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Appendix
to
Theory of Radio-Frequency Interferometry in Geophysical Subsurface Probing

- NUMERICAL RESULTS -

CSR TR-74-2

Contract No. NAS 9-11540

by:

J. A. Kong and L. Tsang

APPENDIX A

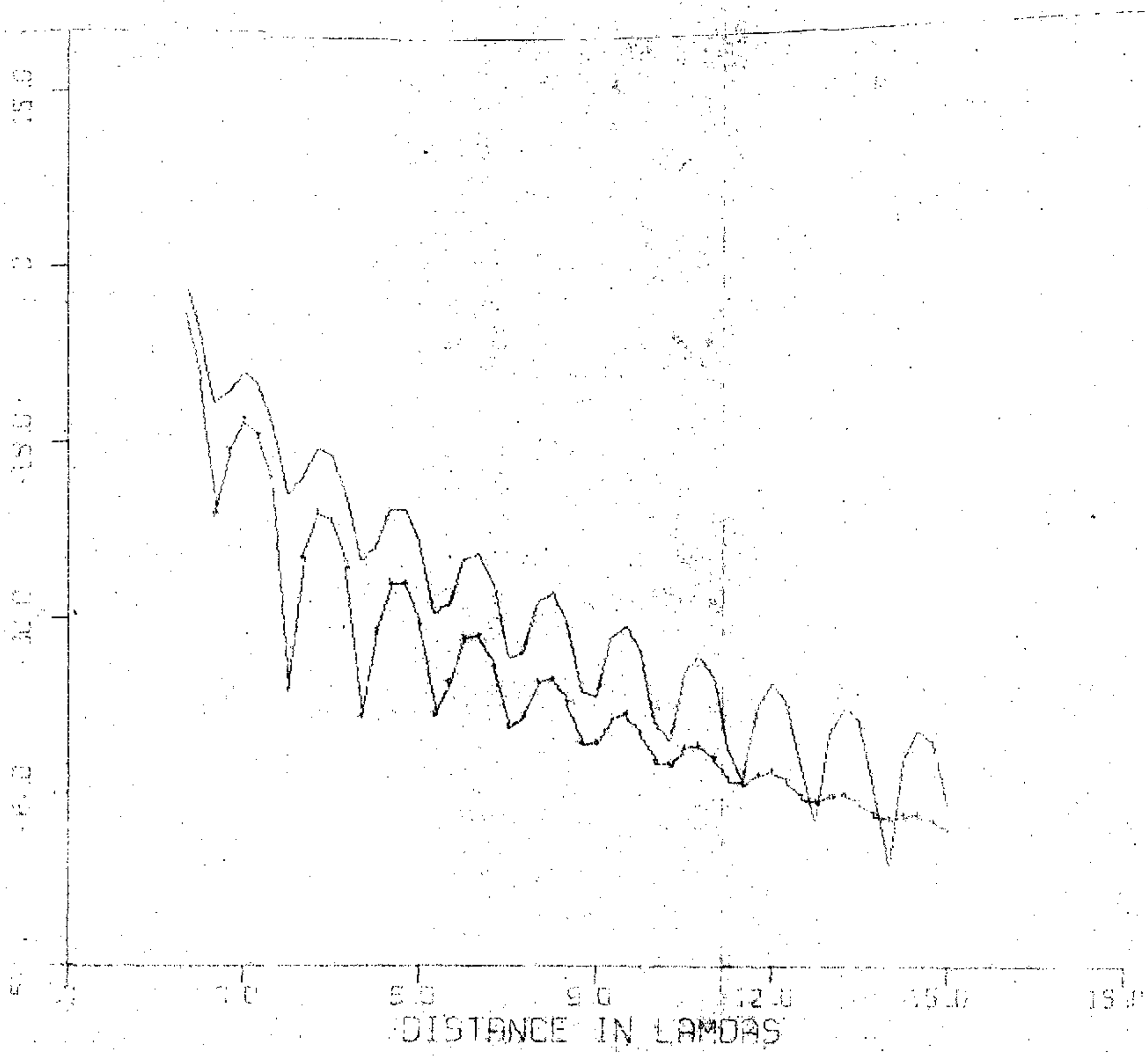
Figures 3.1-3.81, Interference patterns

Figures 3.82-3.92, Radiation patterns

VMD

E_φ

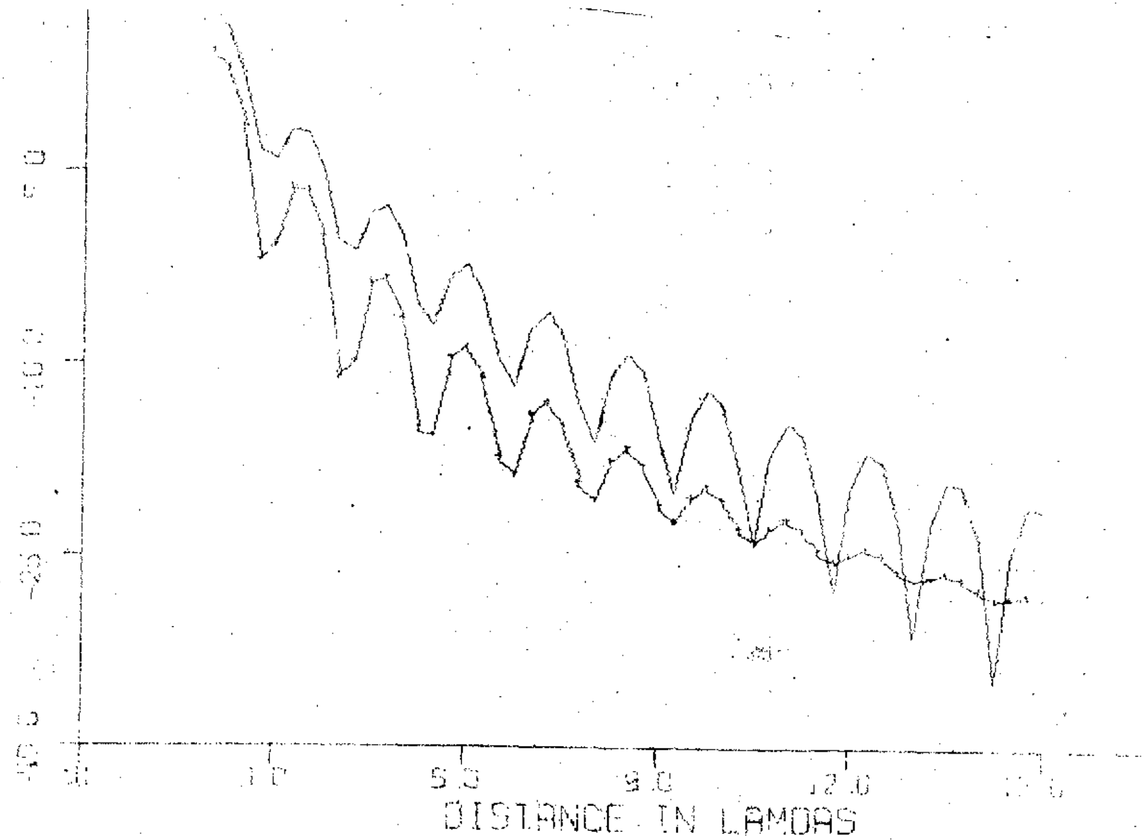
$\varepsilon_1 = 3.2(1+i.05)\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = 1$



VMD

H_ρ

$\varepsilon_1 = 32(1+i\overset{.01}{.05})\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$



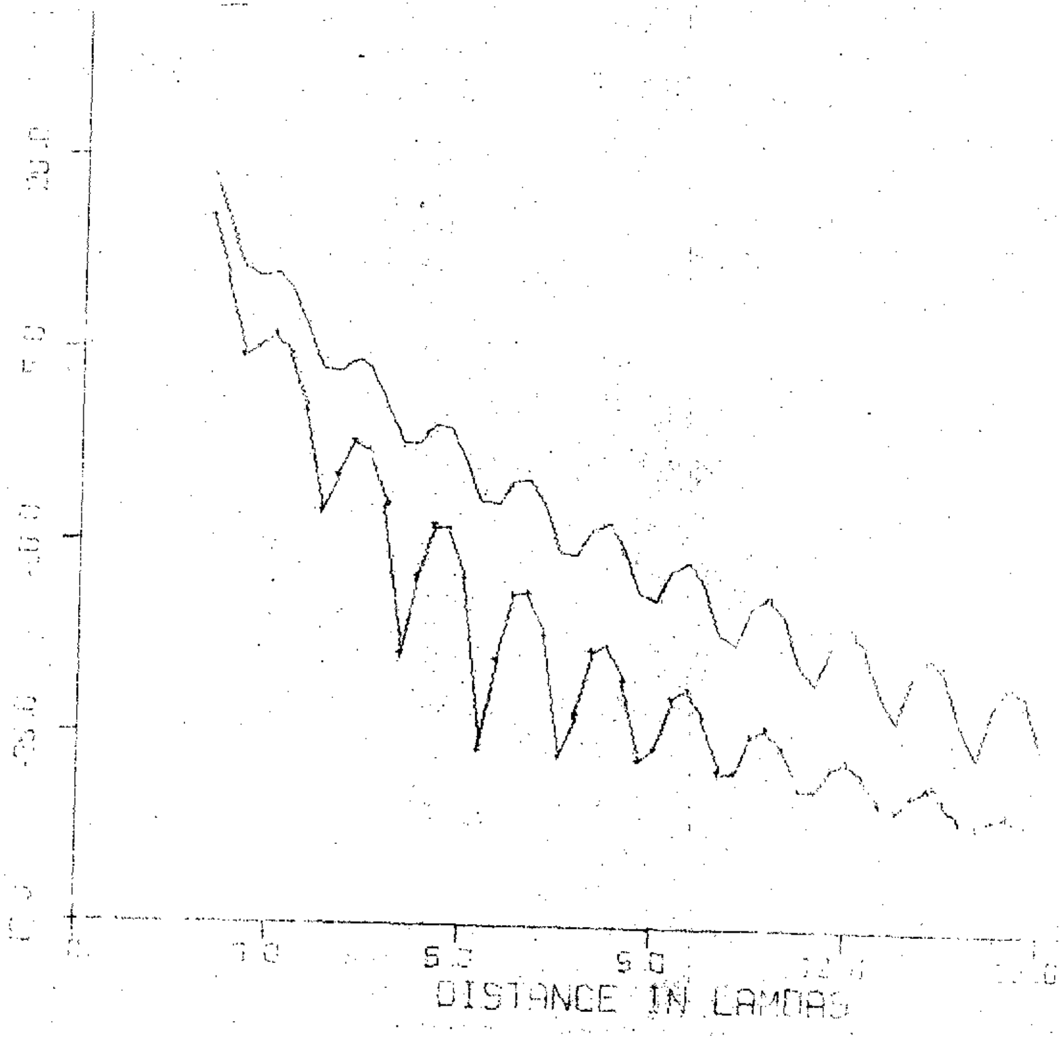
VMD

H_y

$\varepsilon_1 = 3.2(1+i\,0.05)\varepsilon_0$

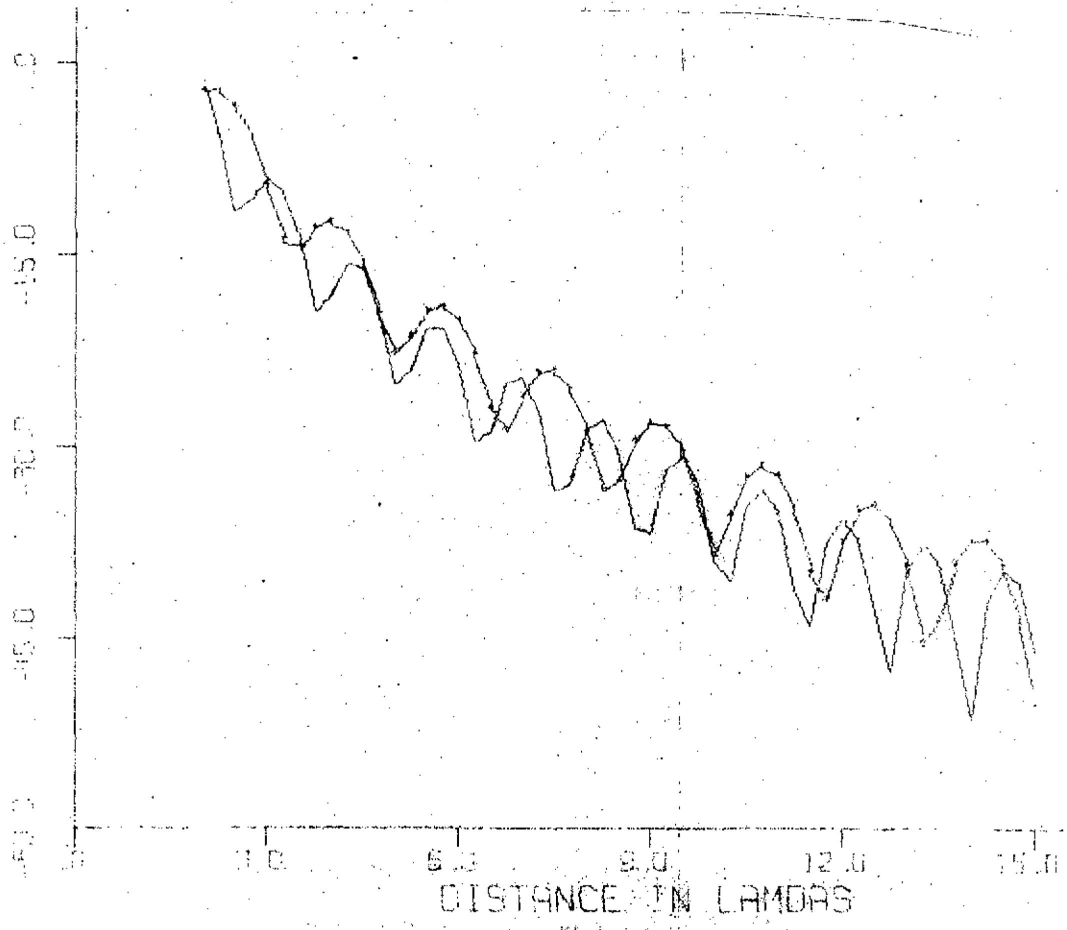
$\mu_1 = 1 \ \mu_0$

$a = 1$



E_φ (VMD)

$\varepsilon_1 = 3.2(1 + i\,.0)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = 1, .8$



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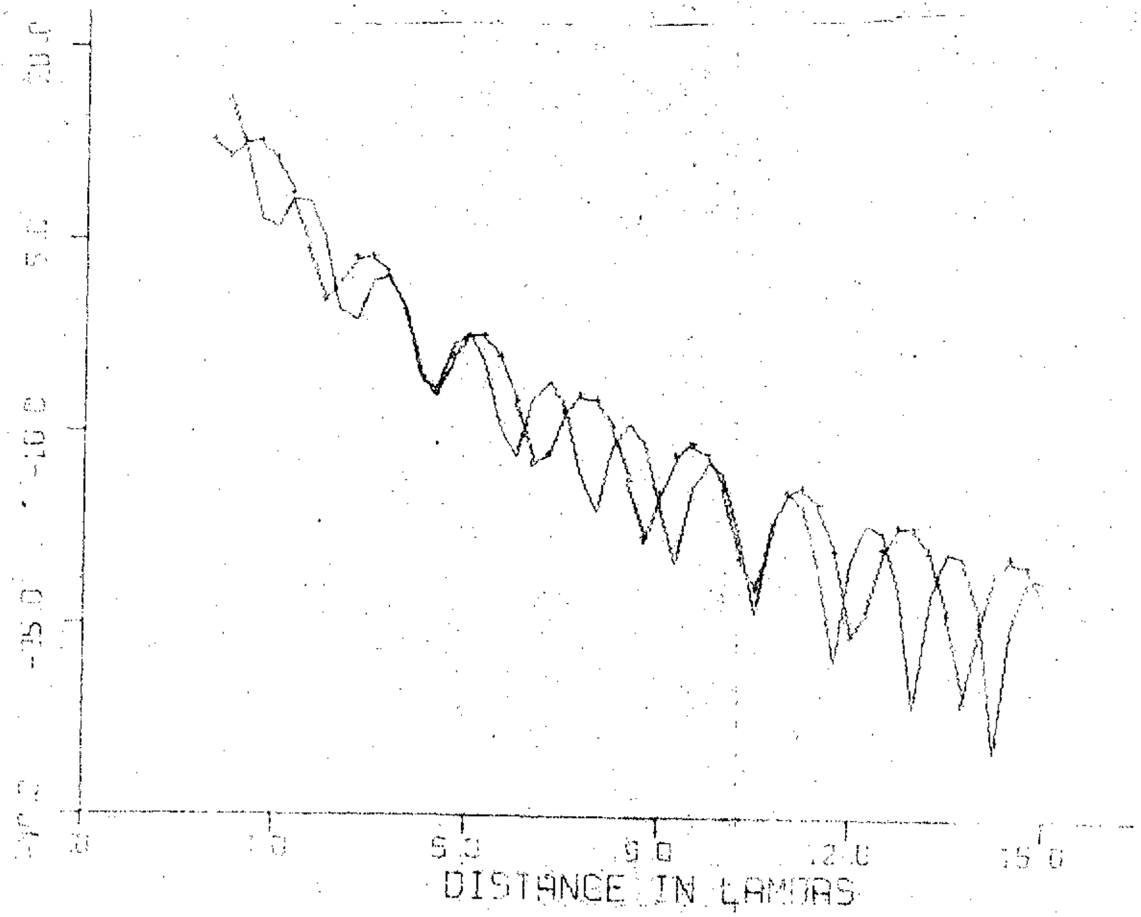
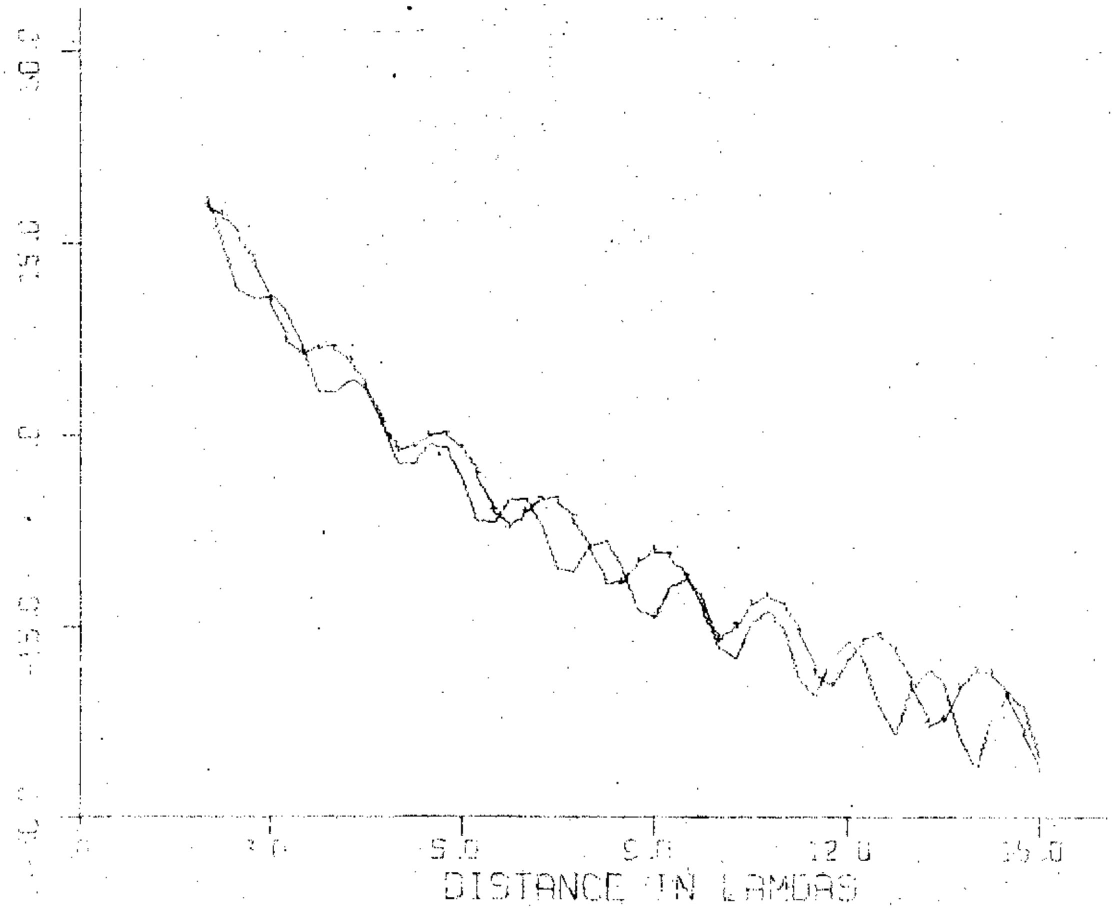


