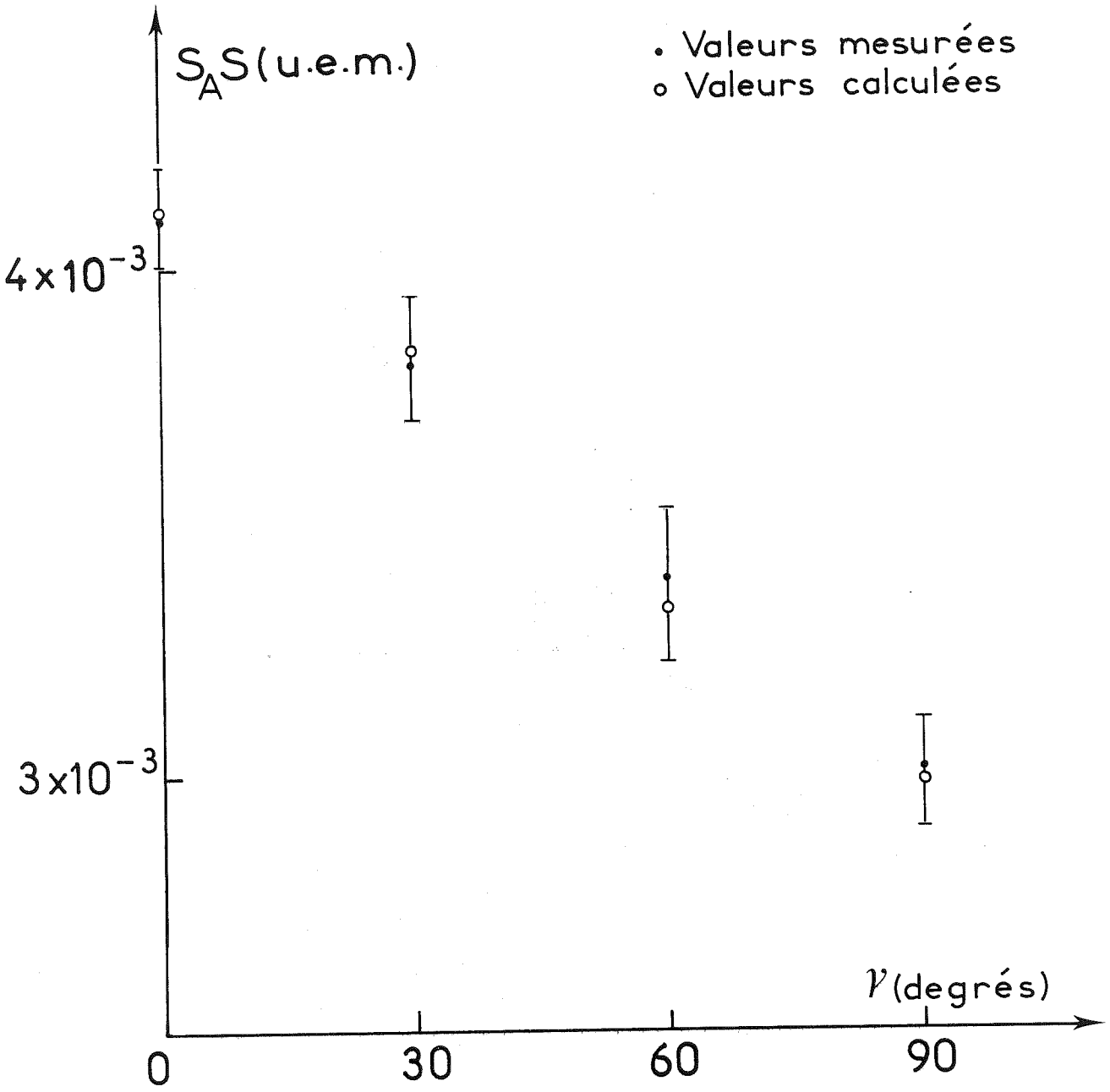

$S_A S$ (u.e.m.)
• Valeurs mesurées
o Valeurs calculées
4×10^{-3}
3×10^{-3}
γ (degrés)
0
30
60
90