H_z (VMD)

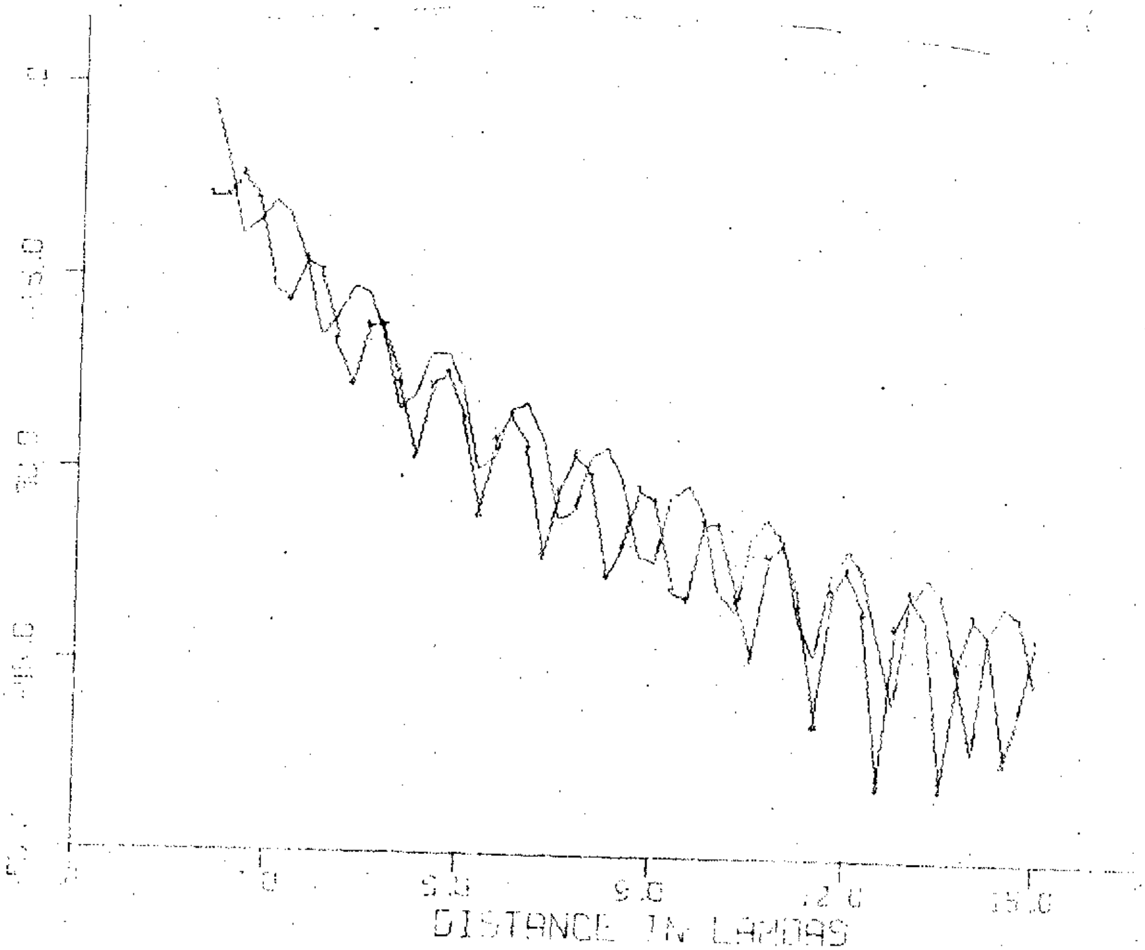
$\varepsilon_1 = 32\,(1 + i\cdot 01)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1,\ \cdot 8$



VMD

$\bar{E}_\phi$

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = 1, 1.2$



VMD

H_ρ

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$\mu_1 = 1 \ \mu_0$
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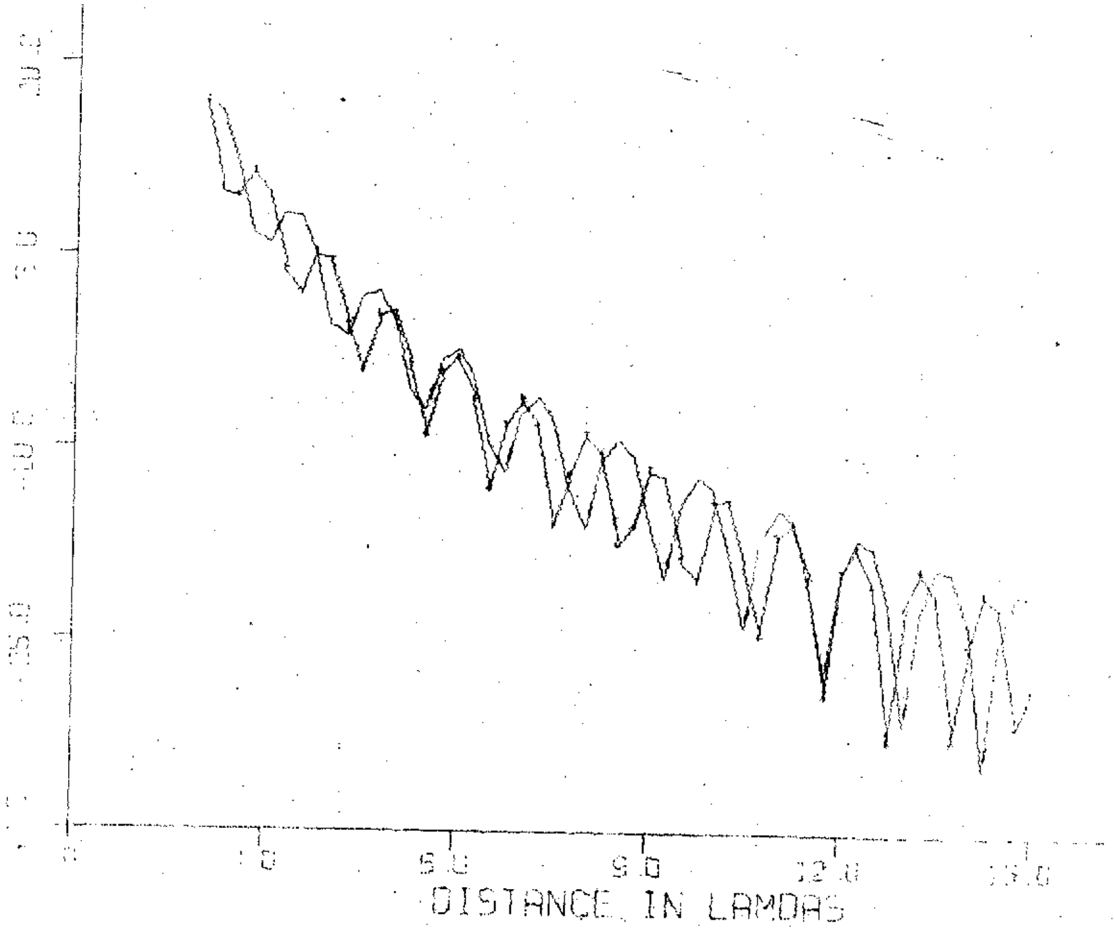
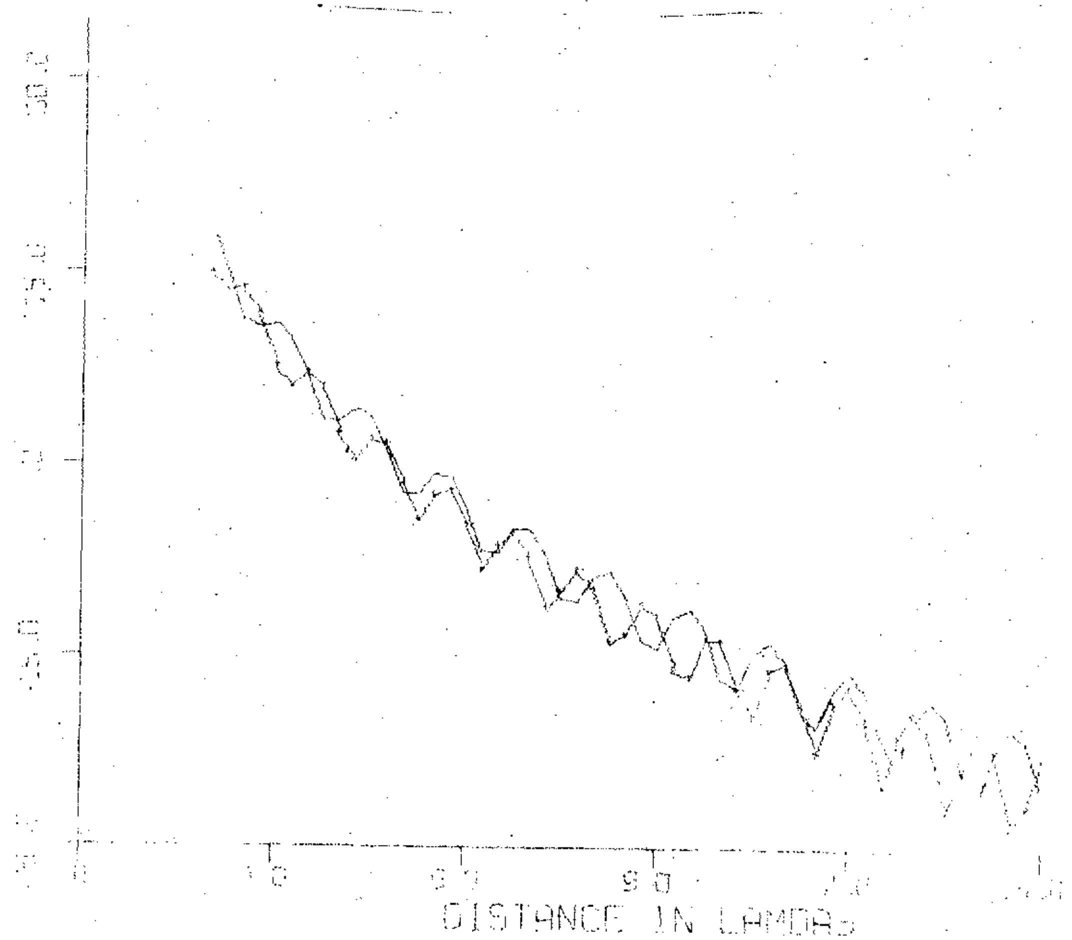


VMD

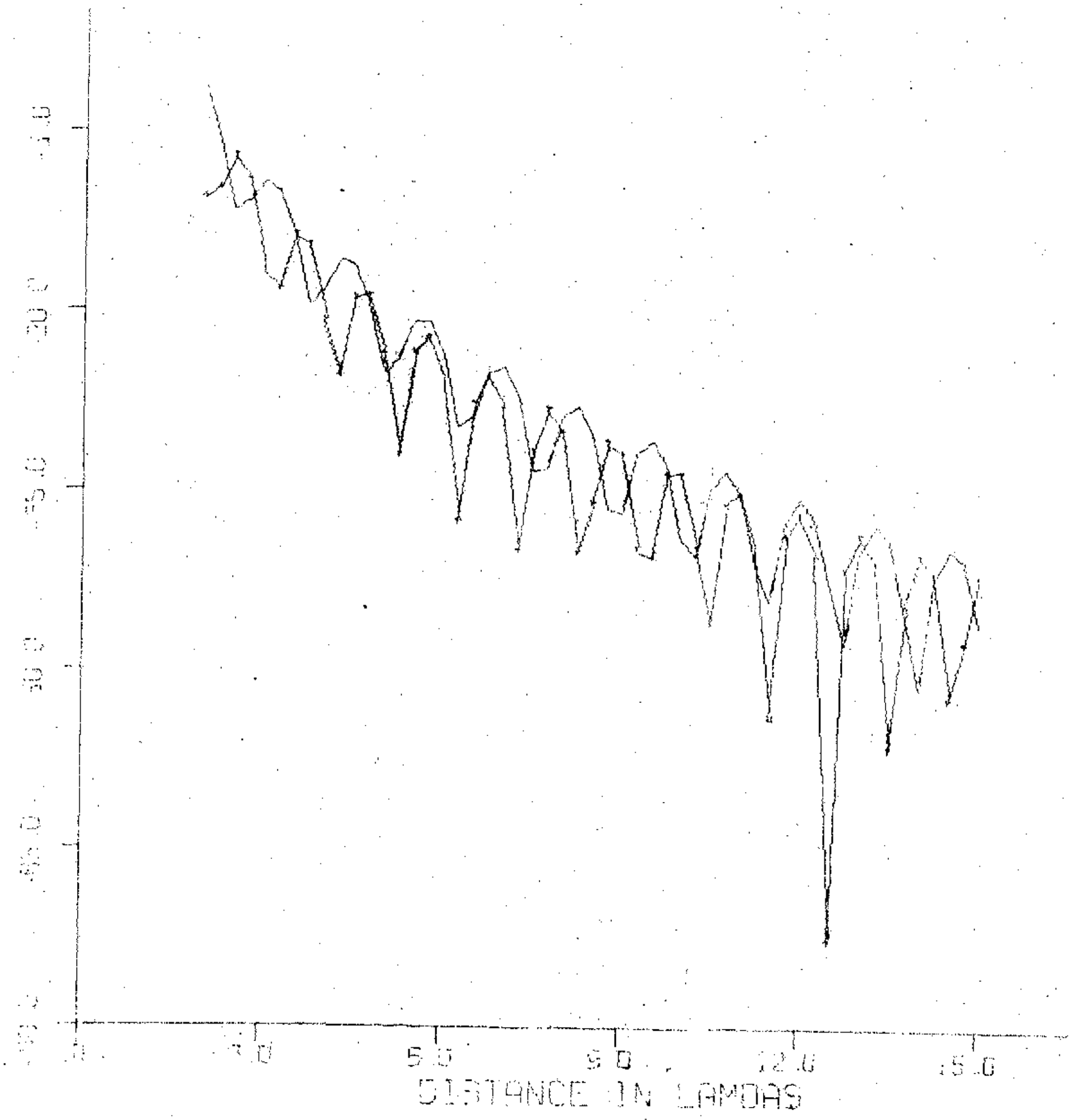
H_z

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, 1.2.$



E_ϕ (VMD)

$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1, 1.2\,\mu_0$
$a = 1$



H_z (VMD)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
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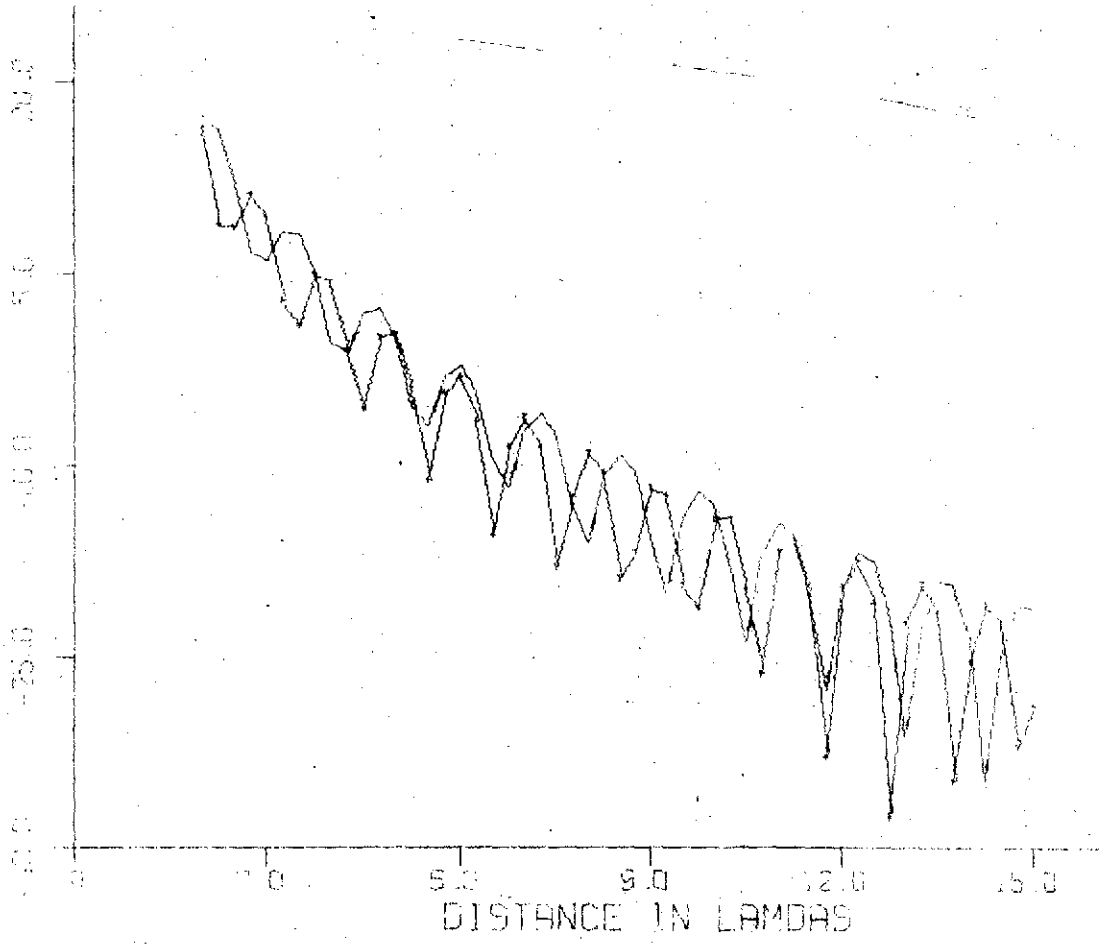

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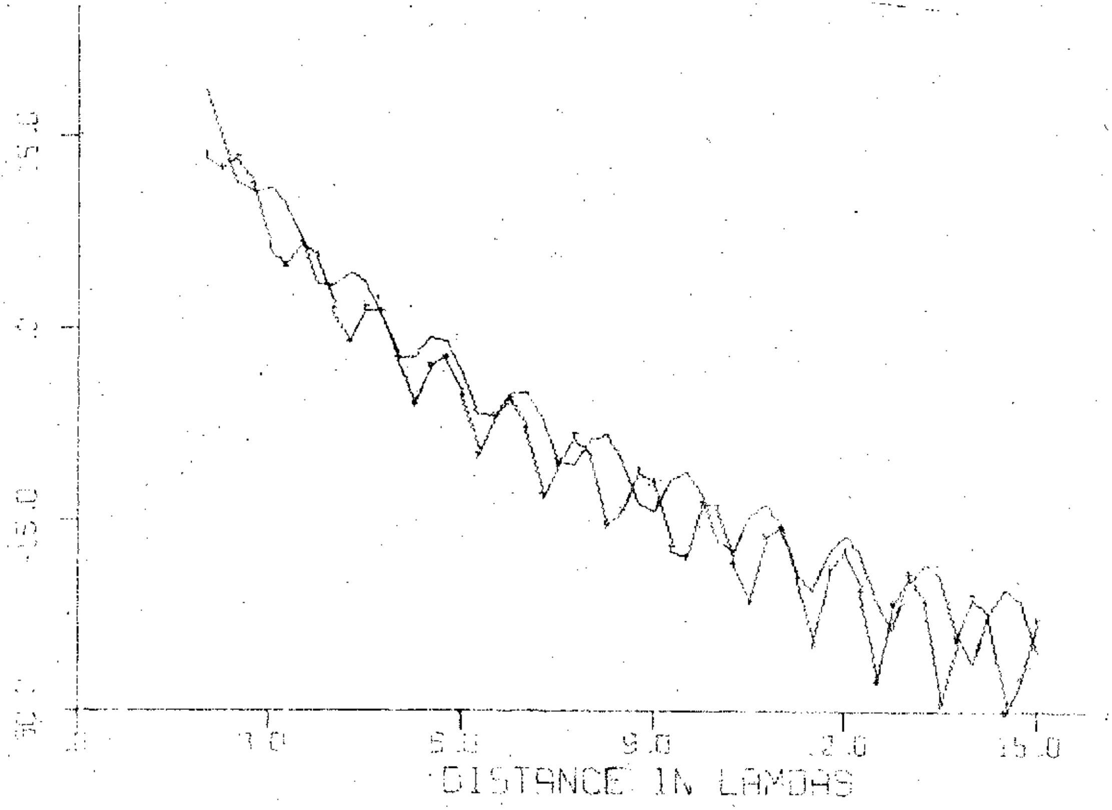
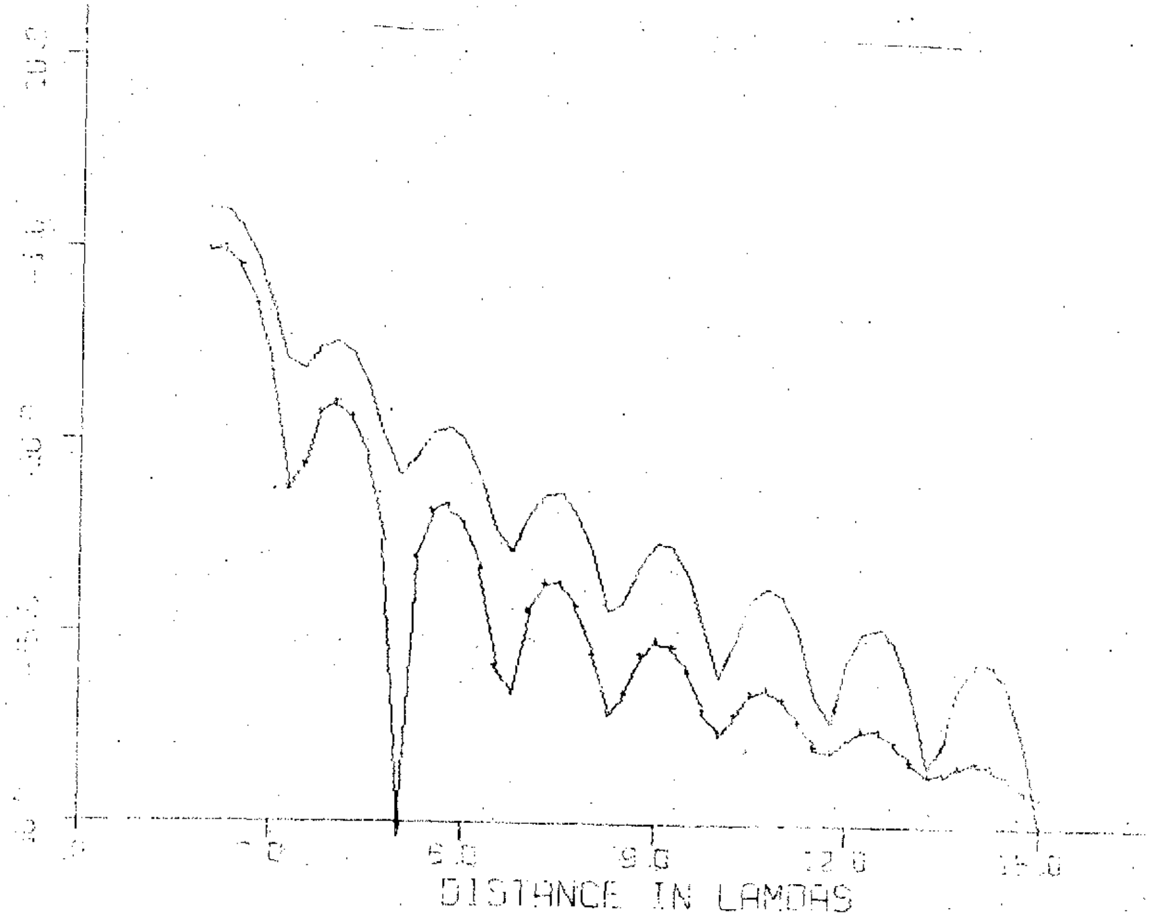


E_φ (VMD)

$\varepsilon_1 = 3.2(1 + i\cdot 0.05)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = 0.8$



H_ρ (VMD)

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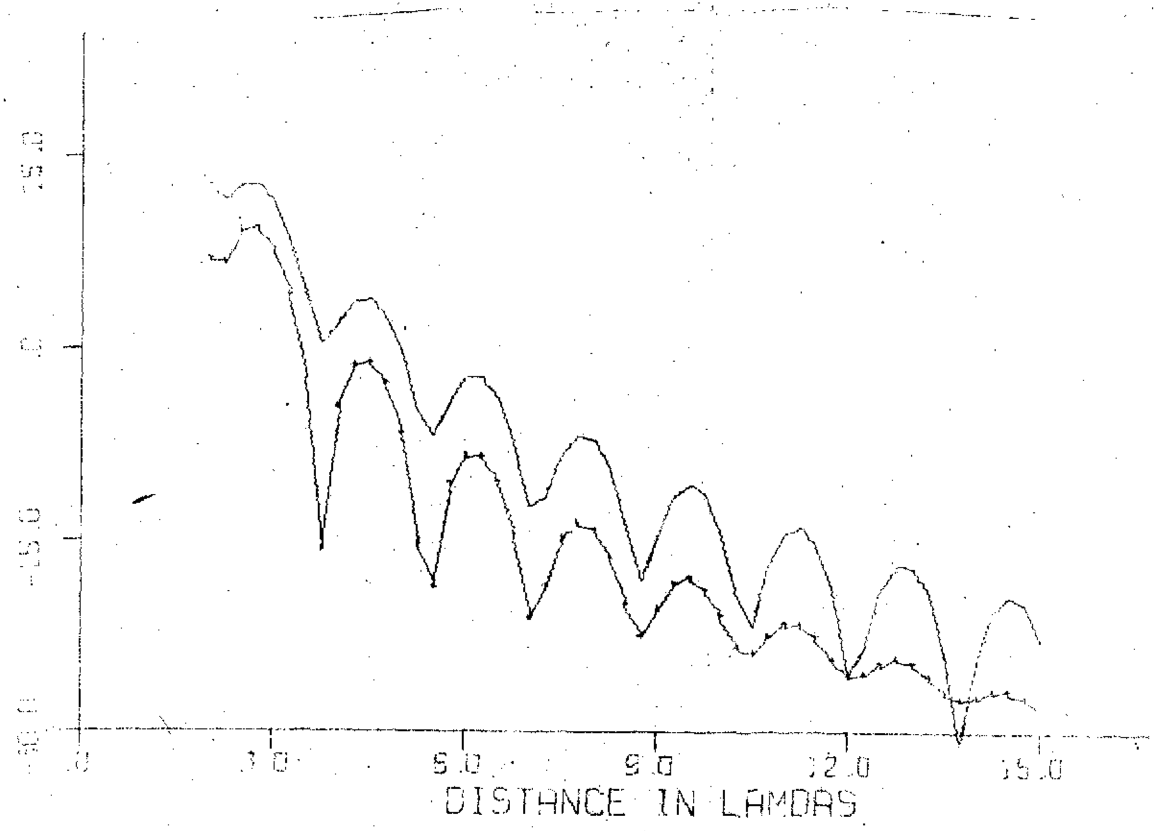
$\mu_1 = 1\ \mu_0$
$a = 0.8$



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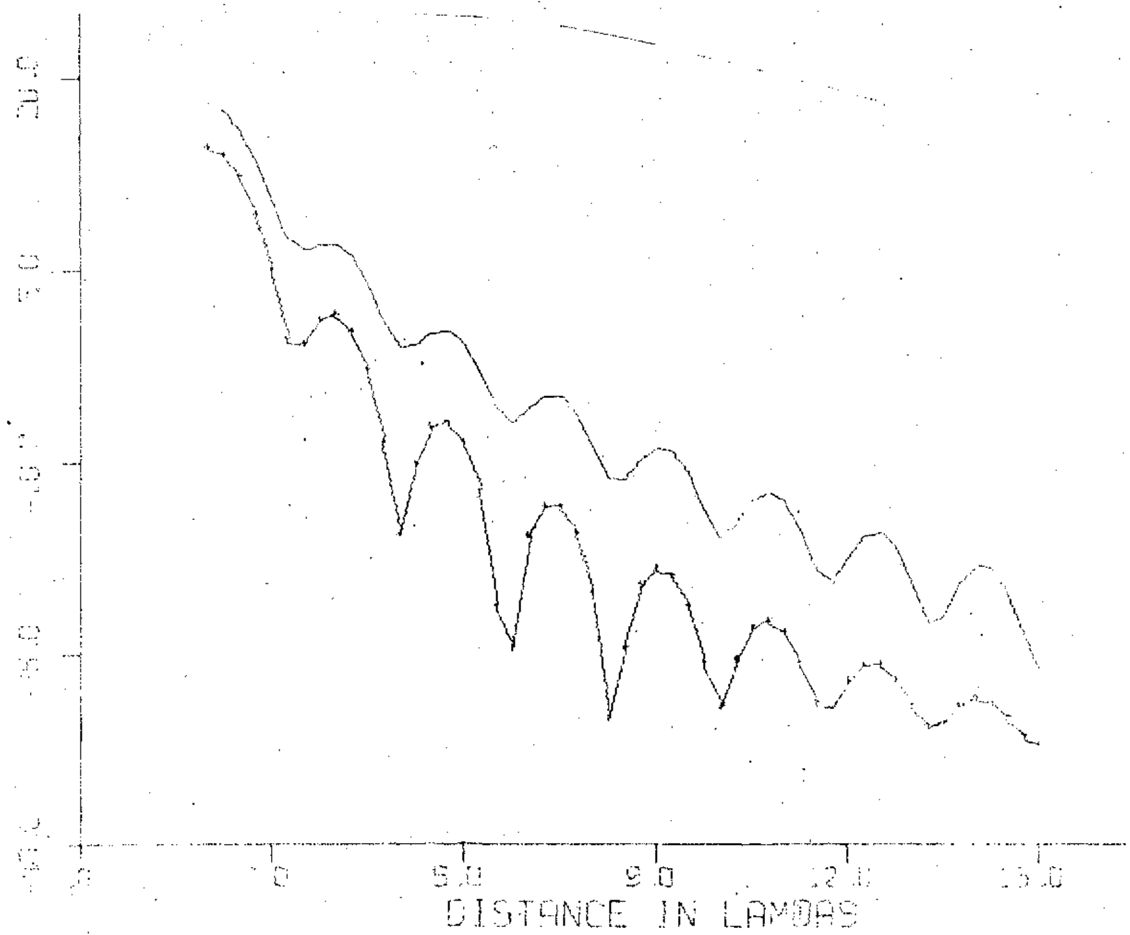

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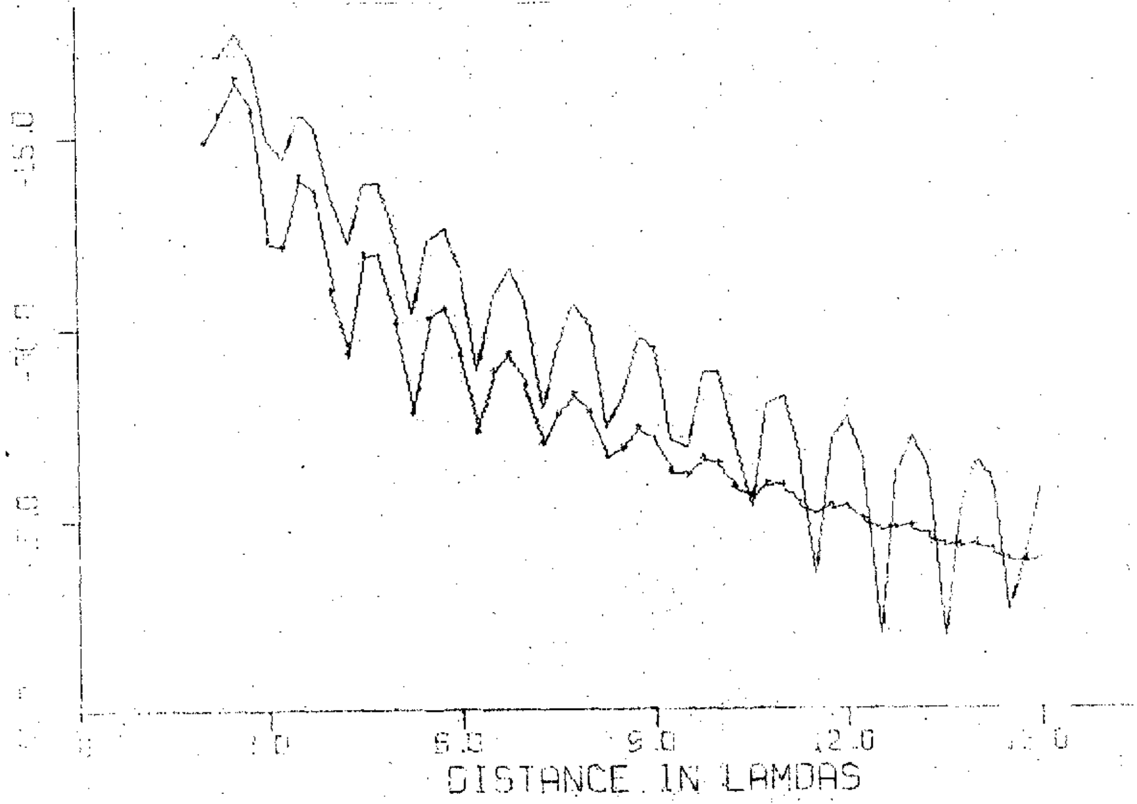

H_ς (VMD)