Fig. 44

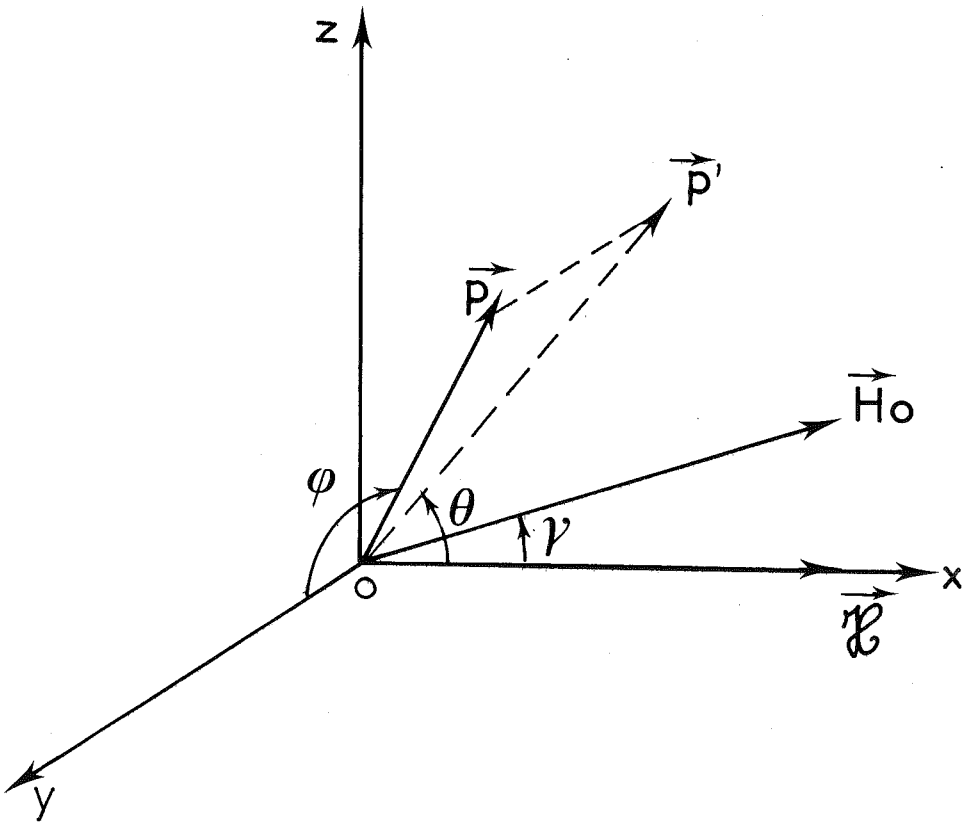


Fig. 45

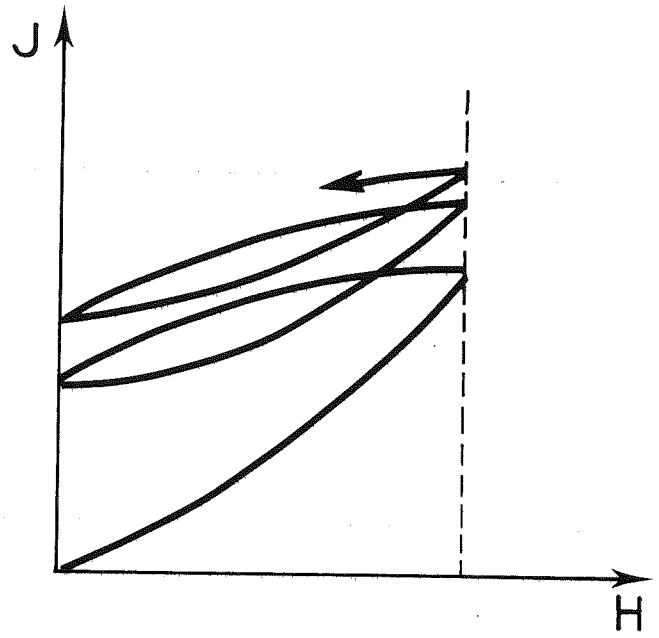


Fig. 46

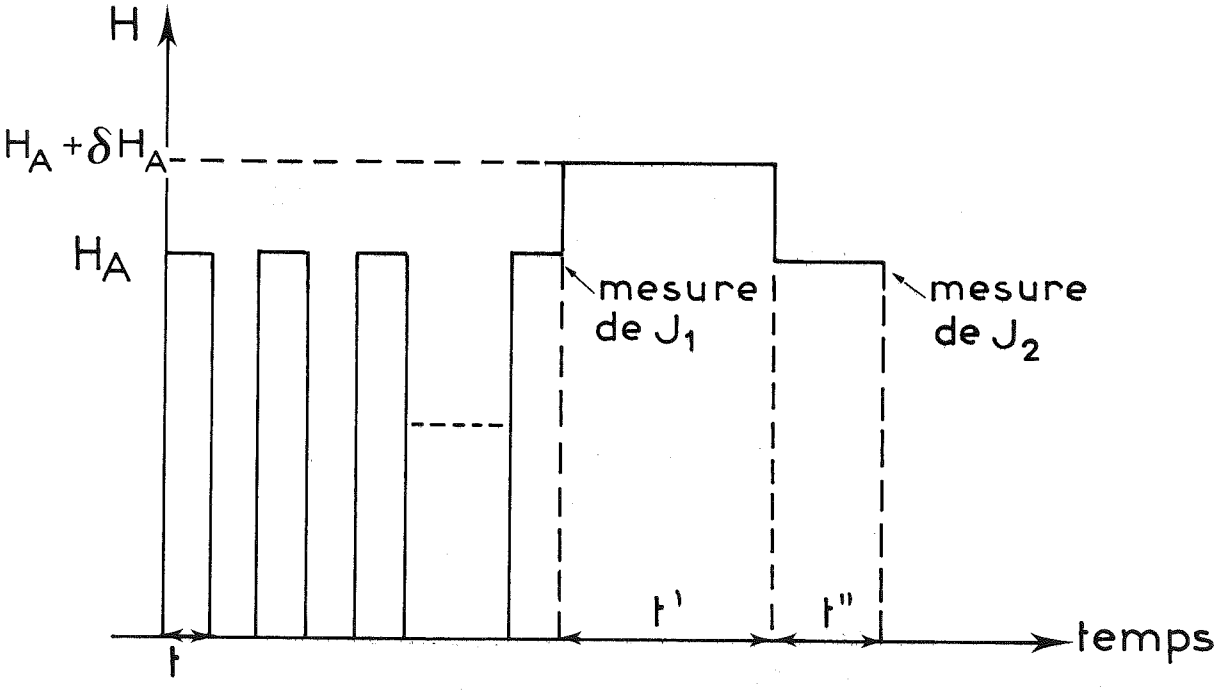


Fig. 47

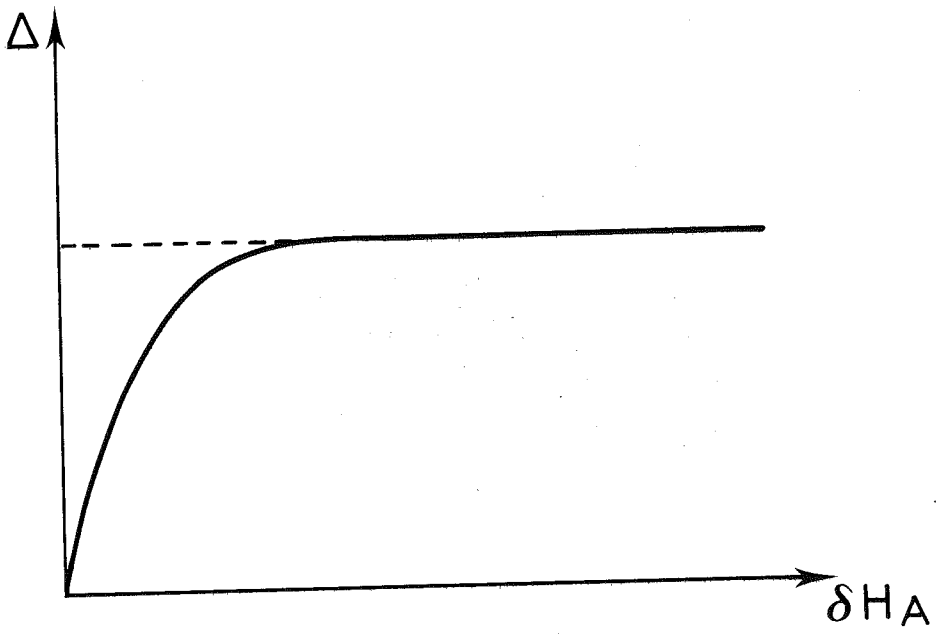


Fig. 48

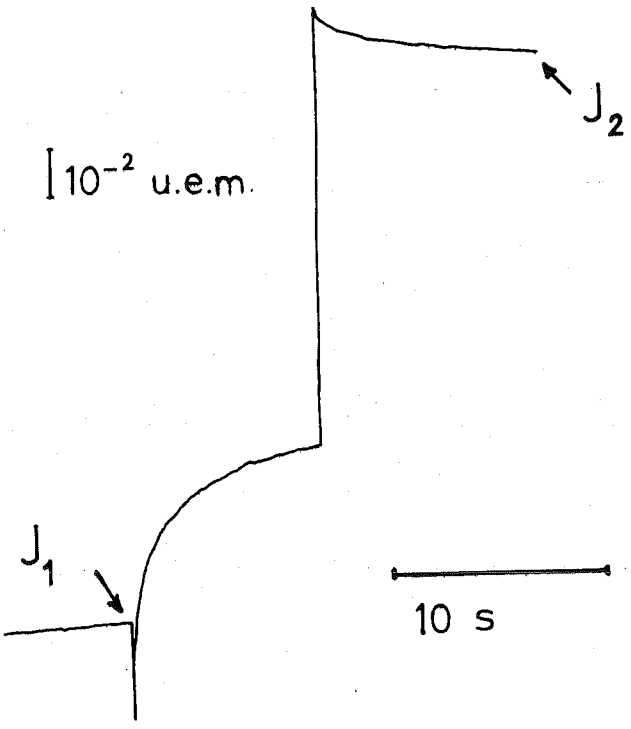


Fig. 49

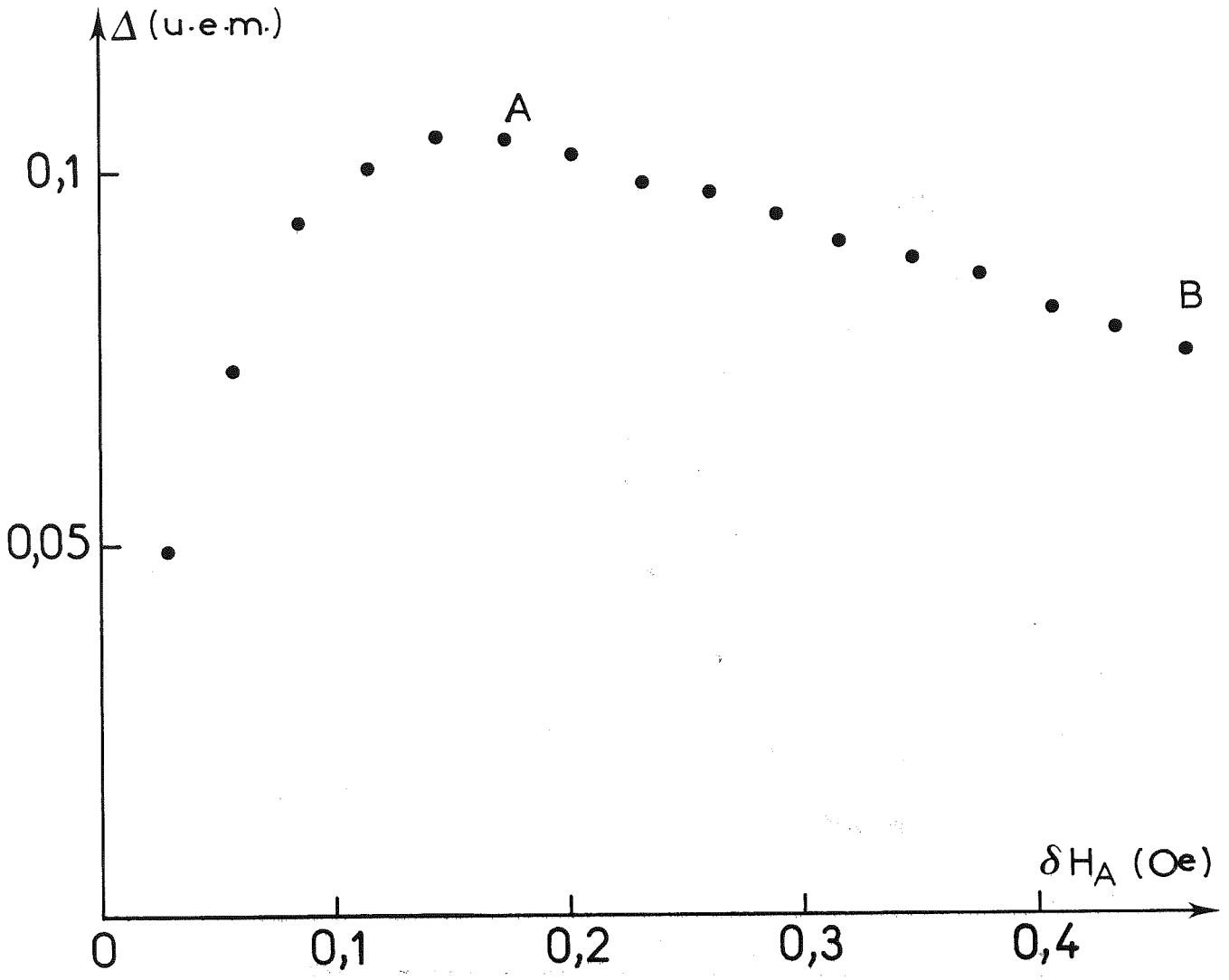


Fig.50

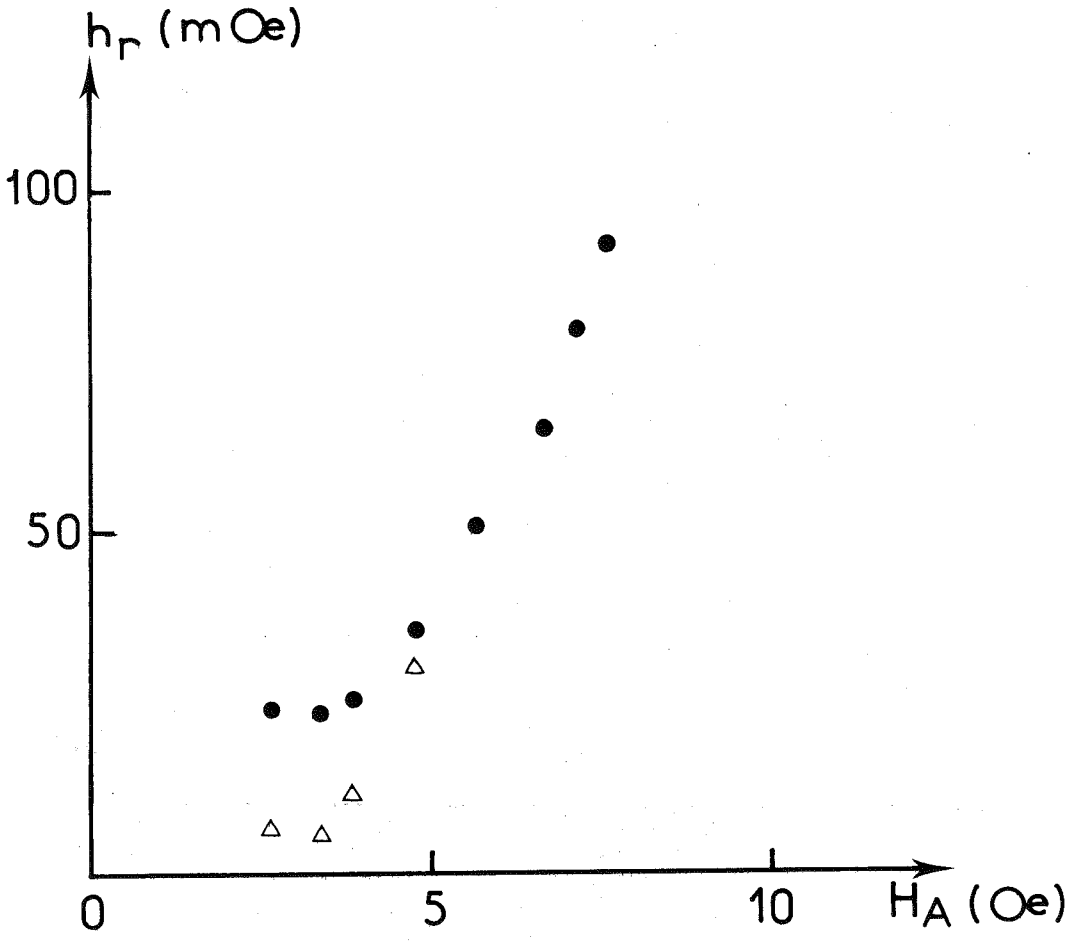


Fig.51

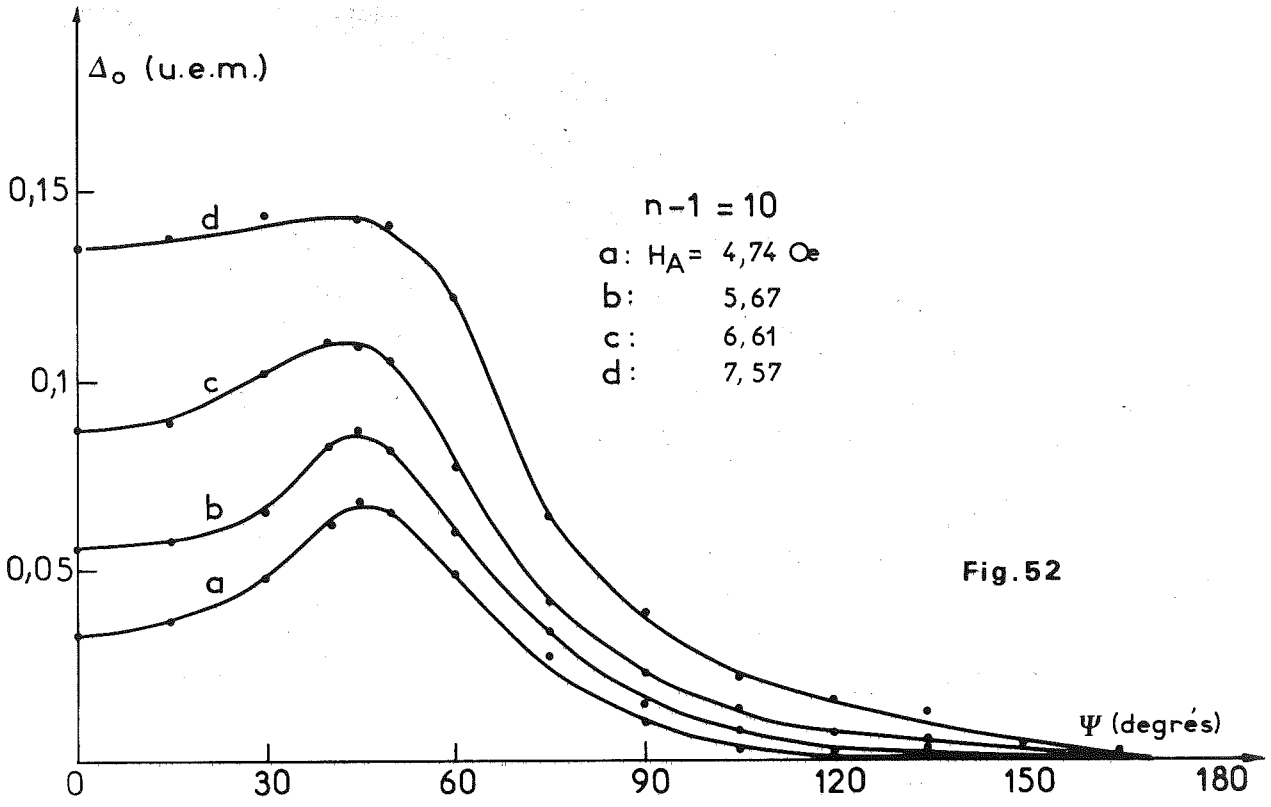

Δo (u.e.m.)
0,15
0,1
0,05
d
c
b
a
n-1 = 10
a: HA = 4,74 Oe
b: 5,67
c: 6,61
d: 7,57
Ψ (degrés)
0
30
60
90
120
150
180