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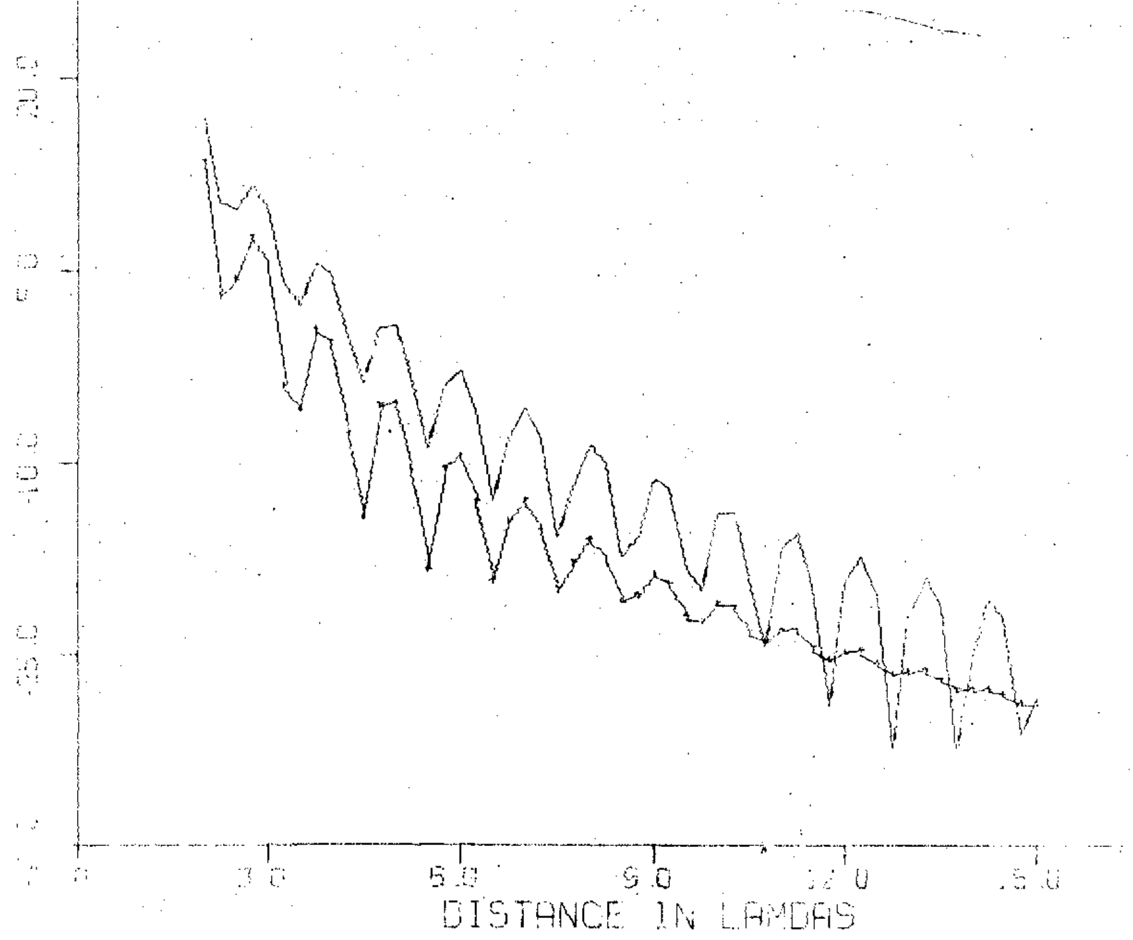
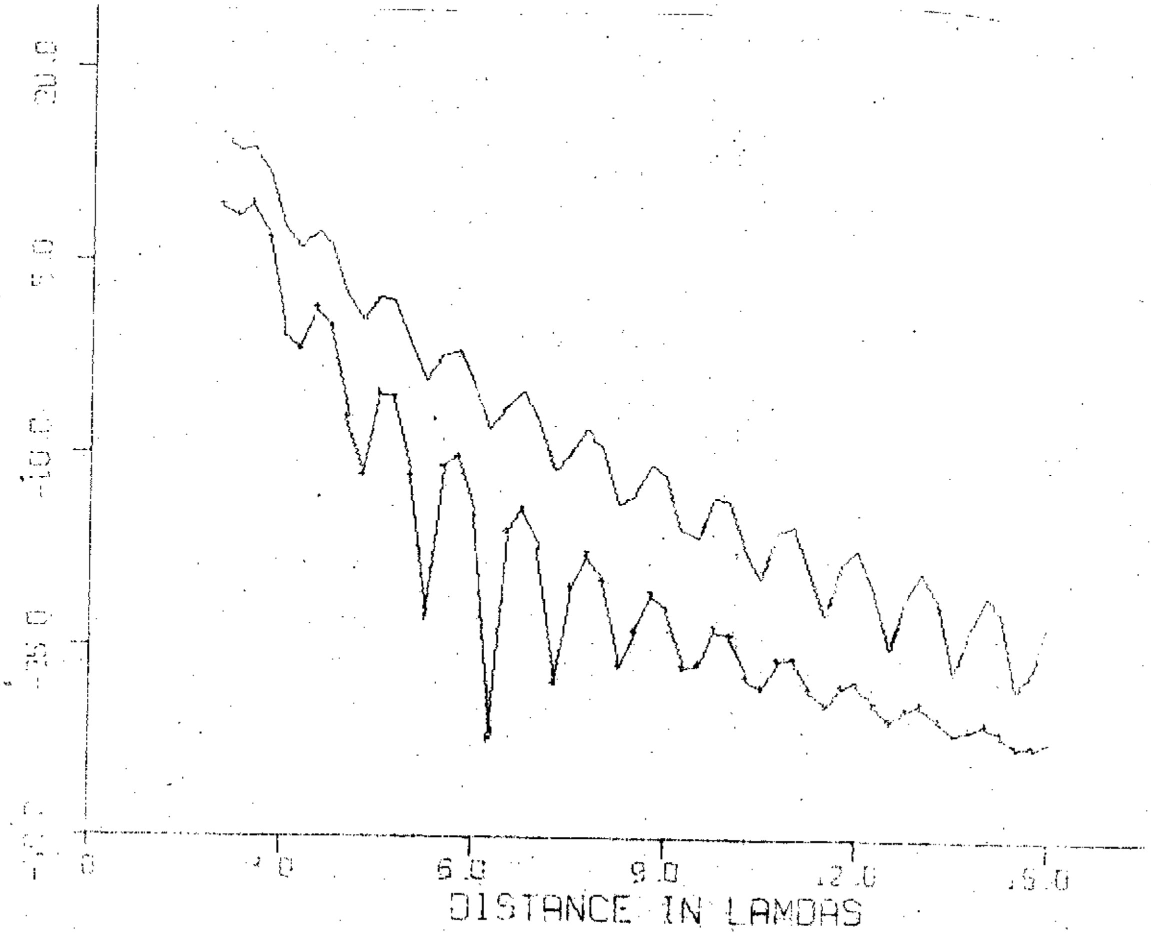


H_z(VMD)

$\varepsilon_1 = 3.2(1 + i\,{}^{.01}_{.05})\varepsilon_0$

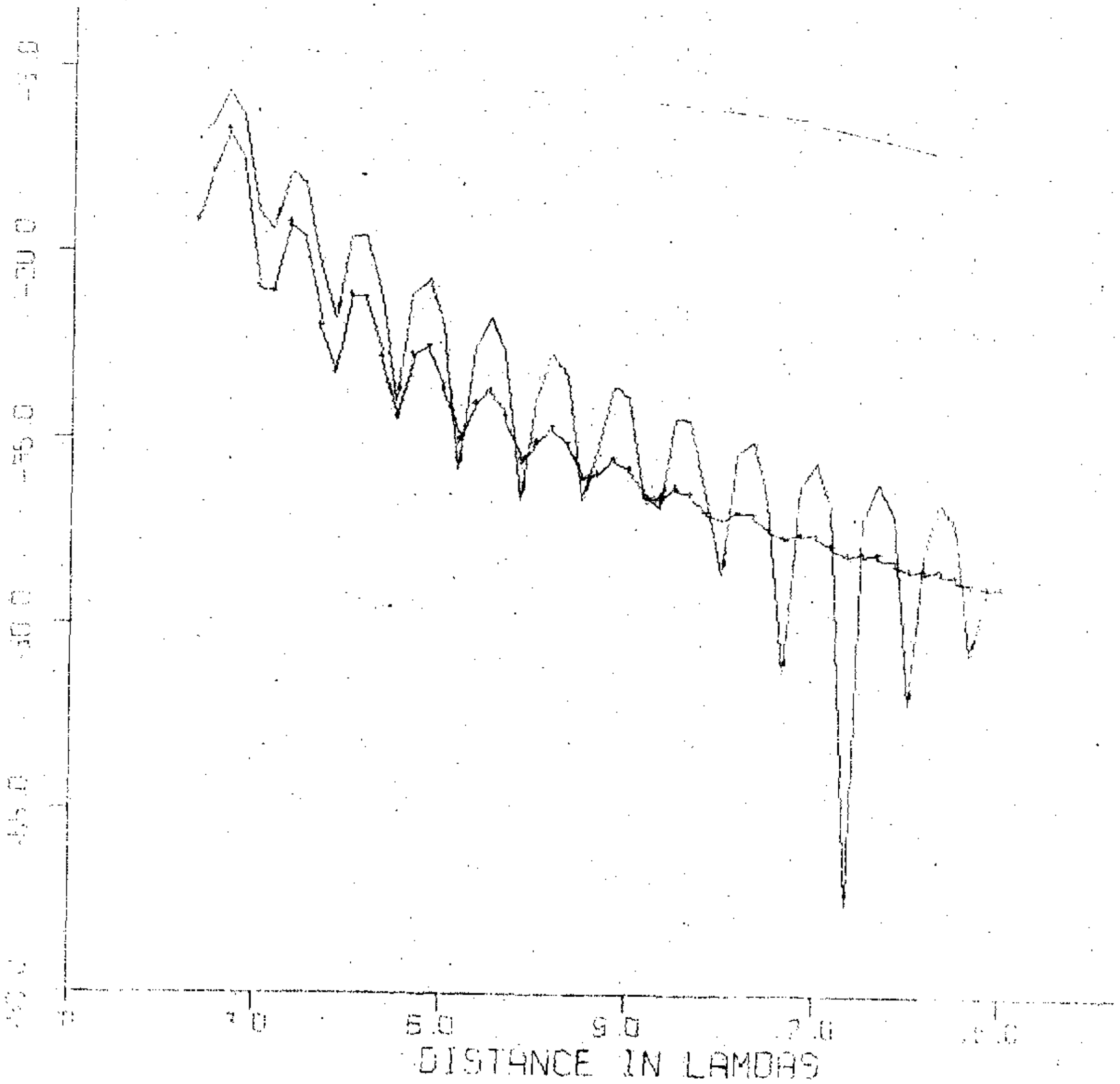
$\mu_1 = 1\ \mu_0$

$a = 1.2$



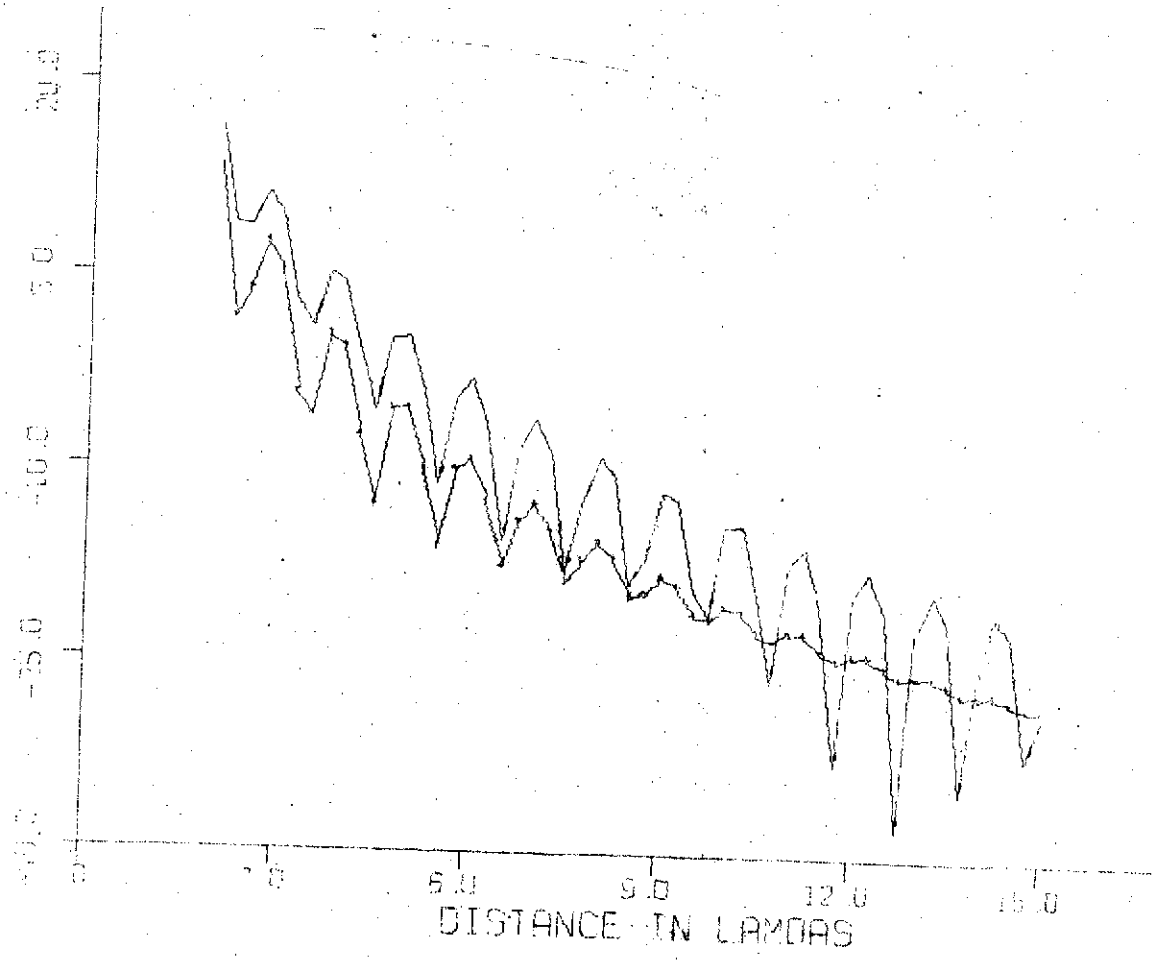
E_φ (VMD)

$\varepsilon_1 = 3.2\,(1 + i\,\overset{.01}{.05})\,\varepsilon_0$
$\mu_1 = 1.2\,\mu_0$
$a = 1$



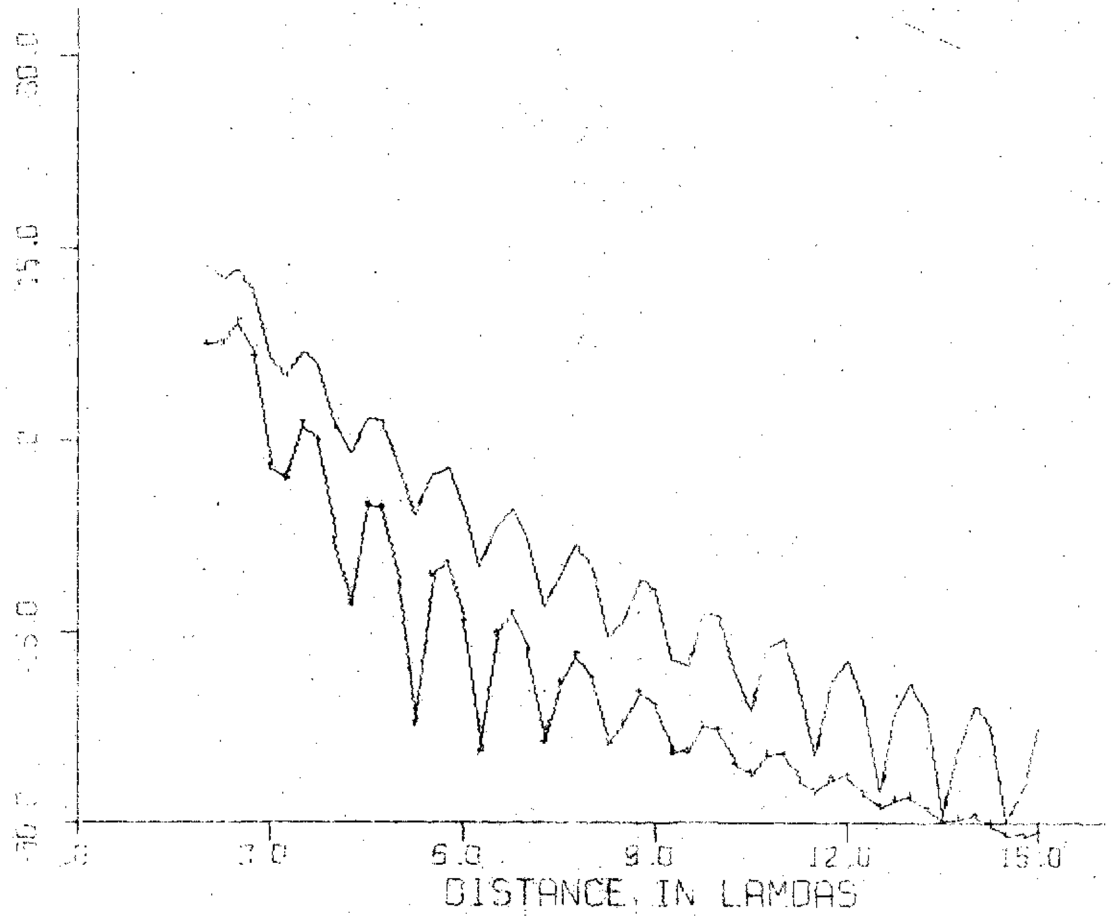
H_z (vmo)

$\varepsilon_1 = 3.2(1 + i0.05)\varepsilon_0$
$\mu_1 = 1.2\,\mu_0$
$a = 1$



H_z (VMD)

$\varepsilon_1 = 3.2(1 + i\,.01)\varepsilon_0$
$\mu_1 = 1.2\,\mu_0$
$a = 1$



E_φ (VMD)