Fig.52

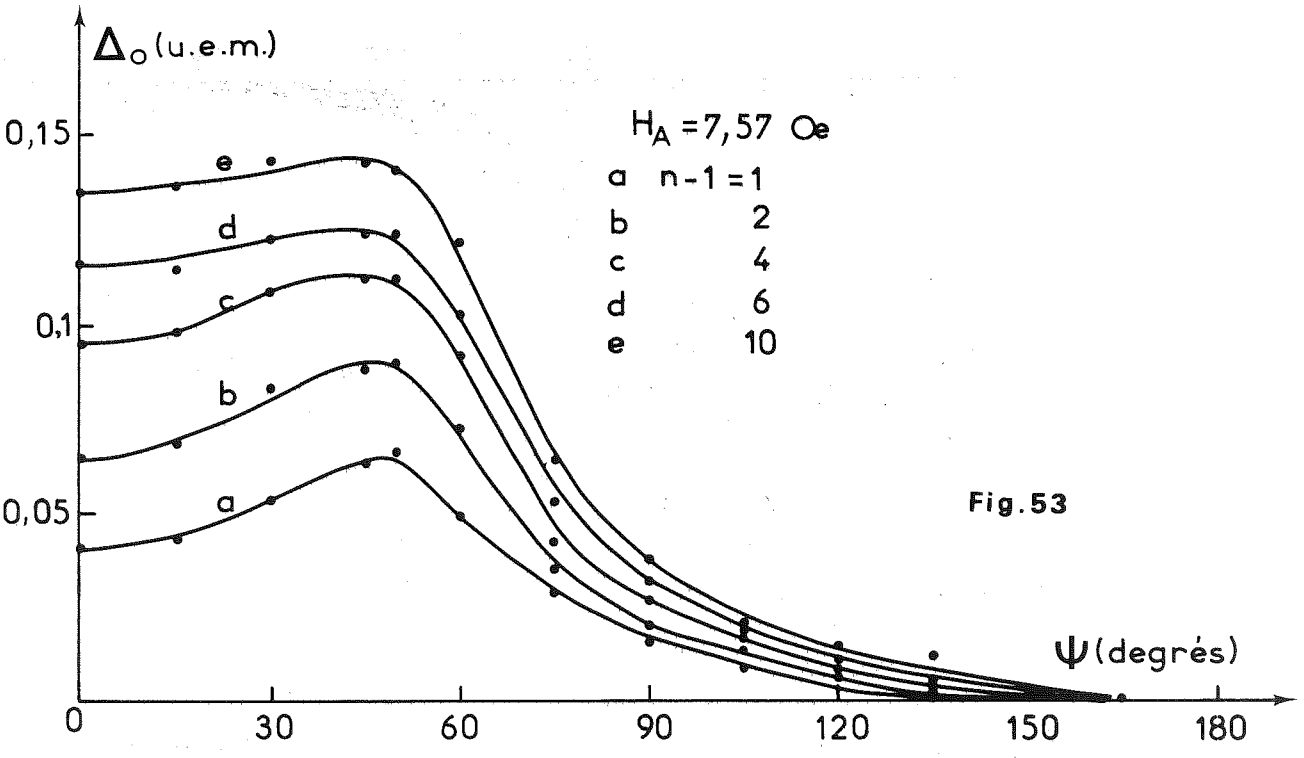

Δo (u.e.m.)
0,15
0,1
0,05
e
d
c
b
a
HA = 7,57 Oe
a n-1 = 1
b 2
c 4
d 6
e 10
Ψ (degrés)
0
30
60
90
120
150
180

Fig.53

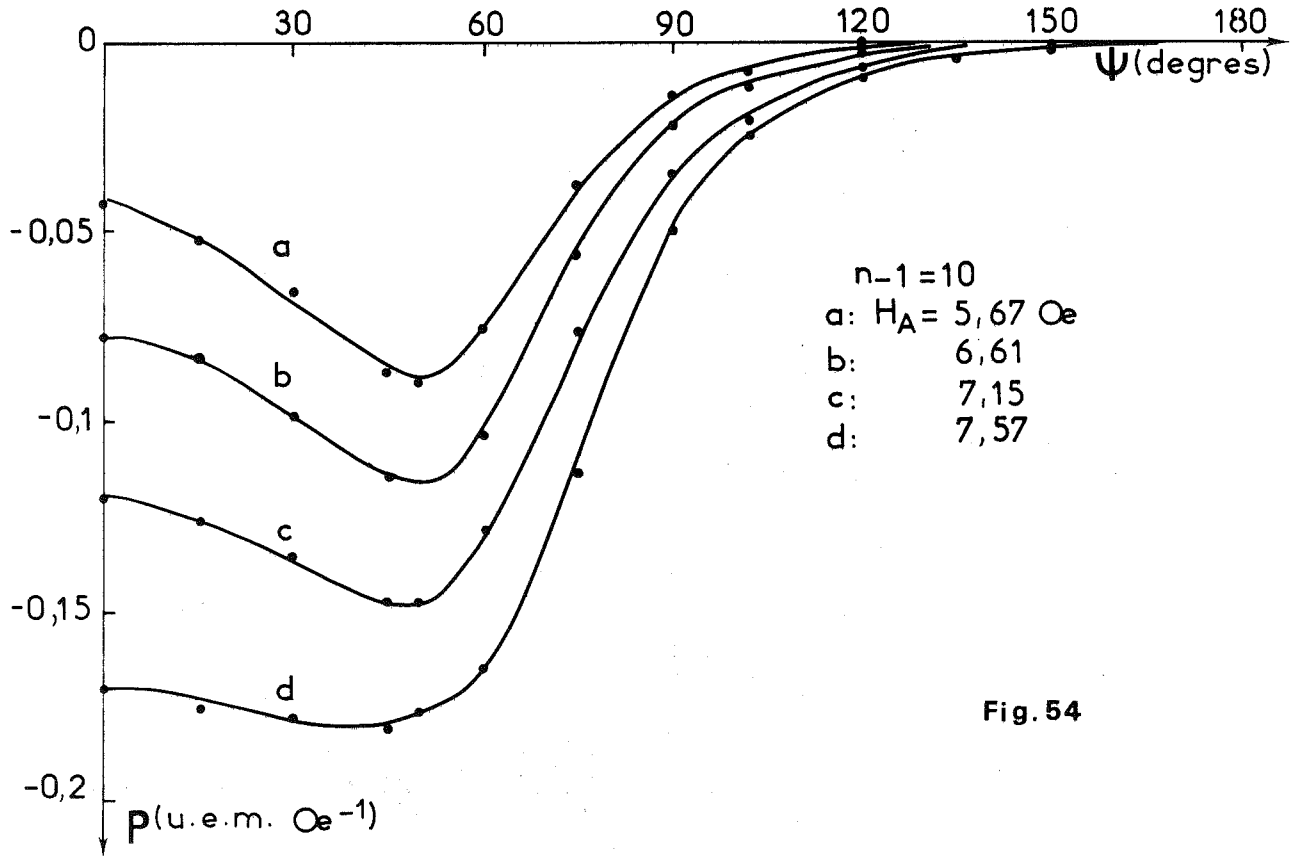

0
30
60
90
120
150
180
Ψ(degres)
-0,05
-0,1
-0,15
-0,2
a
b
c
d
P(u.e.m. Oe⁻¹)
n-1 =10
a: H_A= 5,67 Oe
b: 6,61
c: 7,15
d: 7,57