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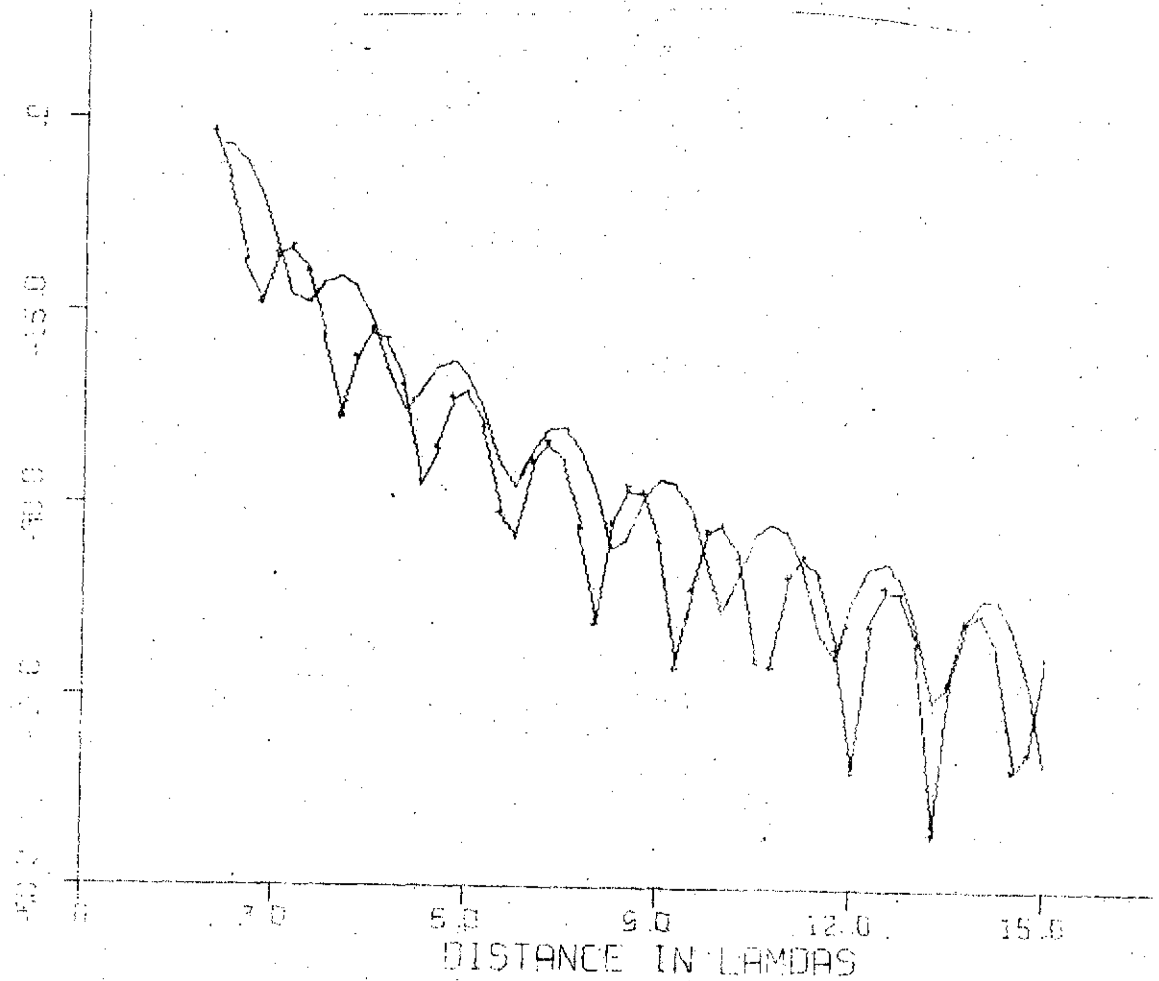

H_ρ (VMD)

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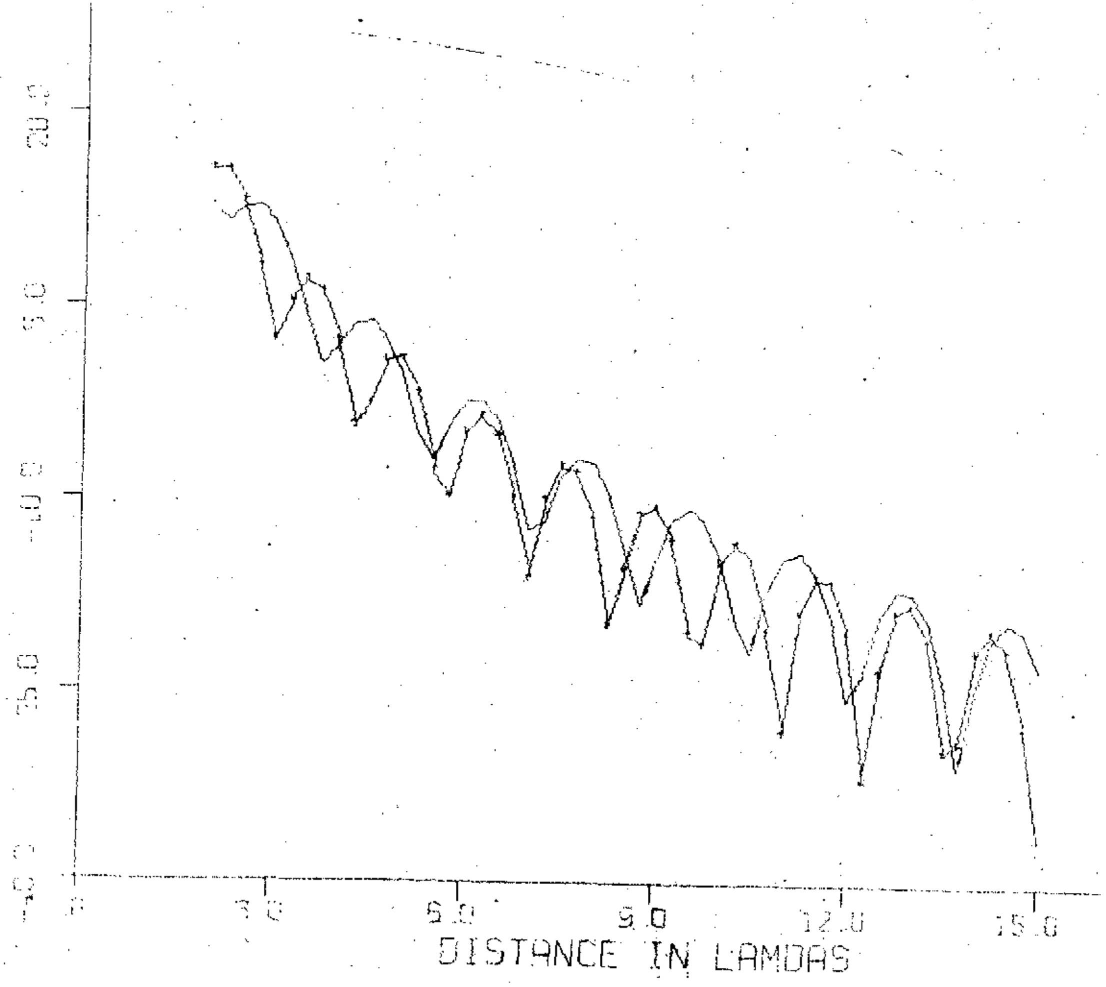

H_z (VMD)

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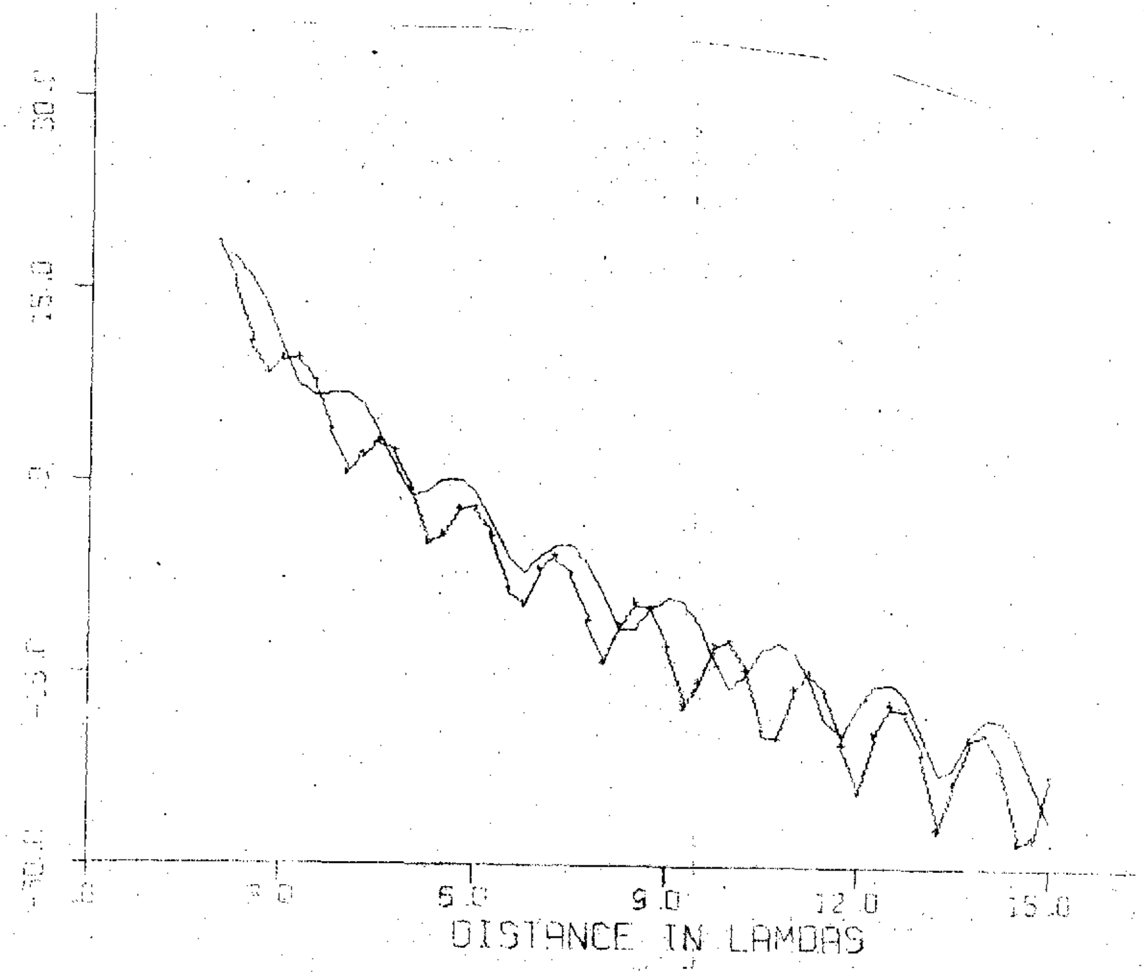

E_φ (VMD)

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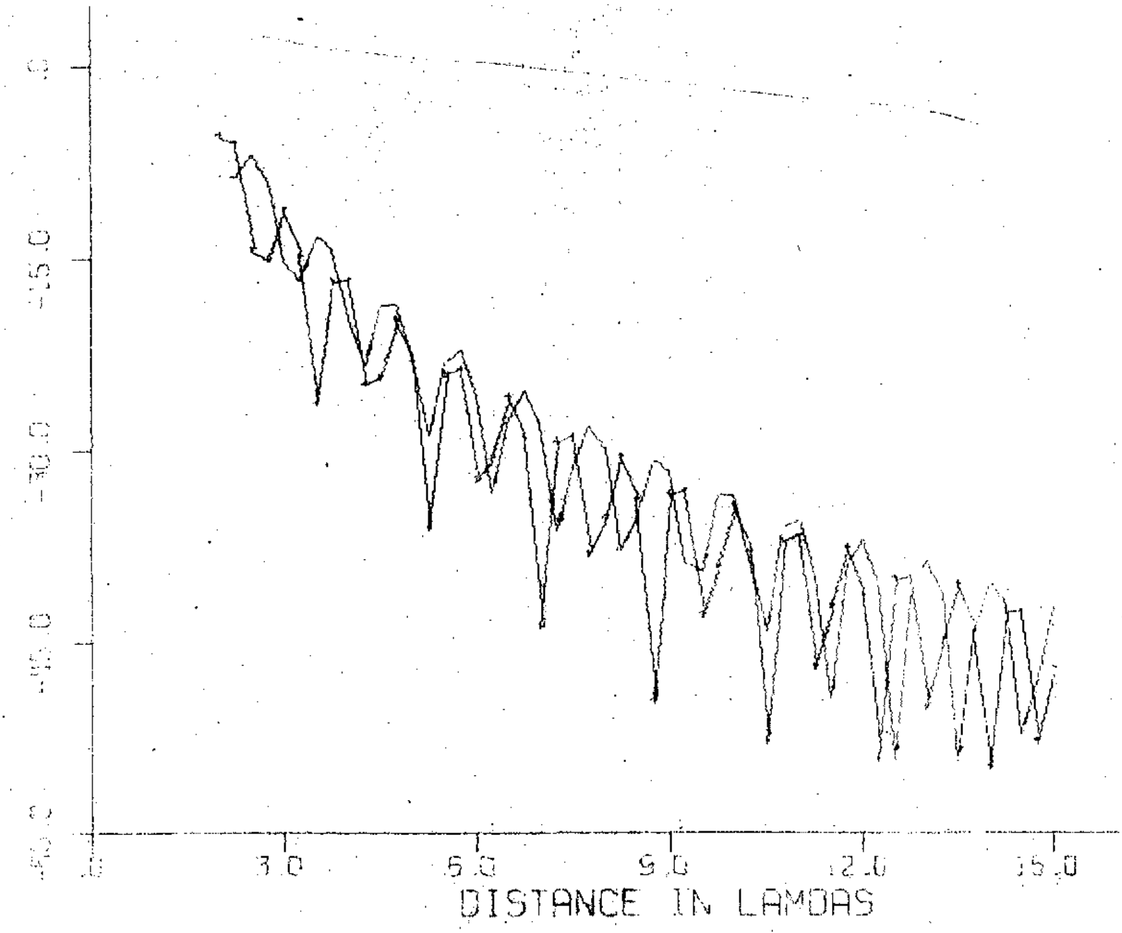

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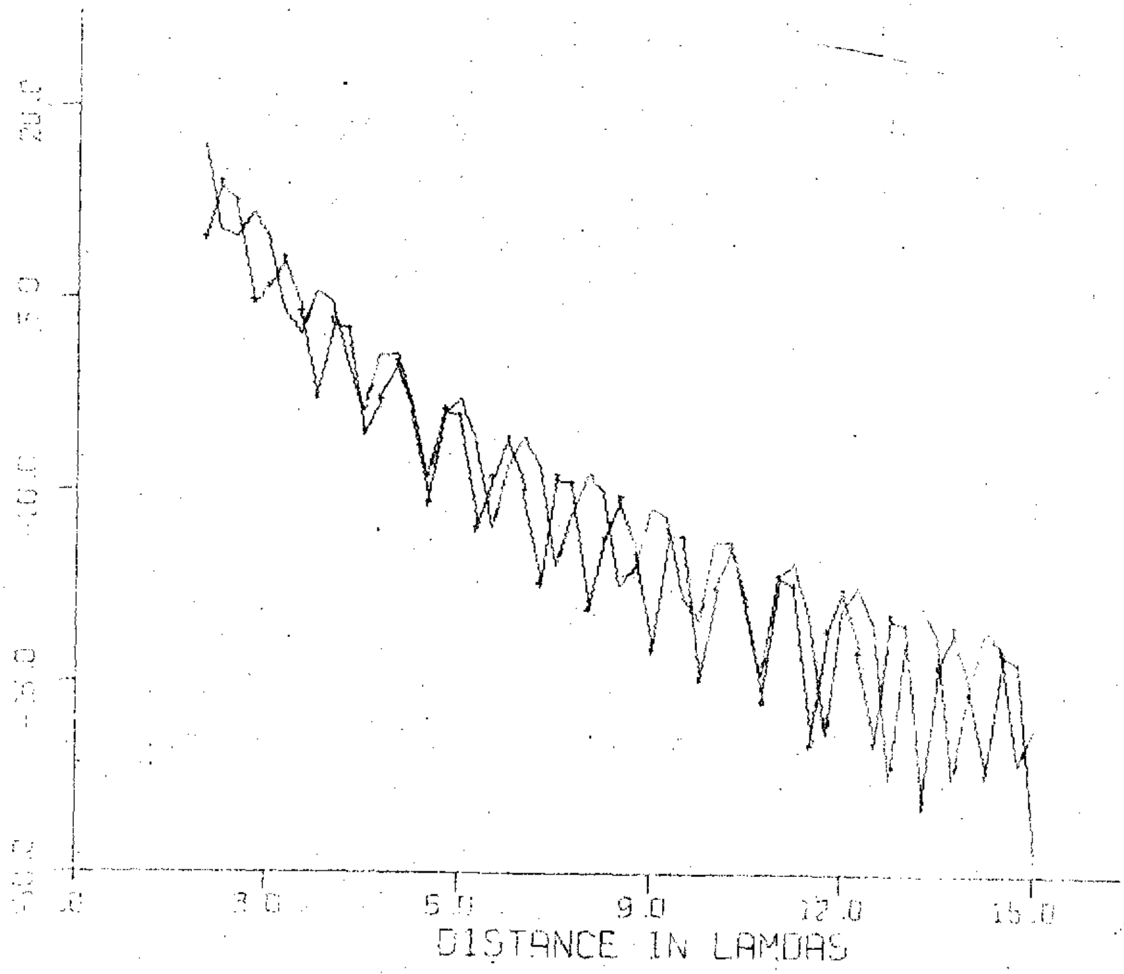