Fig.54

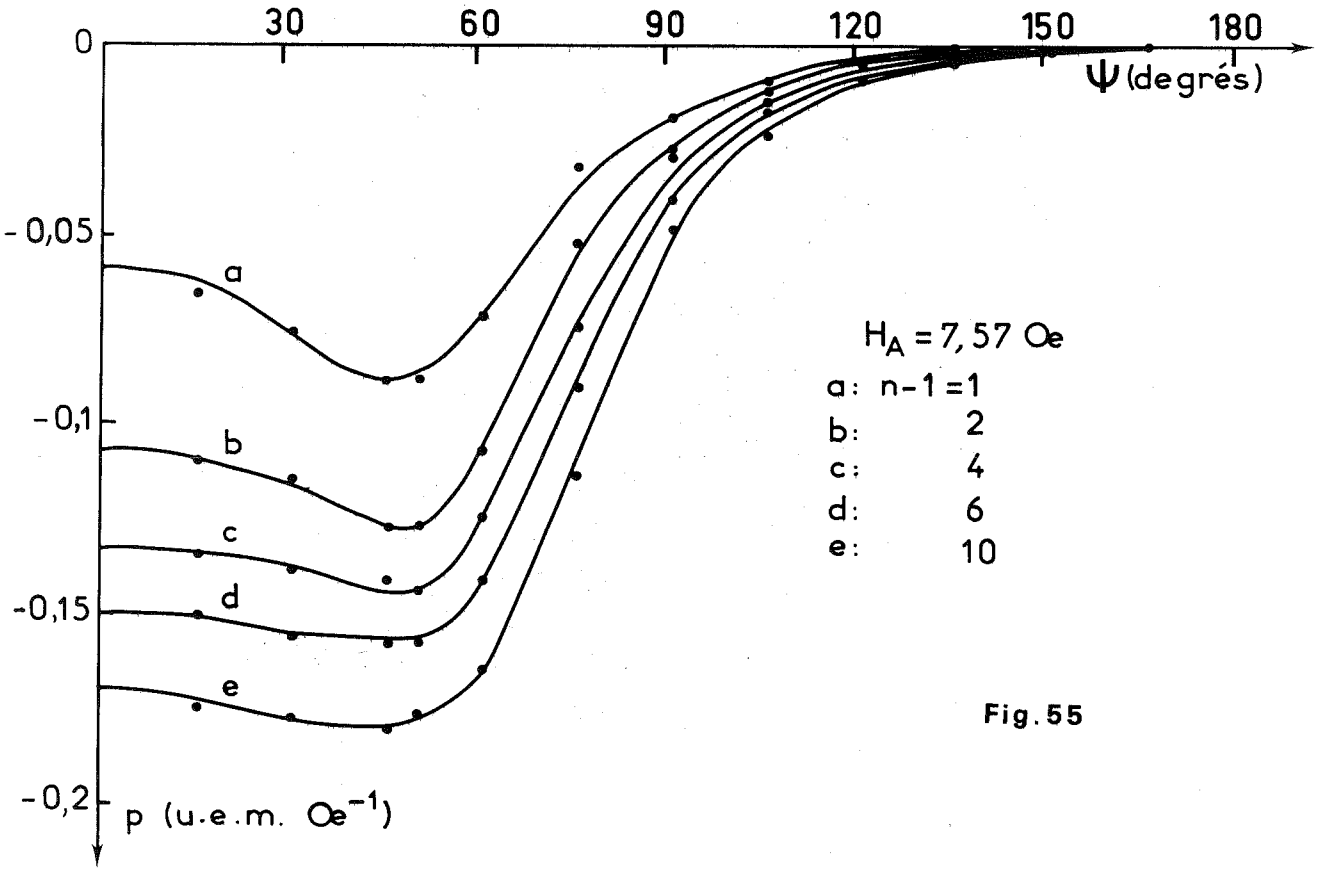
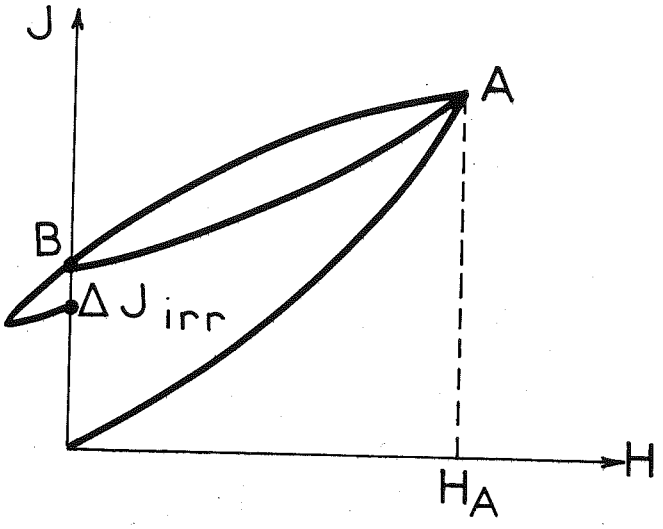
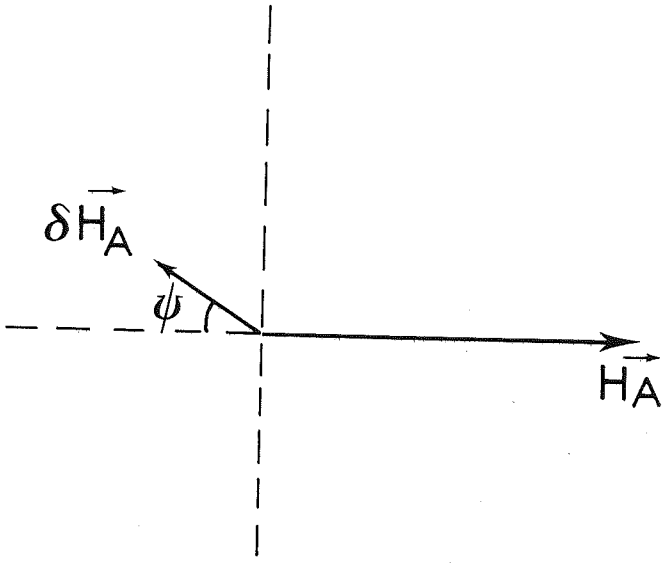

0
30
60
90
120
150
180
Ψ(degrés)
-0,05
-0,1
-0,15
-0,2
a
b
c
d
e
p (u.e.m. Oe⁻¹)
H_A = 7,57 Oe
a: n-1 =1
b: 2
c: 4
d: 6
e: 10

Fig.55





Mesure de la susceptibilité irréversible à l'extrémité B du cycle.

Fig.56

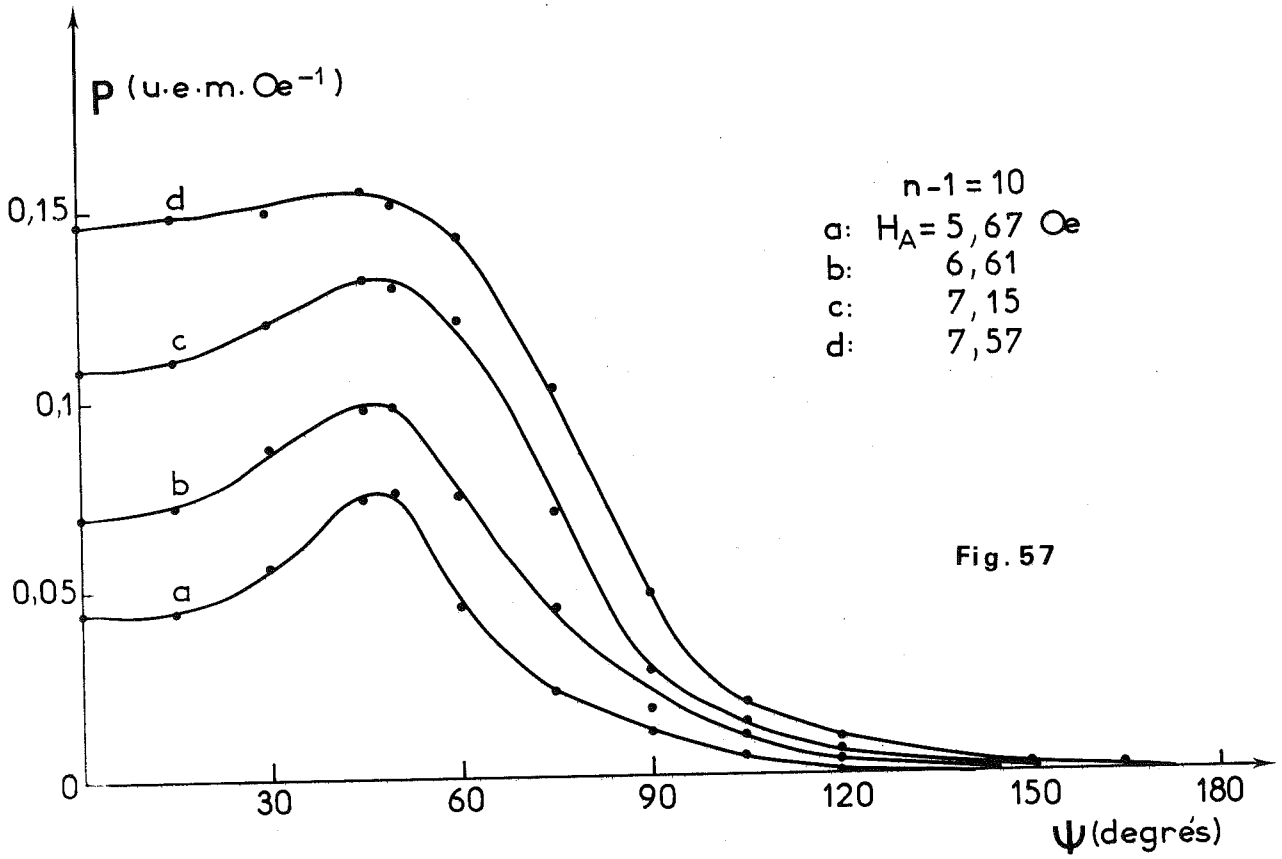

P (u.e.m. Oe⁻¹)
0,15
0,1
0,05
0
d
c
b
a
30
60
90
120
150
180
Ψ (degrés)
n-1 = 10
a: H_A = 5,67 Oe
b: 6,61
c: 7,15
d: 7,57

Fig. 57

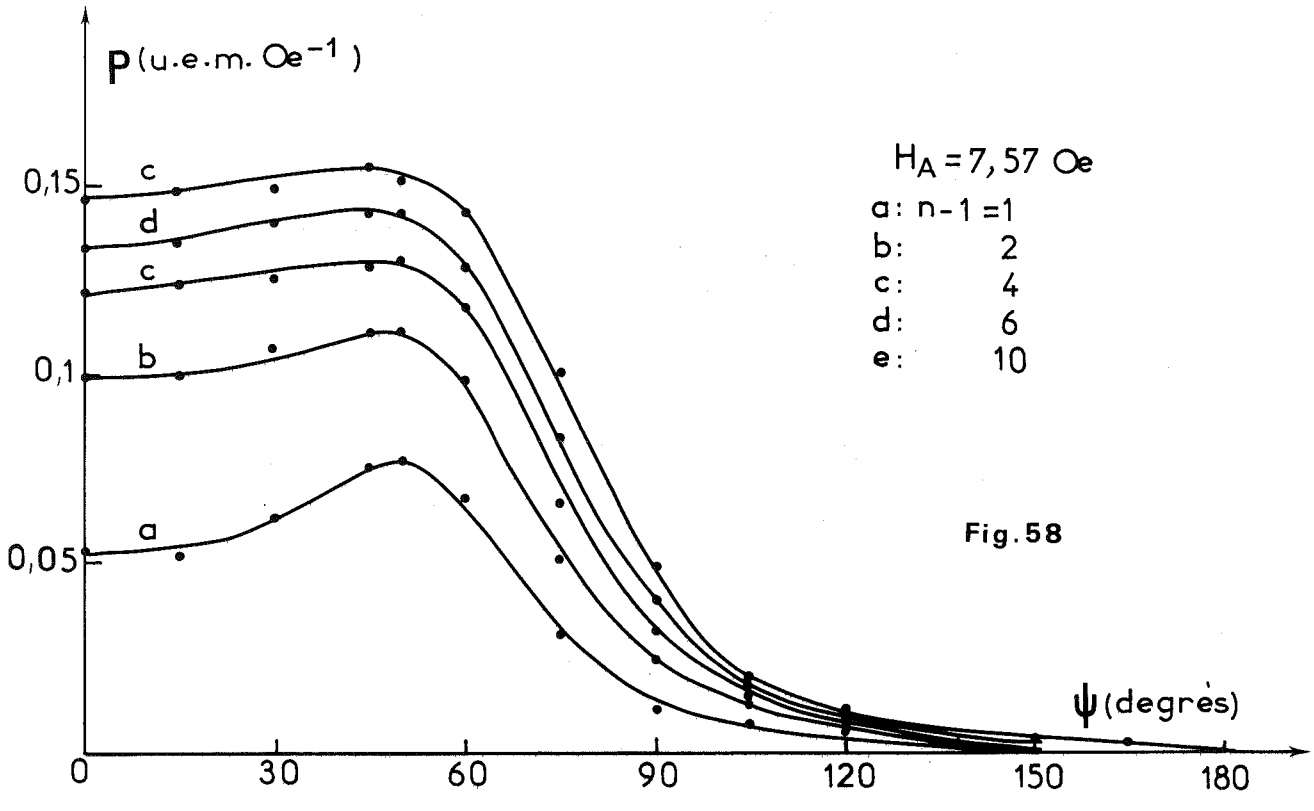

P (u.e.m. Oe⁻¹)
0,15
0,1
0,05
0
c
d
c
b
a
30
60
90
120
150
180
Ψ (degrés)
H_A = 7,57 Oe
a: n-1 = 1
b: 2
c: 4
d: 6
e: 10

Fig. 58

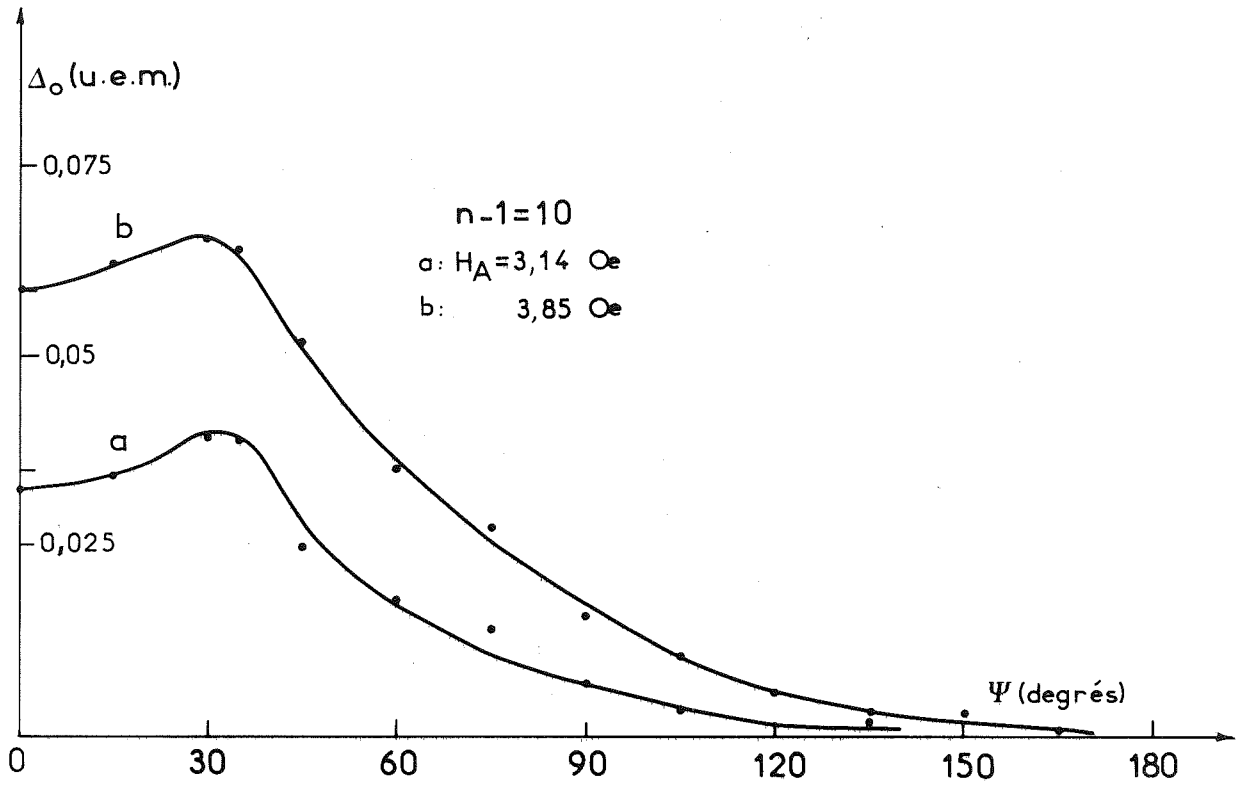

Δ_o (u.e.m.)
0,075
0,05
0,025
b
a
n-1=10
a: H_A=3,14 Oe
b: 3,85 Oe
Ψ (degrés)
0
30
60
90
120
150
180