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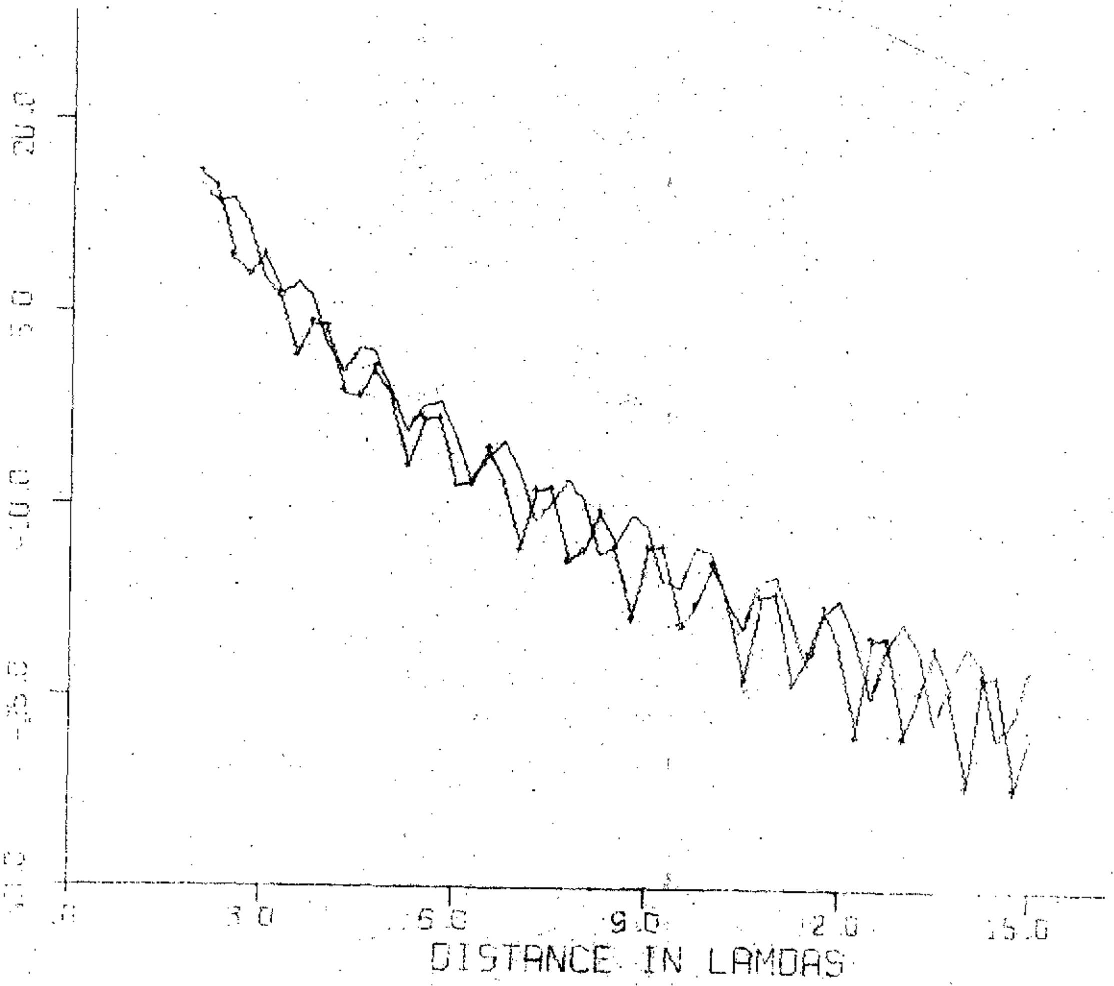

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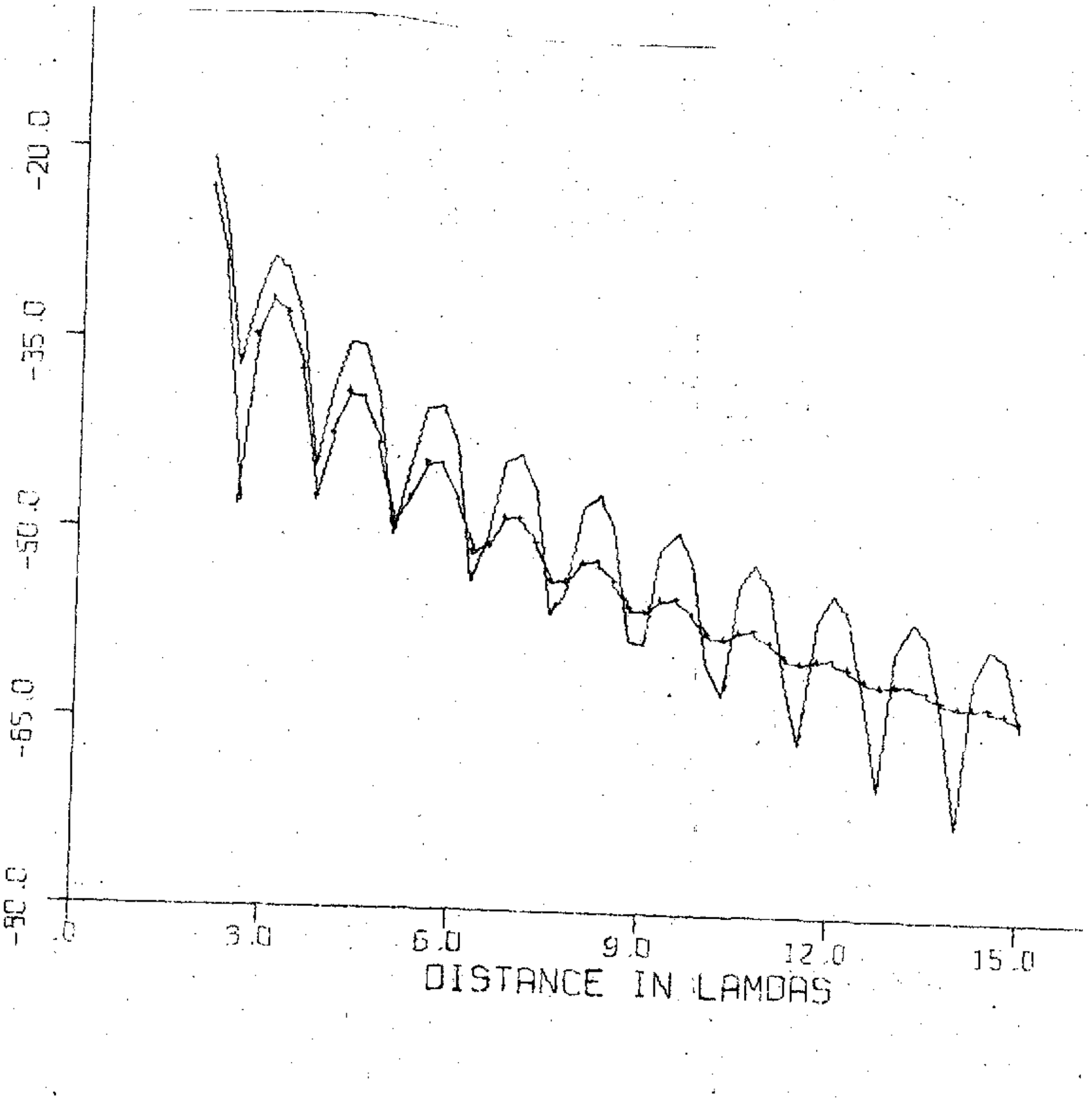

H_ρ (HED)

$\varepsilon_1 = 3.2(1 + i\overset{.01}{.05})\varepsilon_0$

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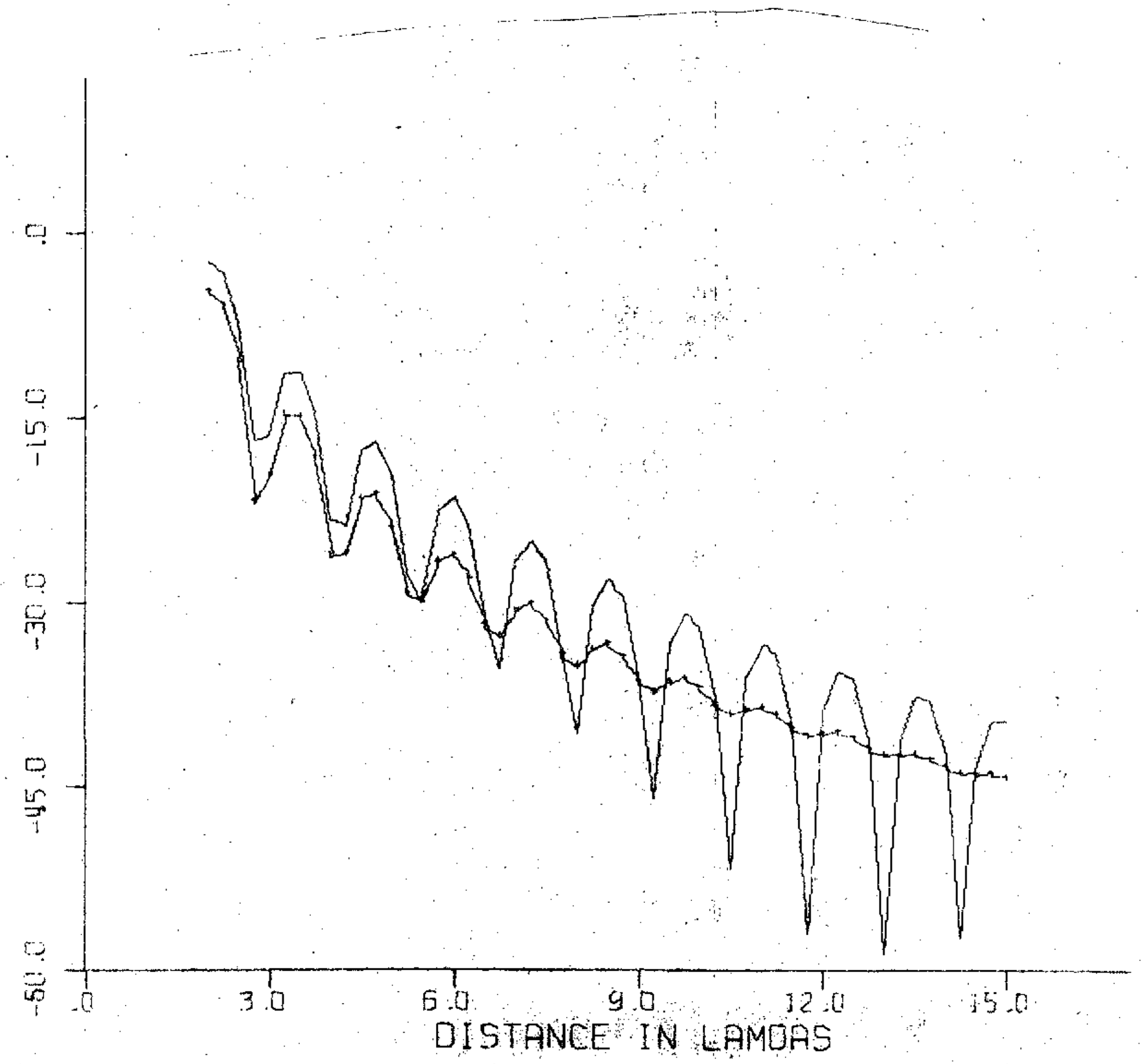

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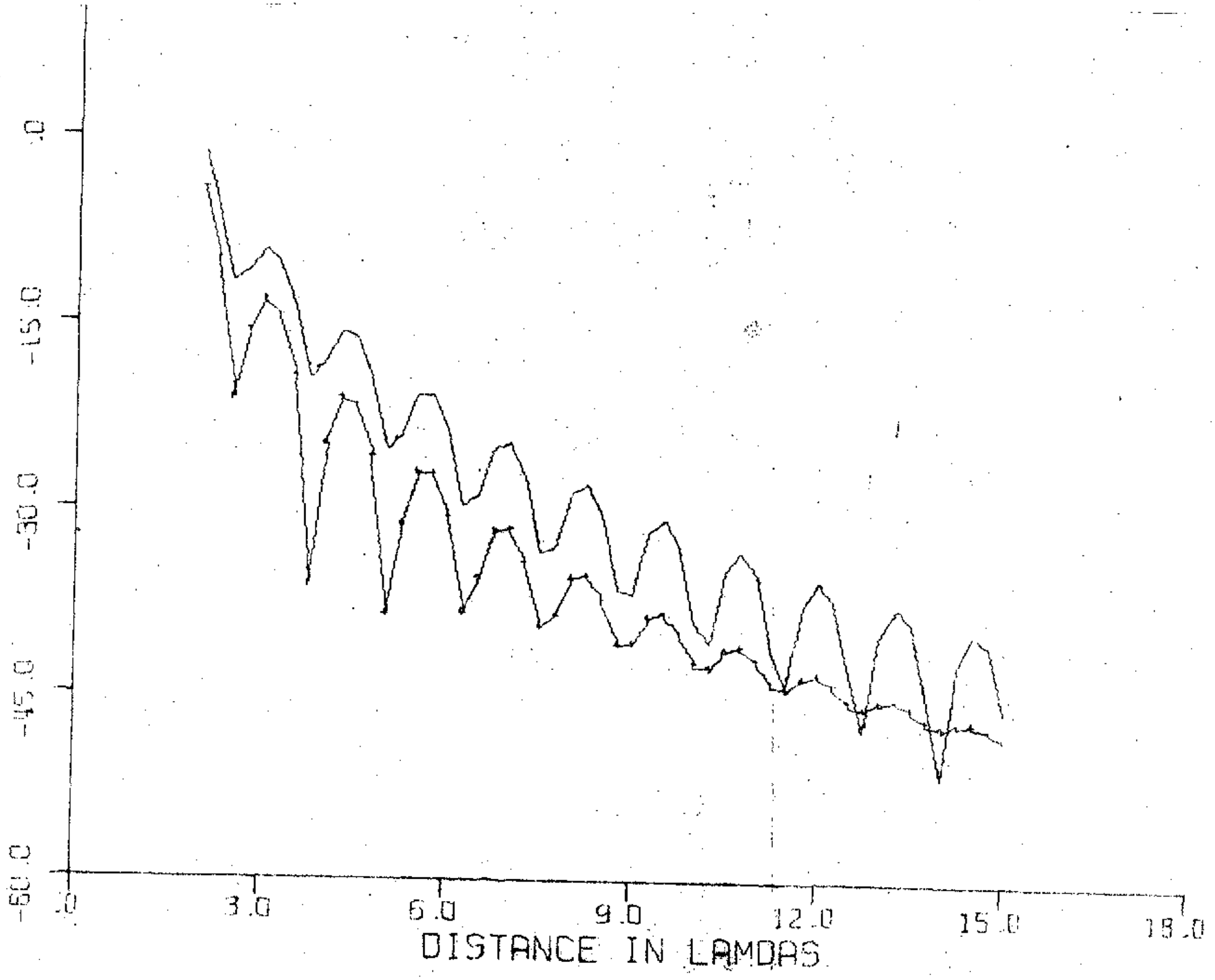

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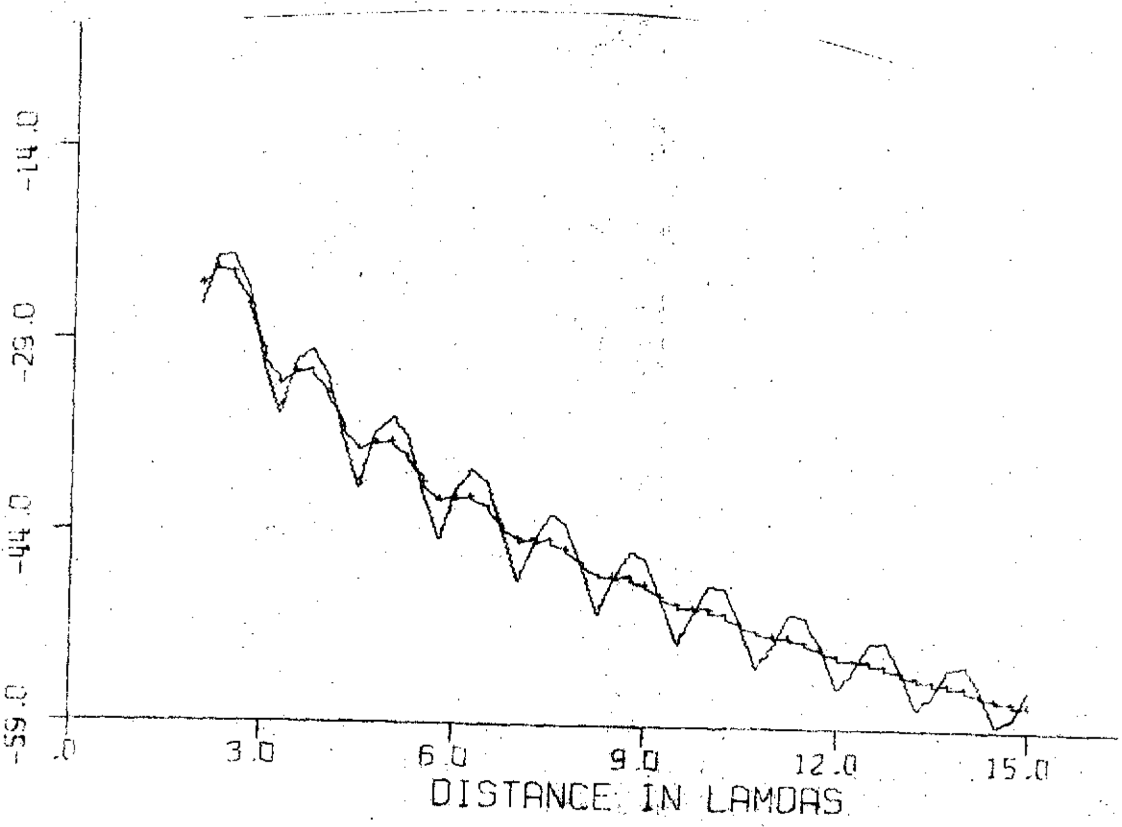

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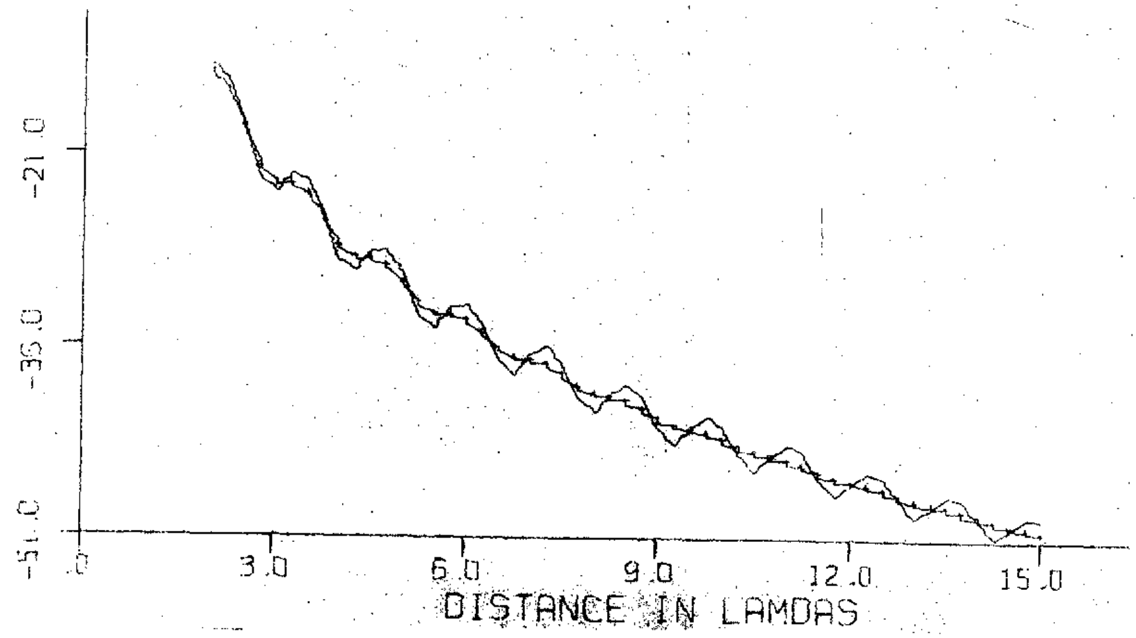