Fig. 59

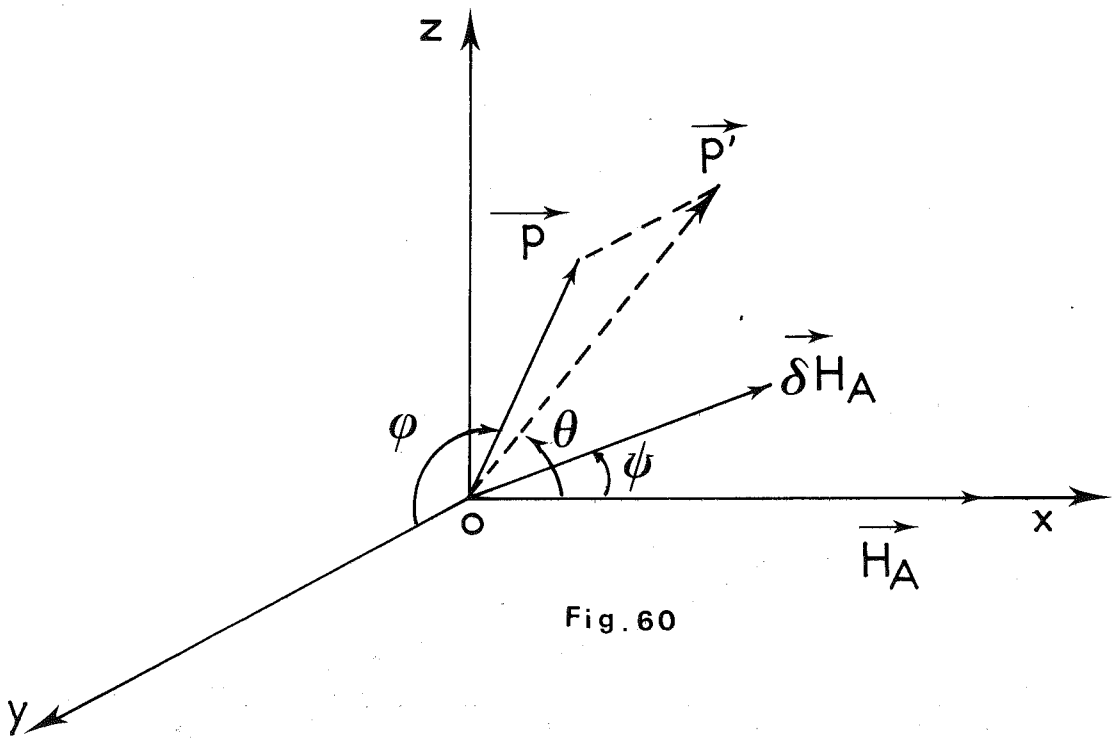

z
$\vec{P'}$
$\vec{P}$
$\vec{\delta H_A}$
φ
θ
ψ
o
x
$\vec{H_A}$
y

Fig. 60

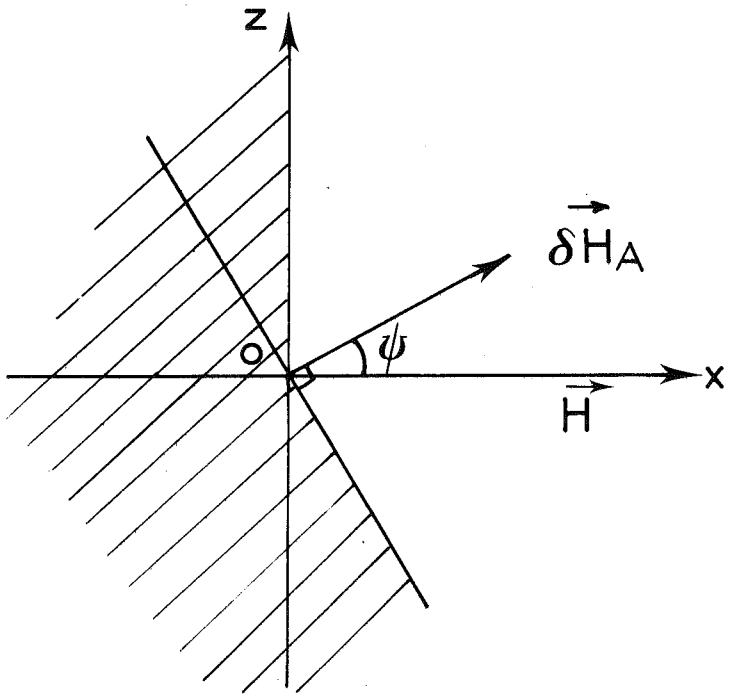

z
$\vec{\delta H_A}$
ψ
o
x
$\vec{H}$

Fig. 61

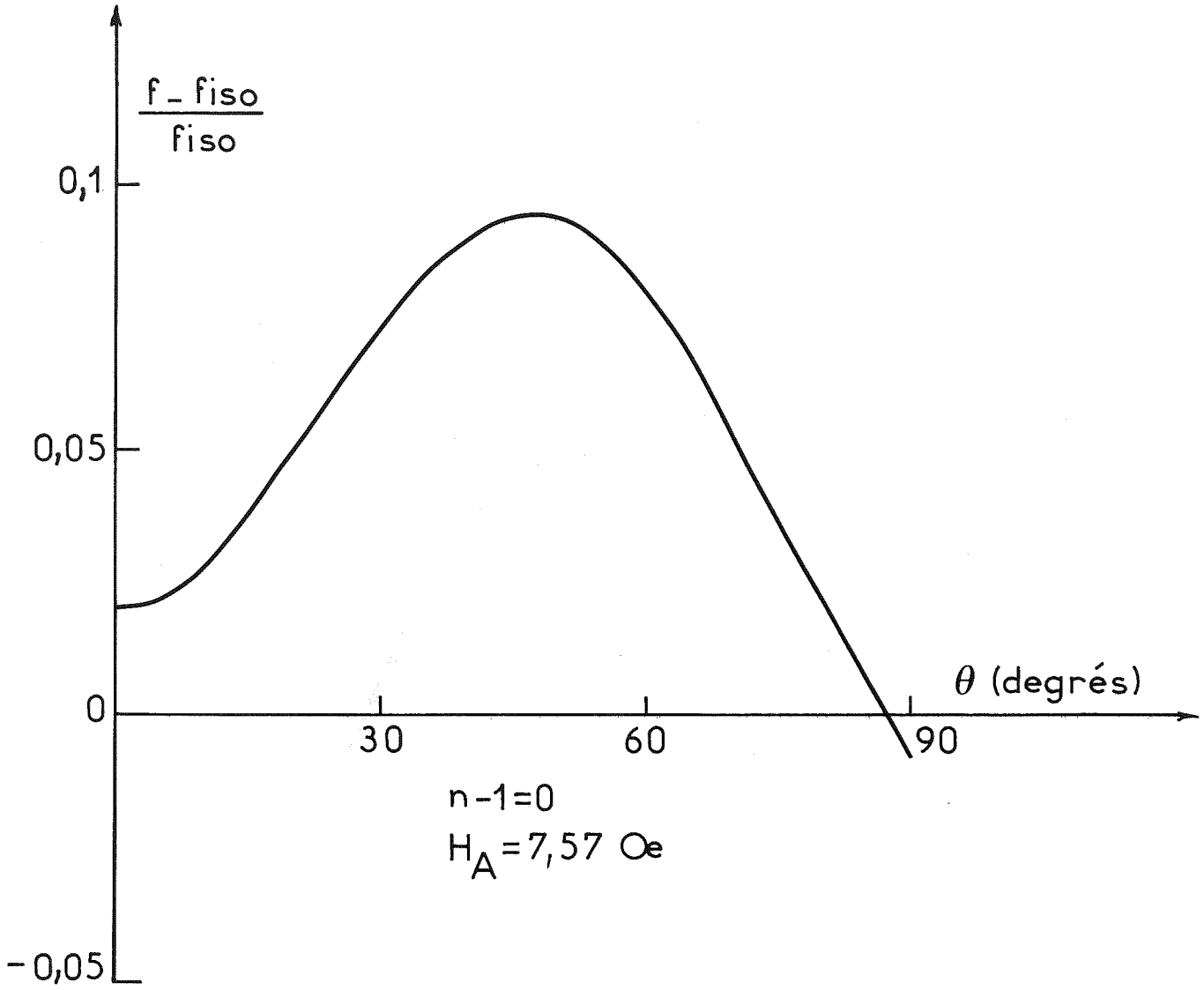


Fig.62

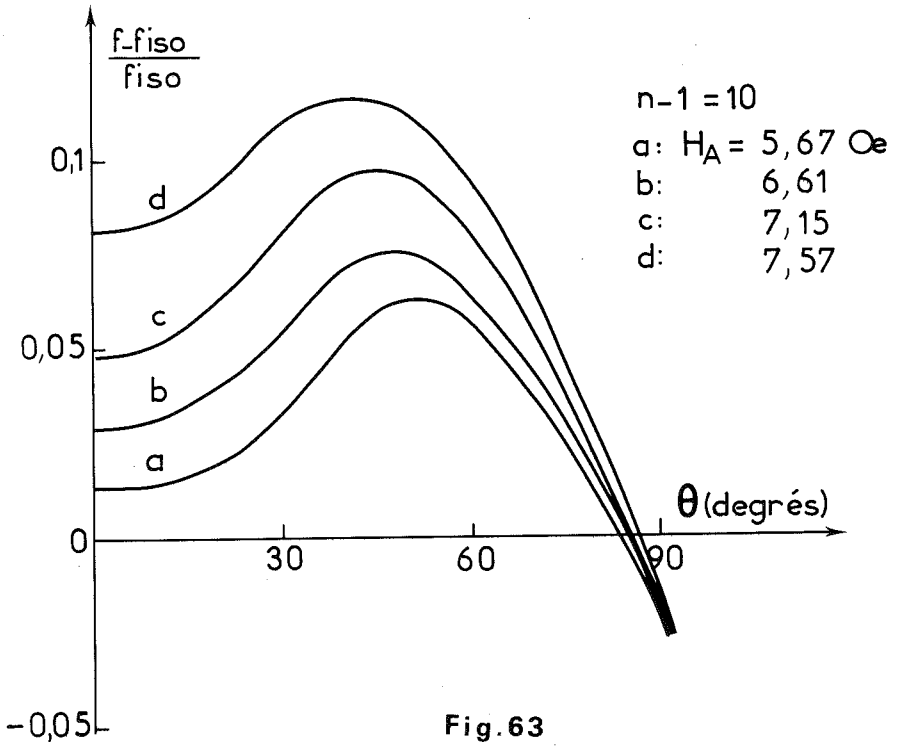

f-fiso
fiso
0,1
0,05
0
-0,05
d
c
b
a
30
60
90
θ (degrés)
n-1 = 10
a: H_A = 5,67 Oe
b: 6,61
c: 7,15
d: 7,57

Fig.63

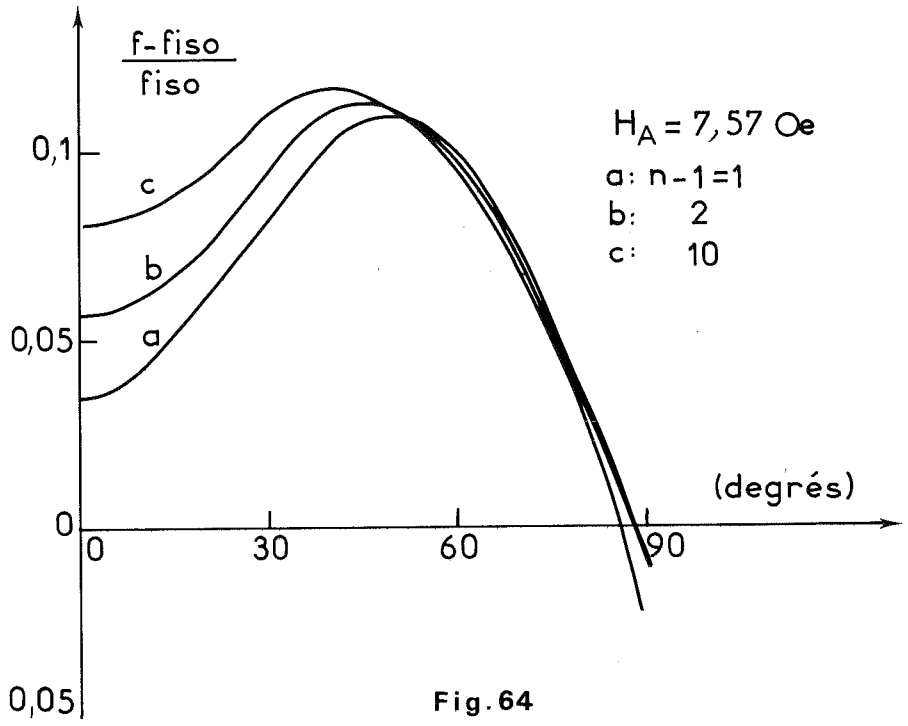

f-fiso
fiso
0,1
0,05
0
0,05
c
b
a
0
30
60
90
(degrés)
H_A = 7,57 Oe
a: n-1=1
b: 2
c: 10