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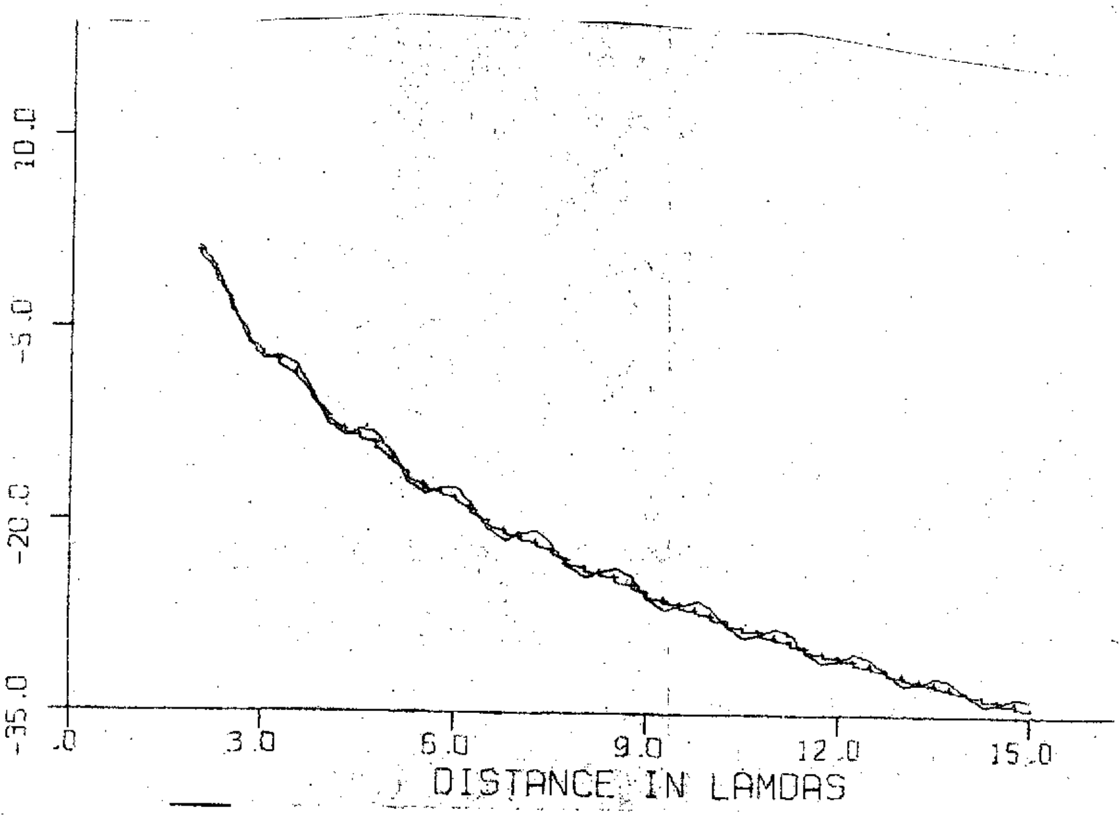

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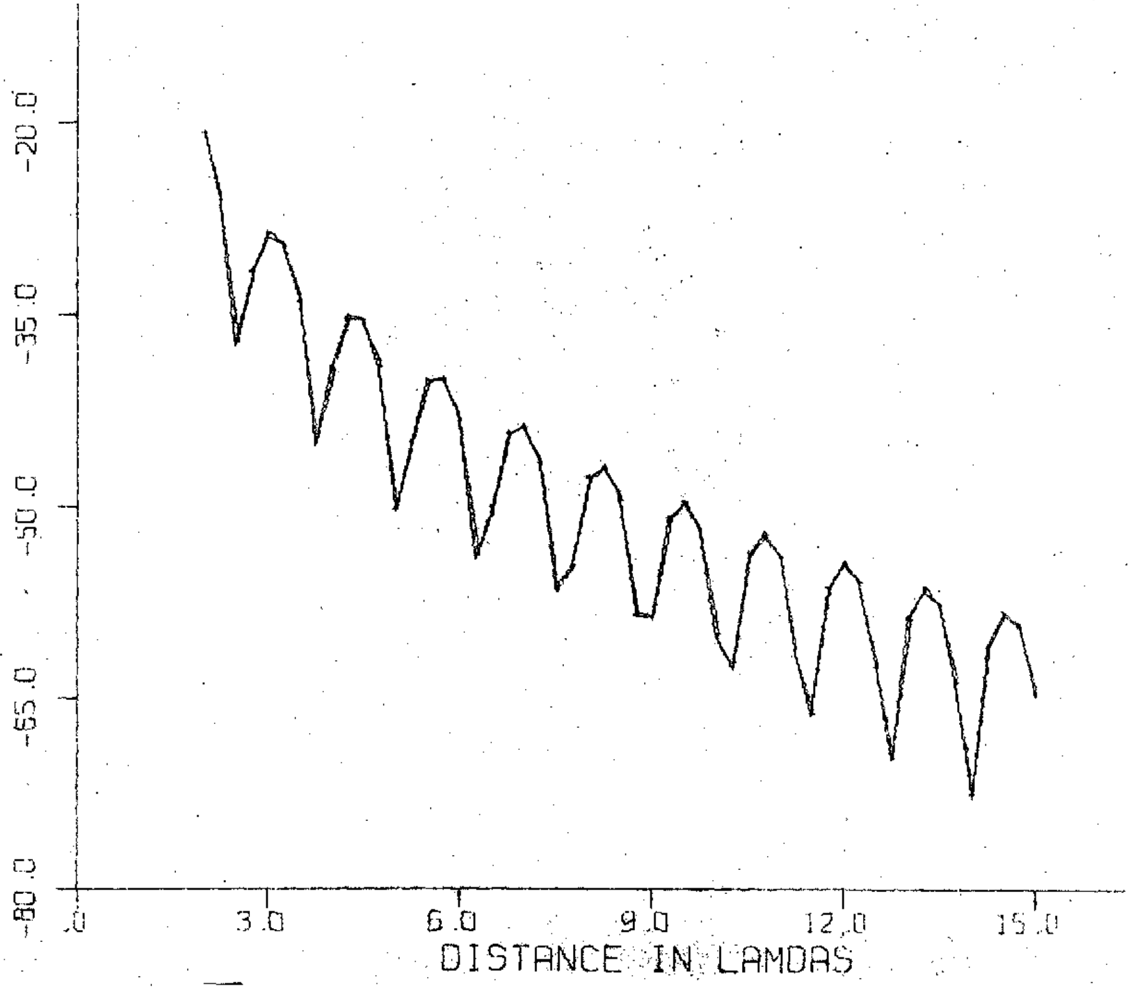

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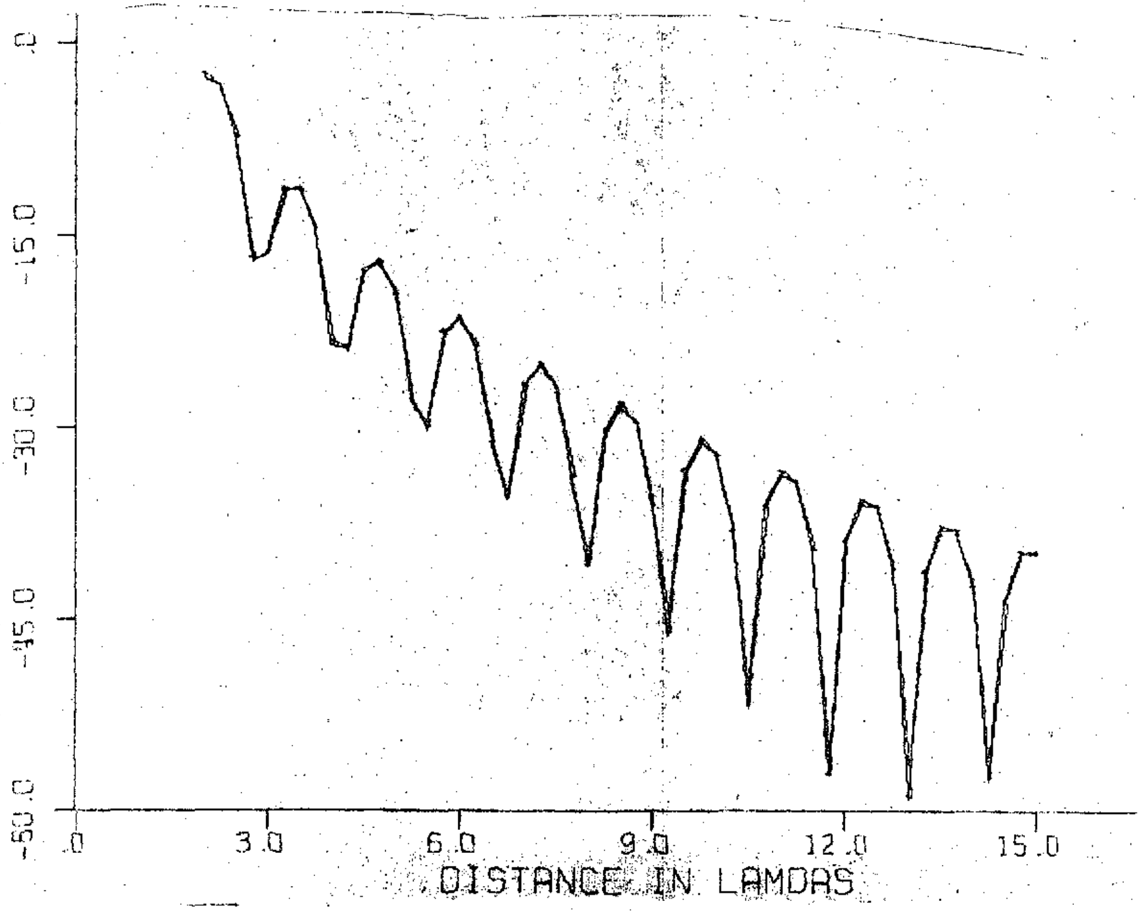

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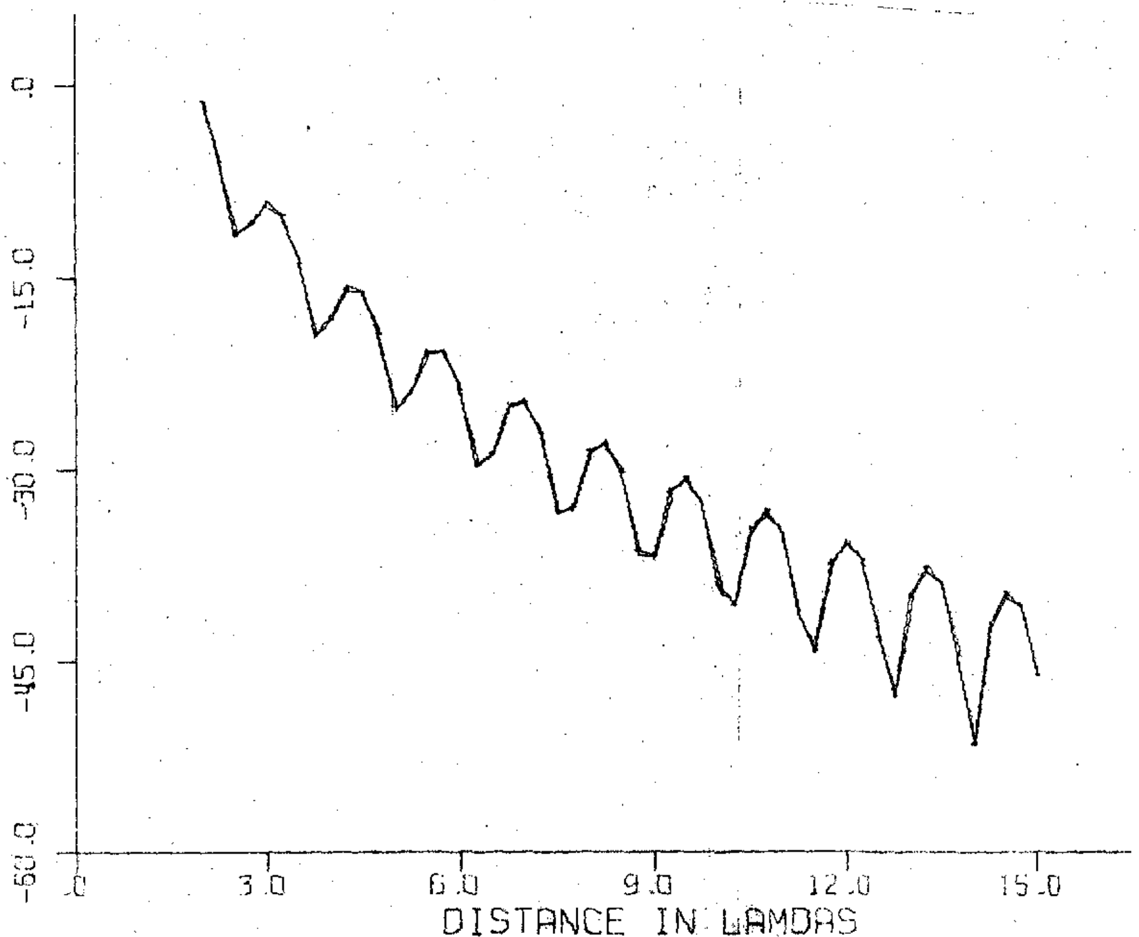

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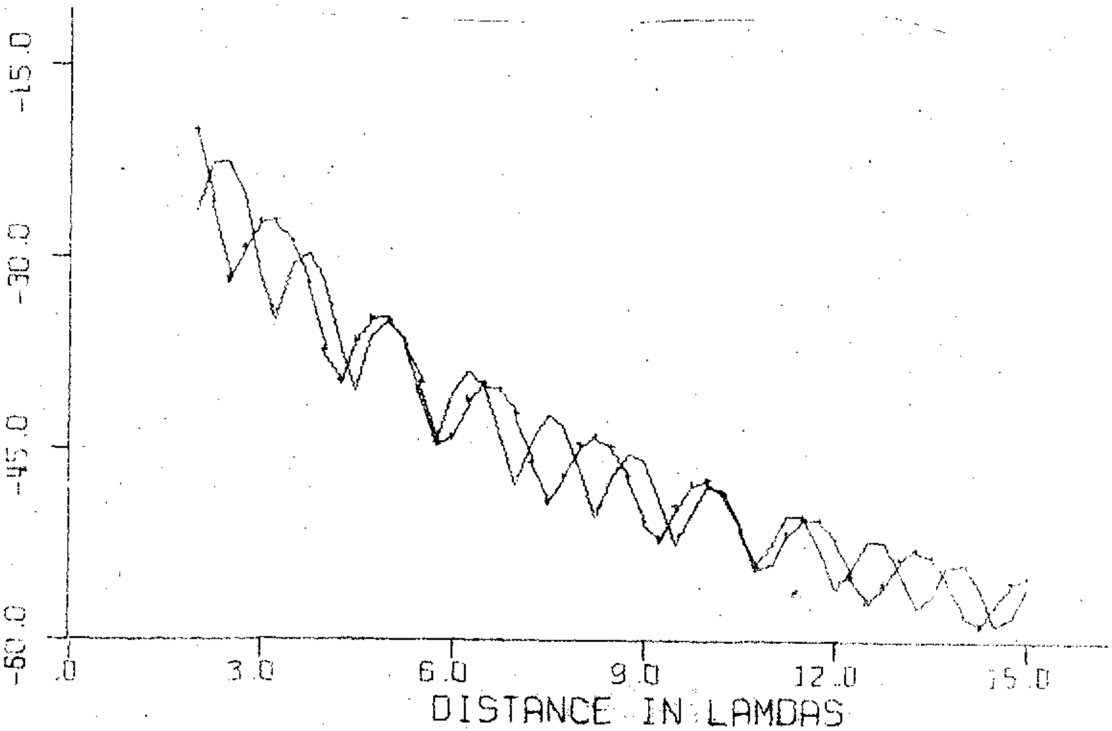