Fig.64

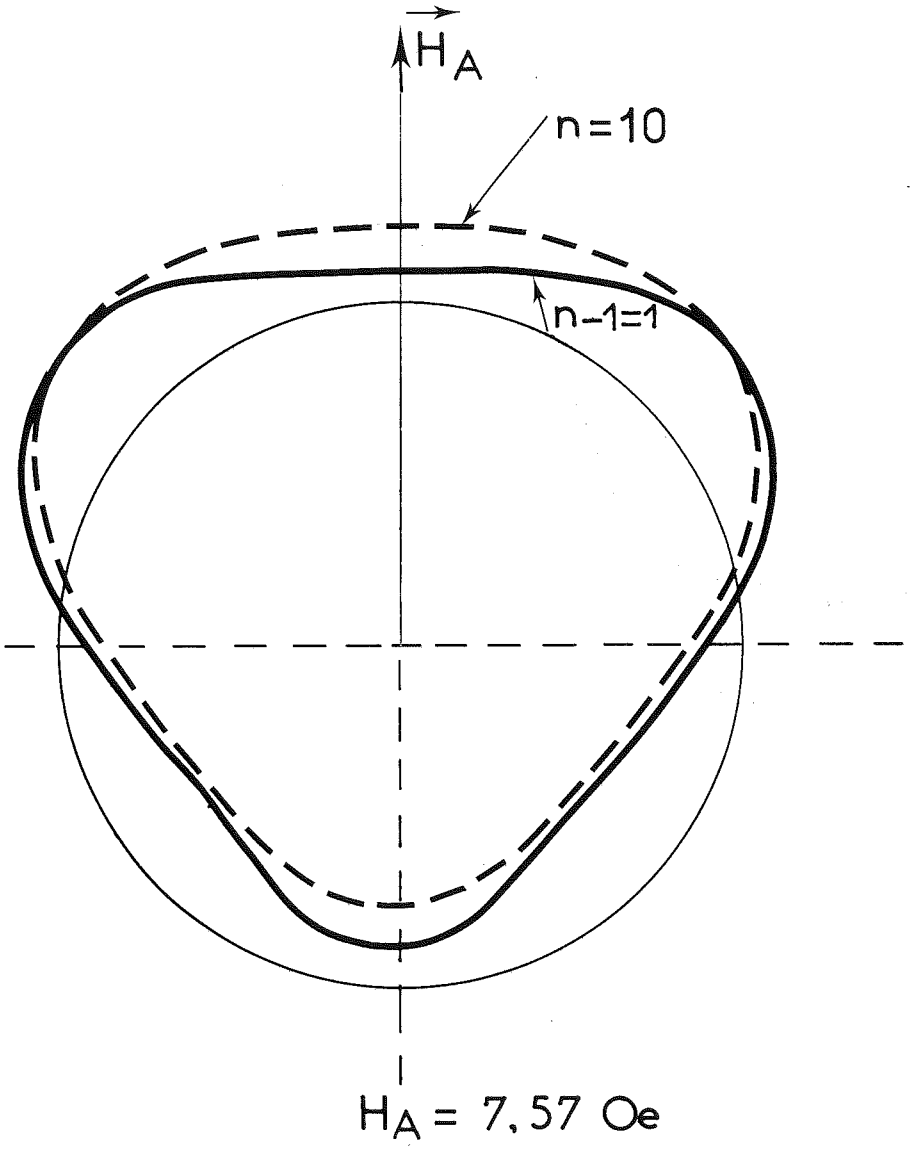


Fig.65

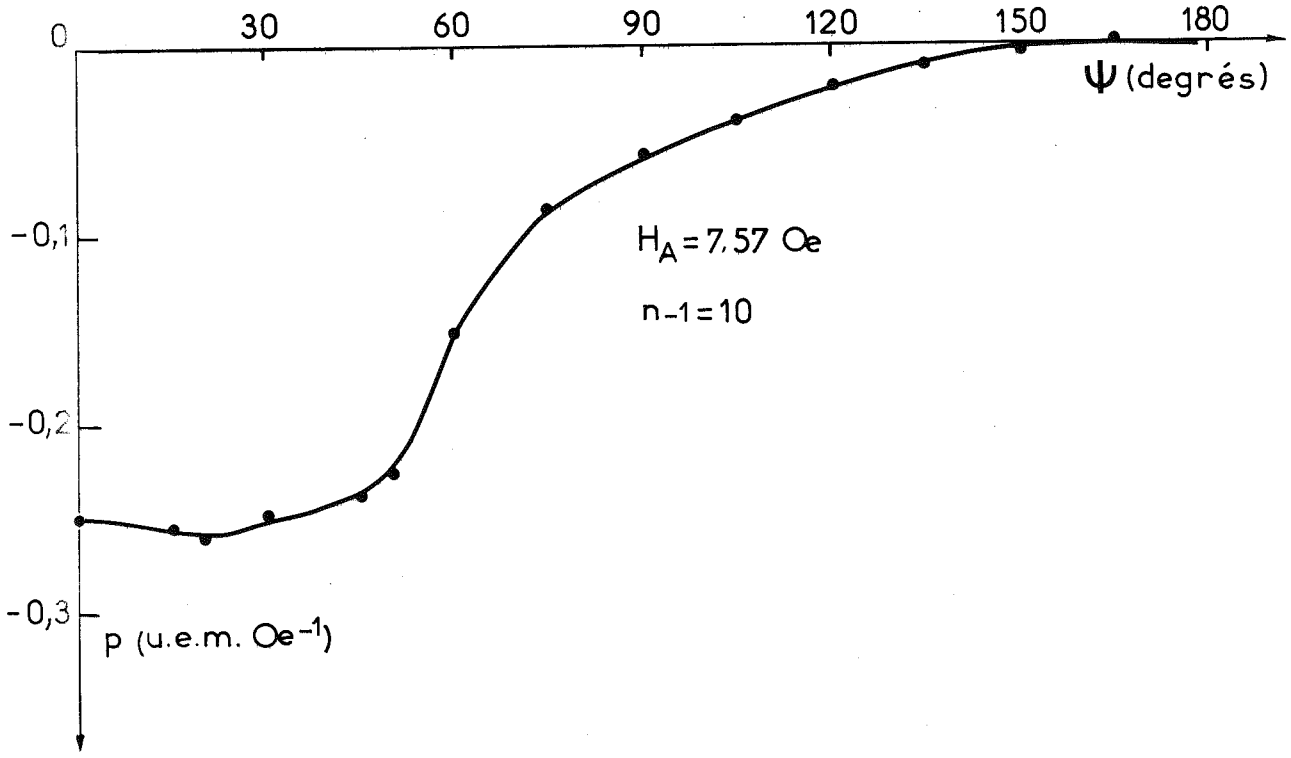


Fig. 66

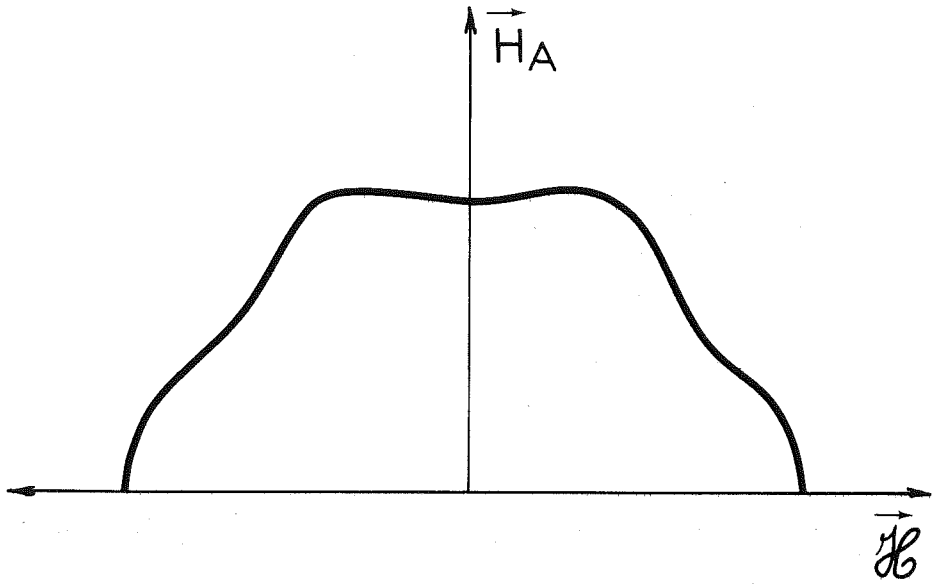


Fig.67

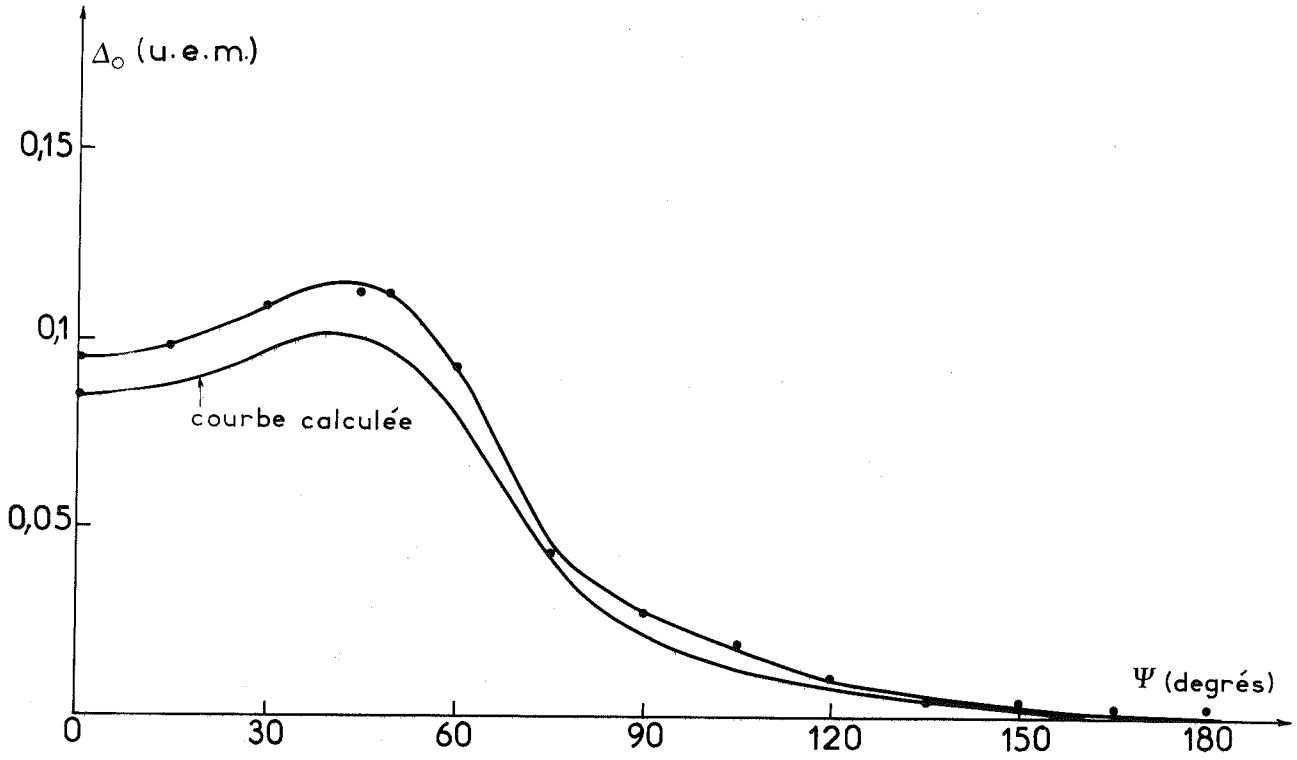

Δ_o (u.e.m.)
0,15
0,1
0,05
courbe calculée
Ψ (degrés)
0
30
60
90
120
150
180

Fig.68

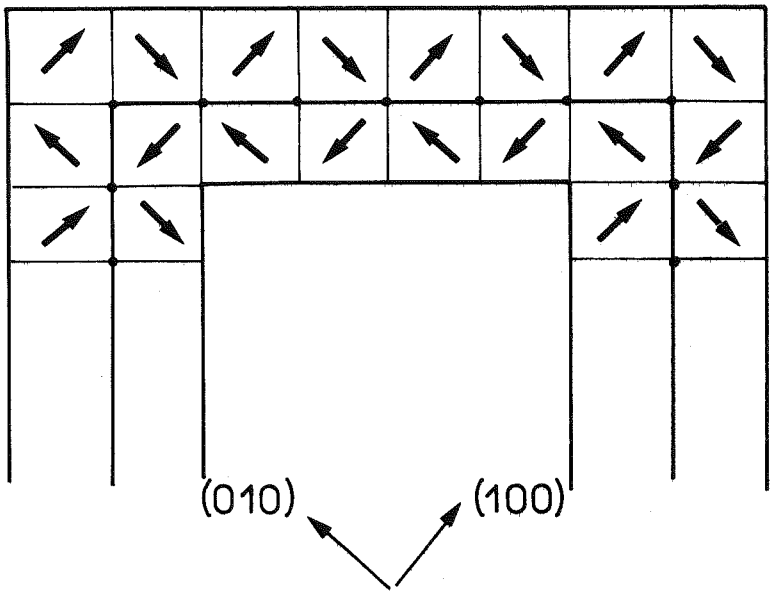


Fig. 69

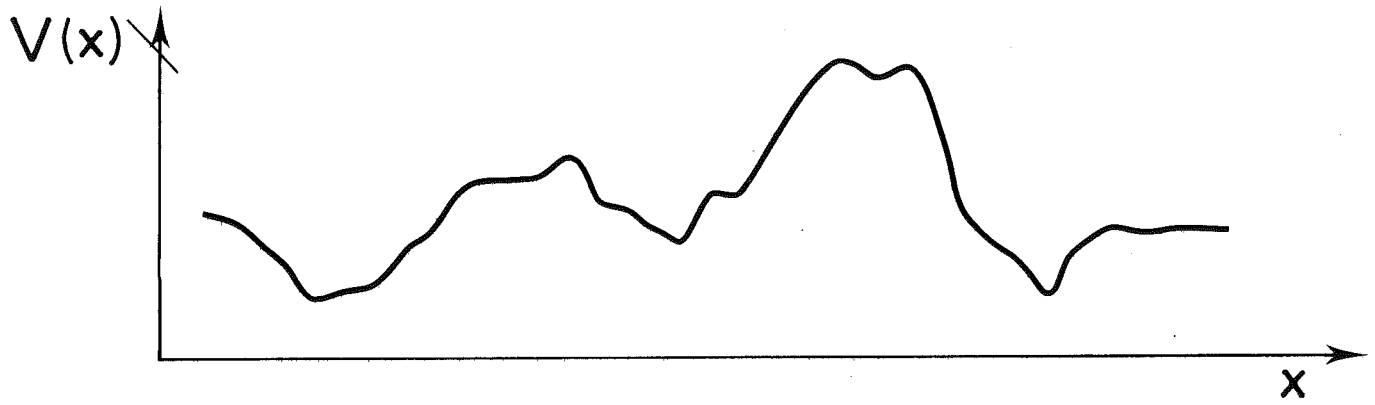


Fig. 70

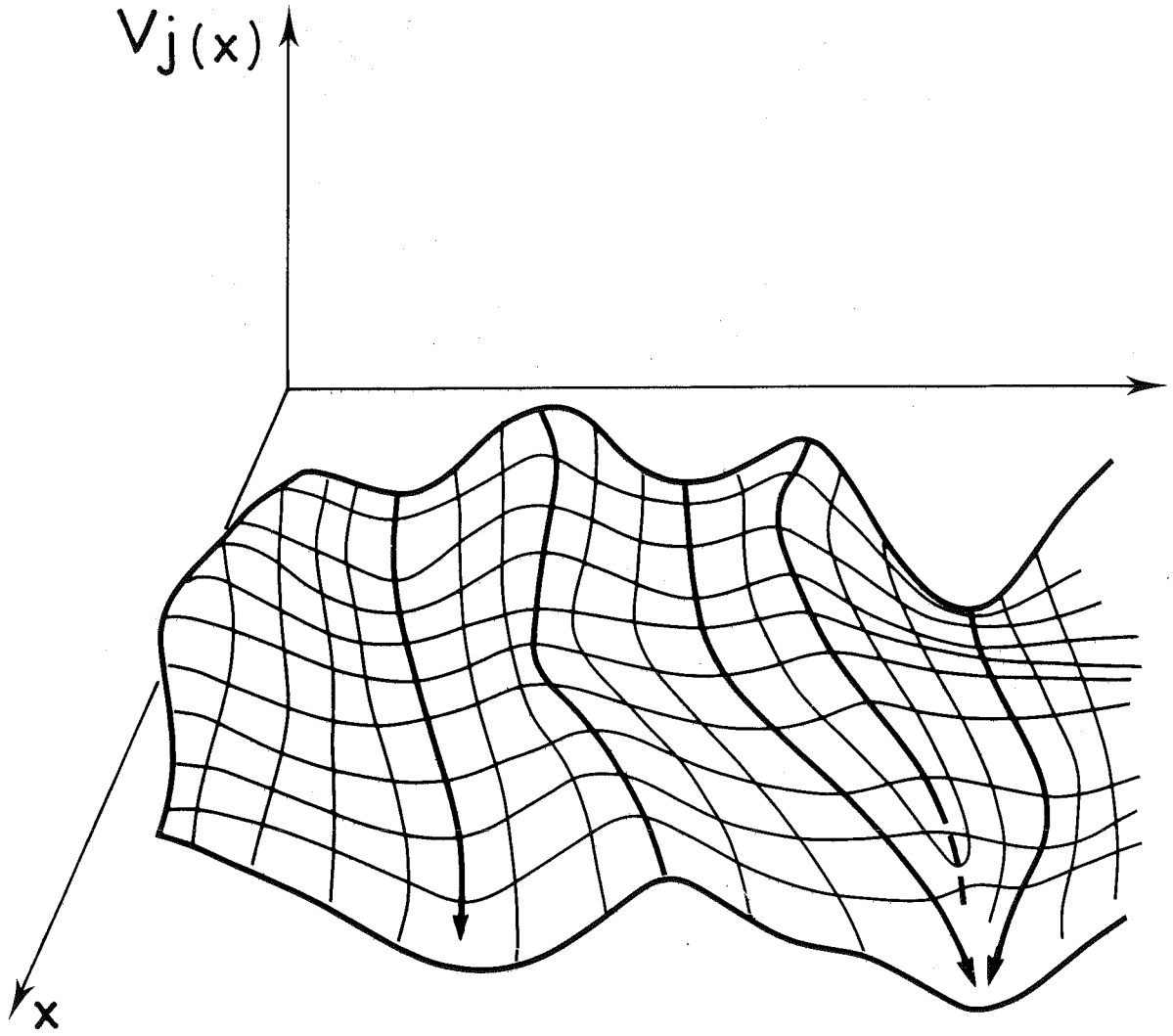


Fig. 71

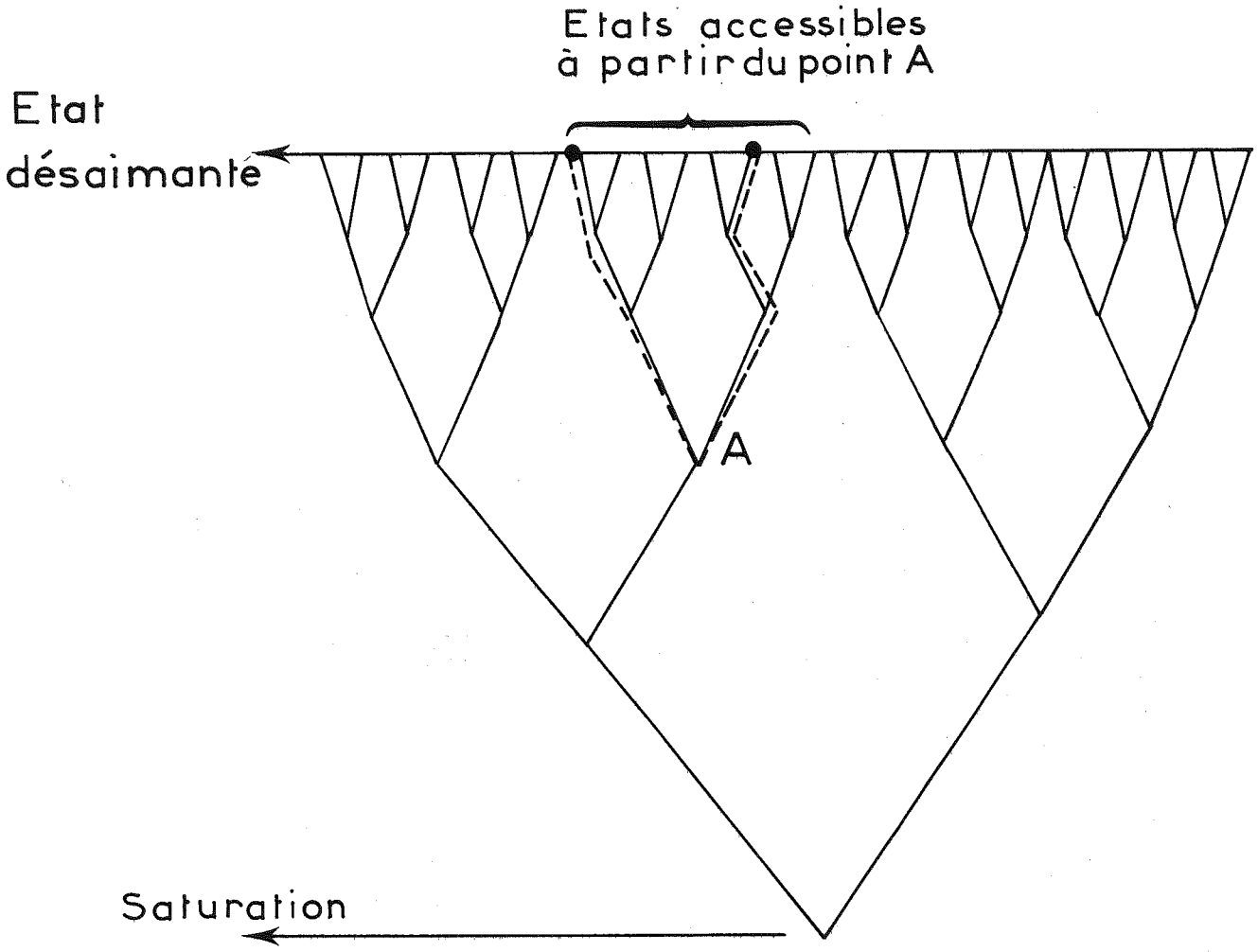

Etats accessibles
à partir du point A
Etat
désaimanté
A
Saturation

Fig.72

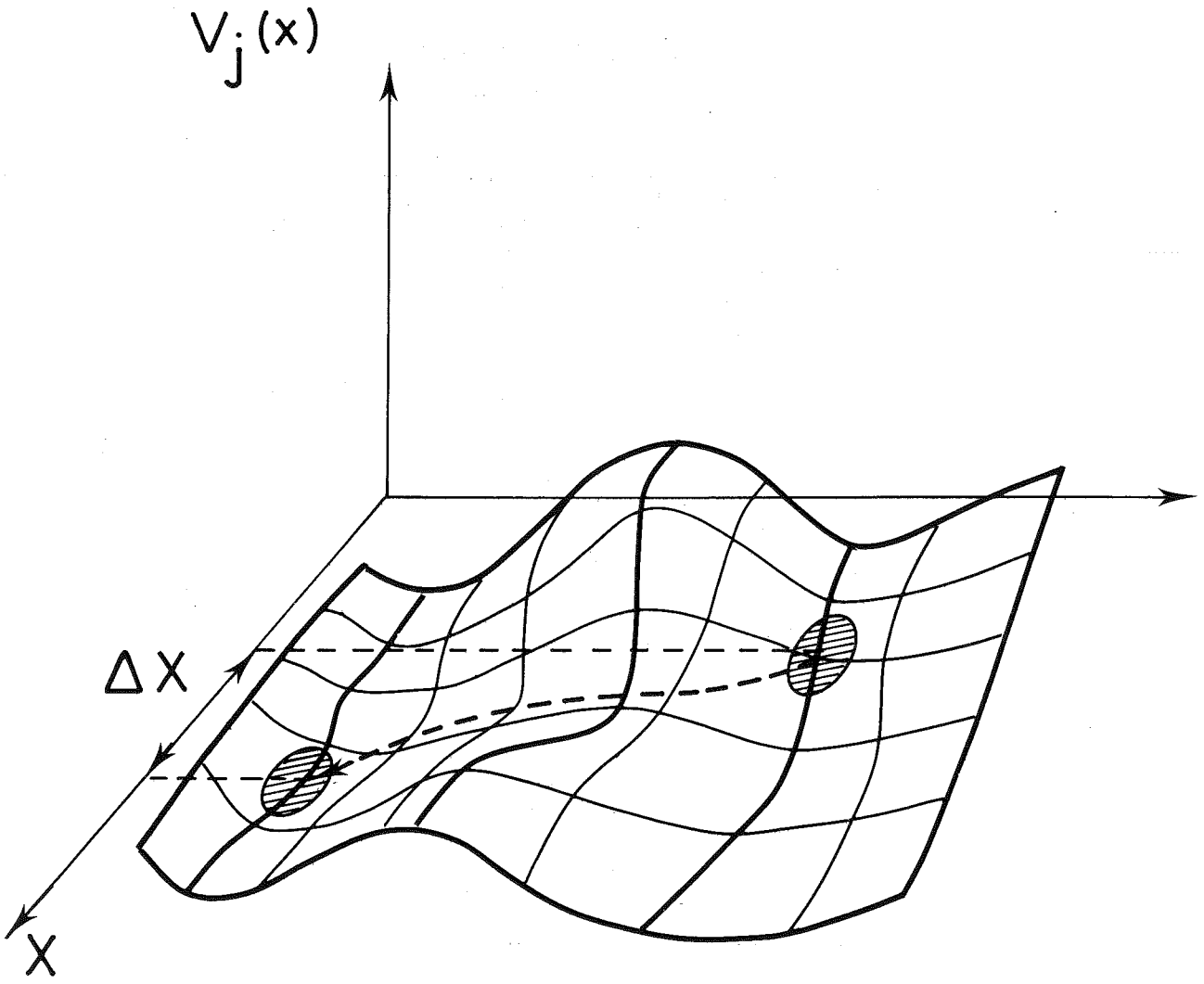


Fig. 73

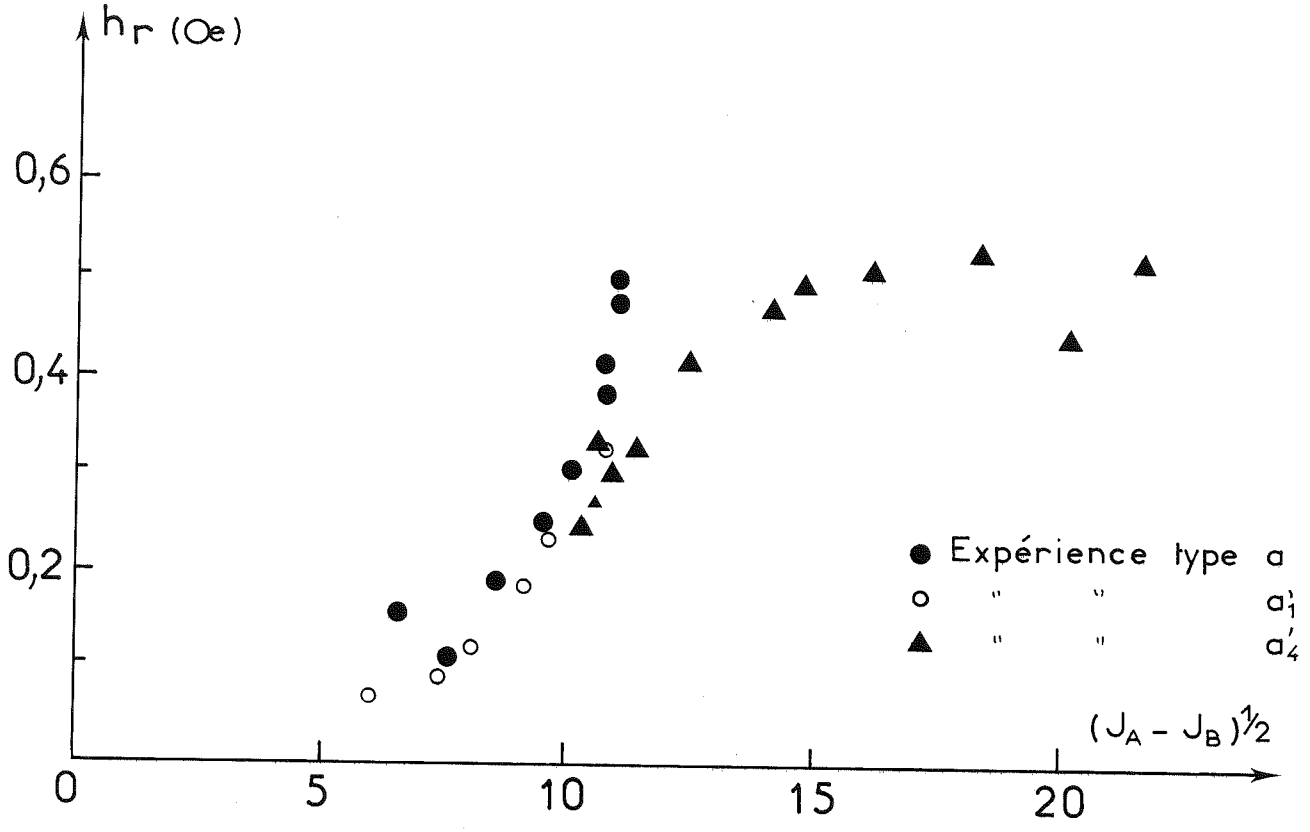


Fig.74