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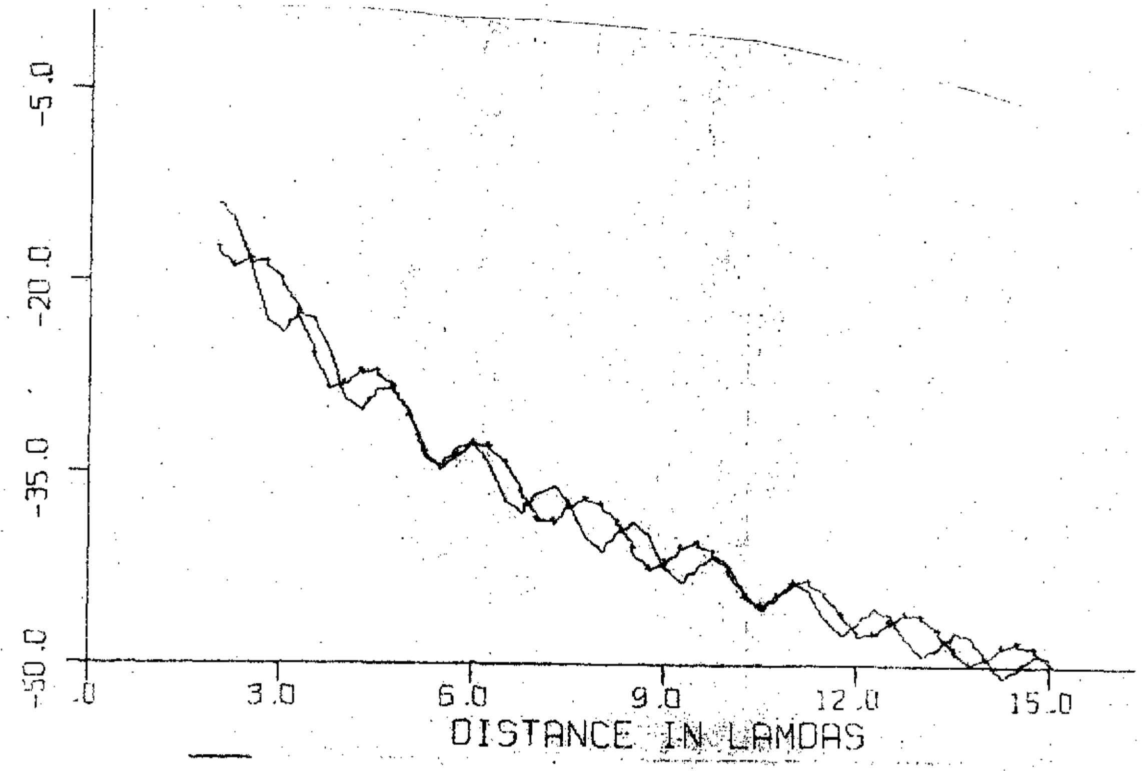

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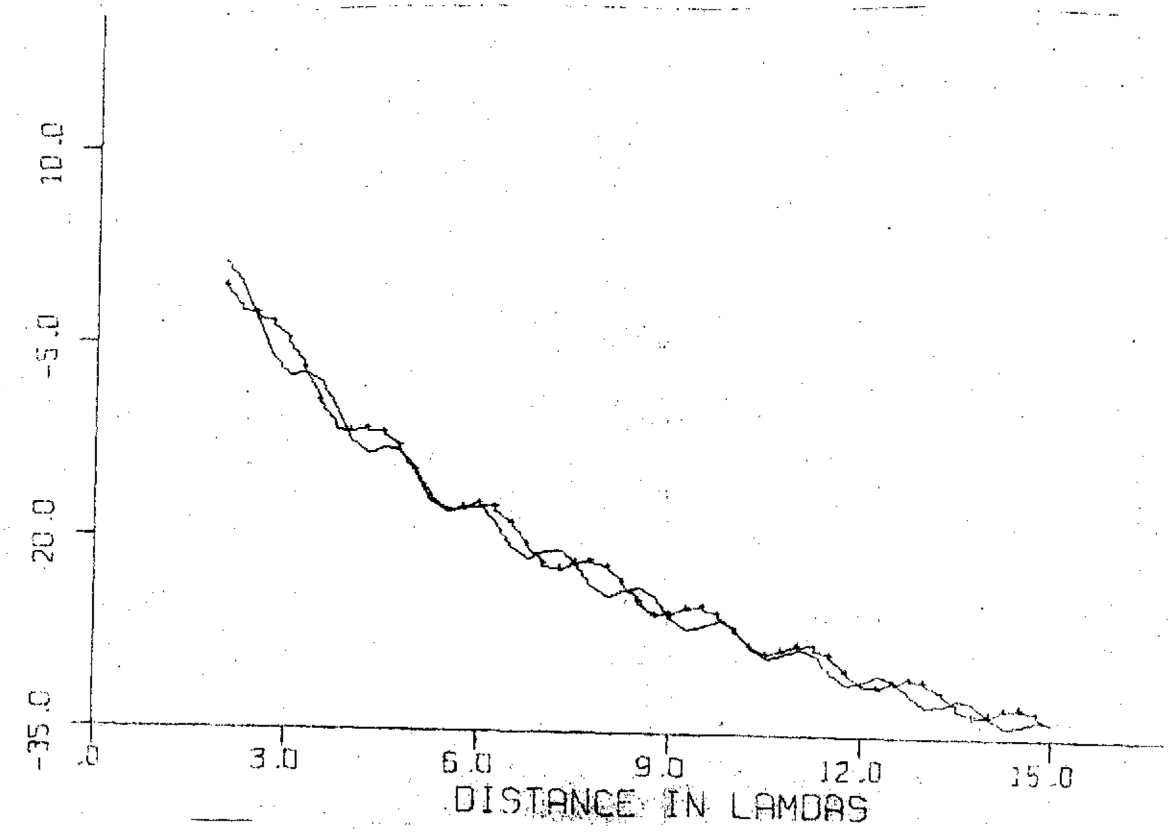

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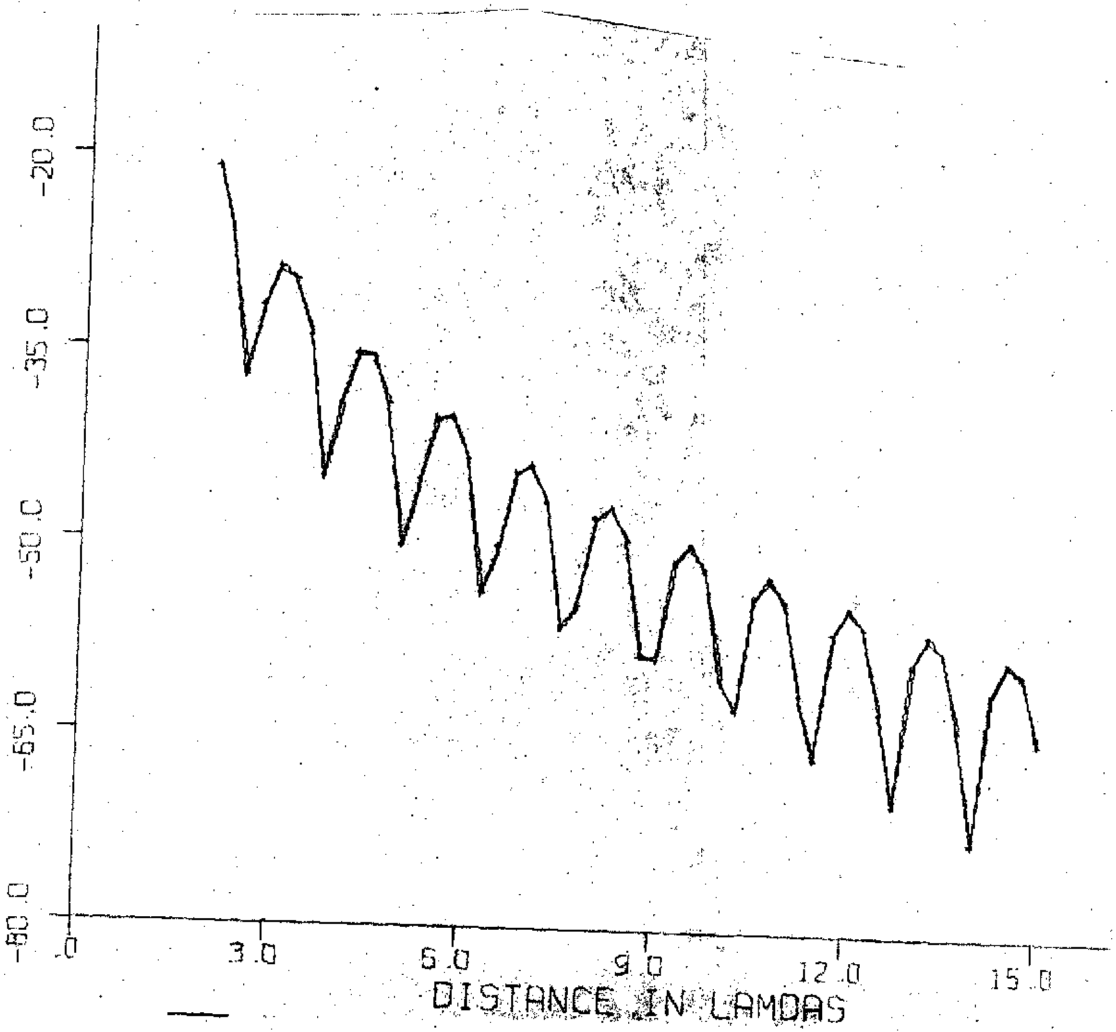

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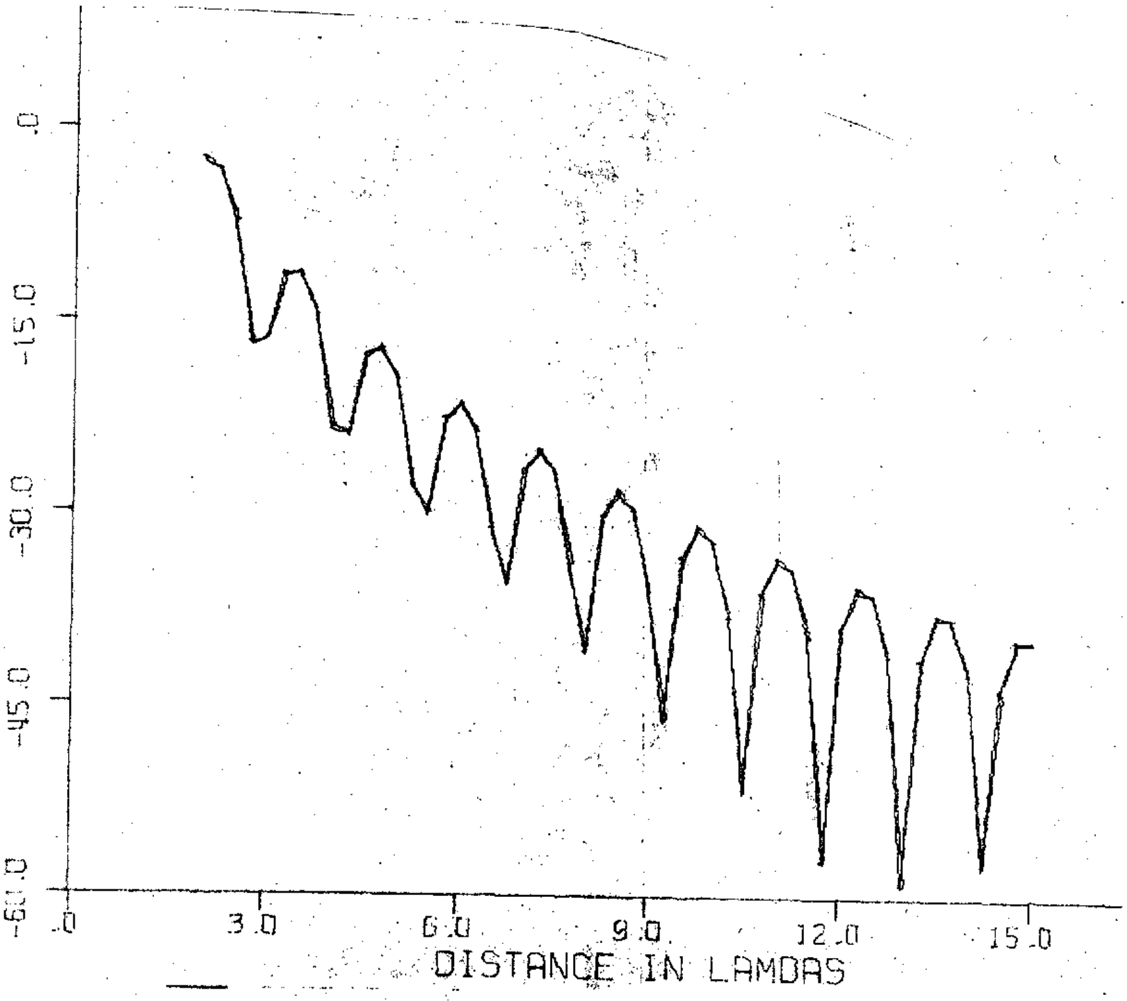

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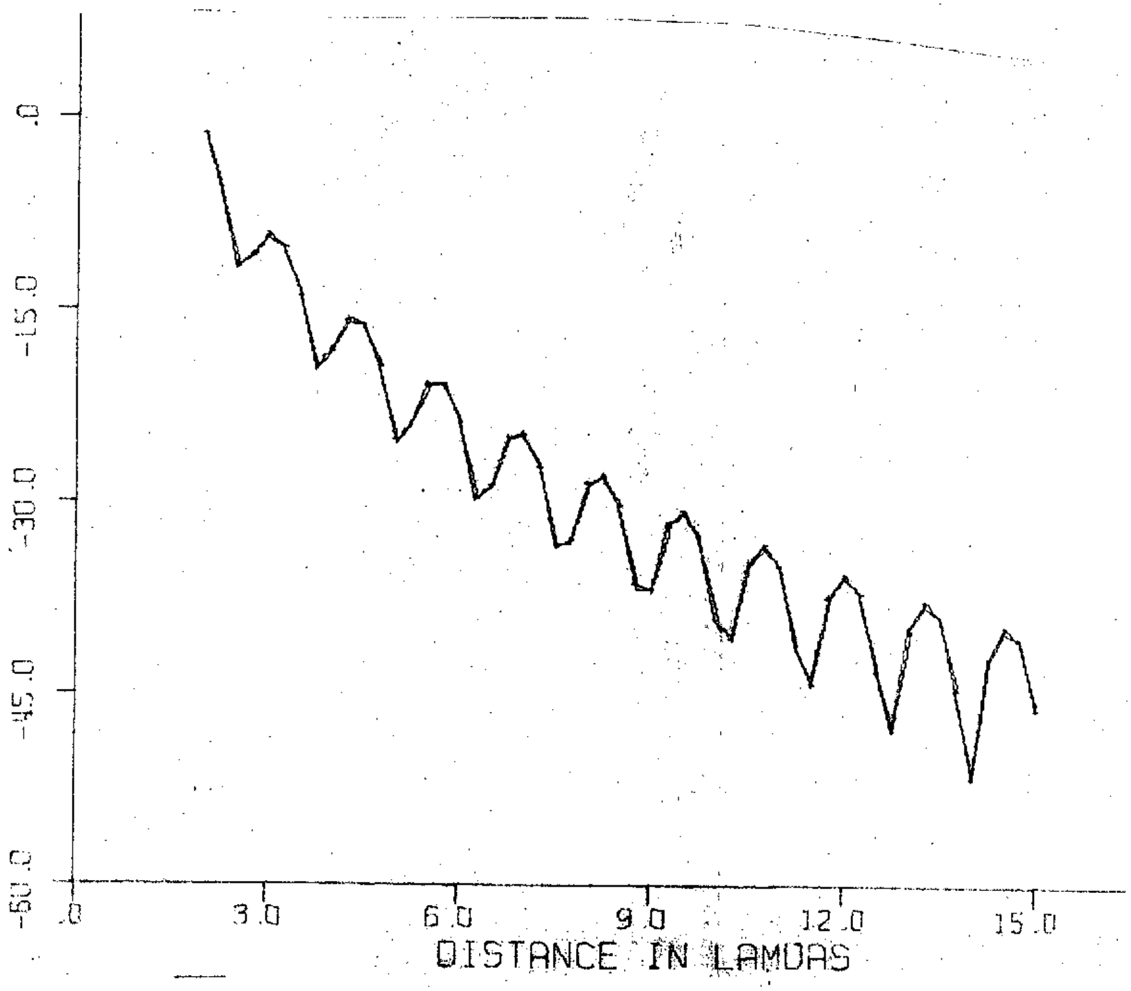

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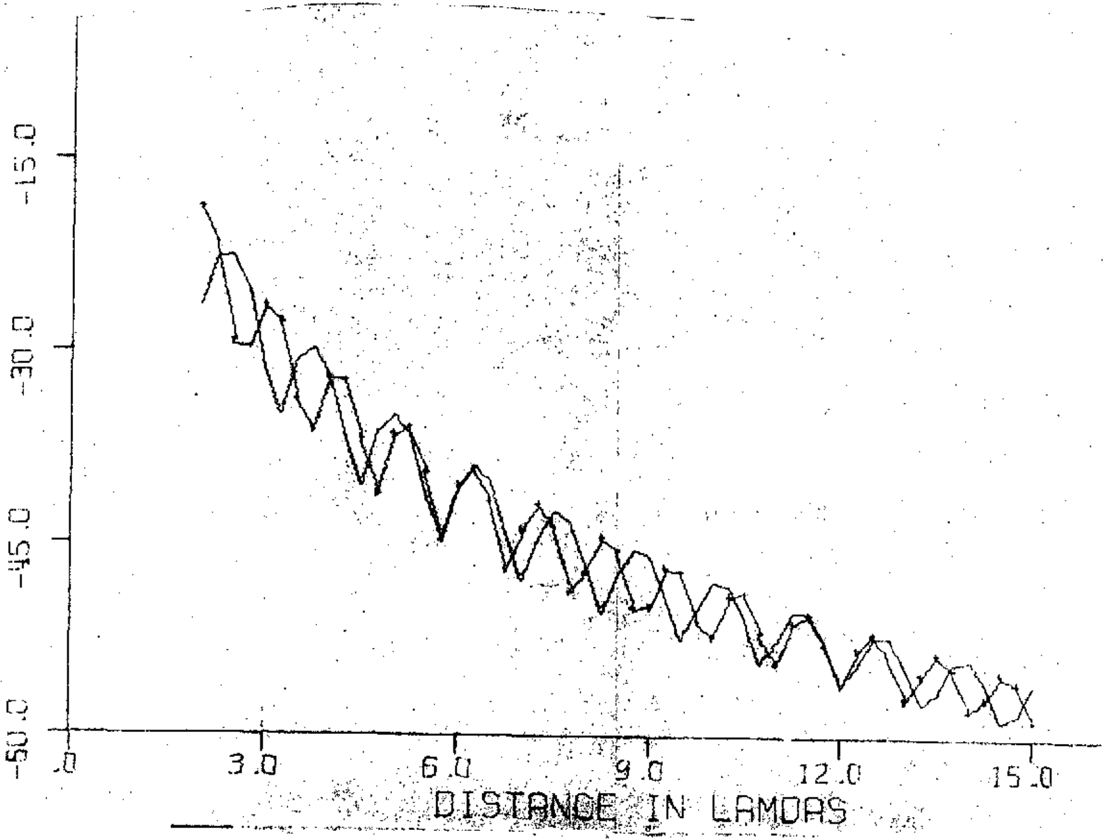

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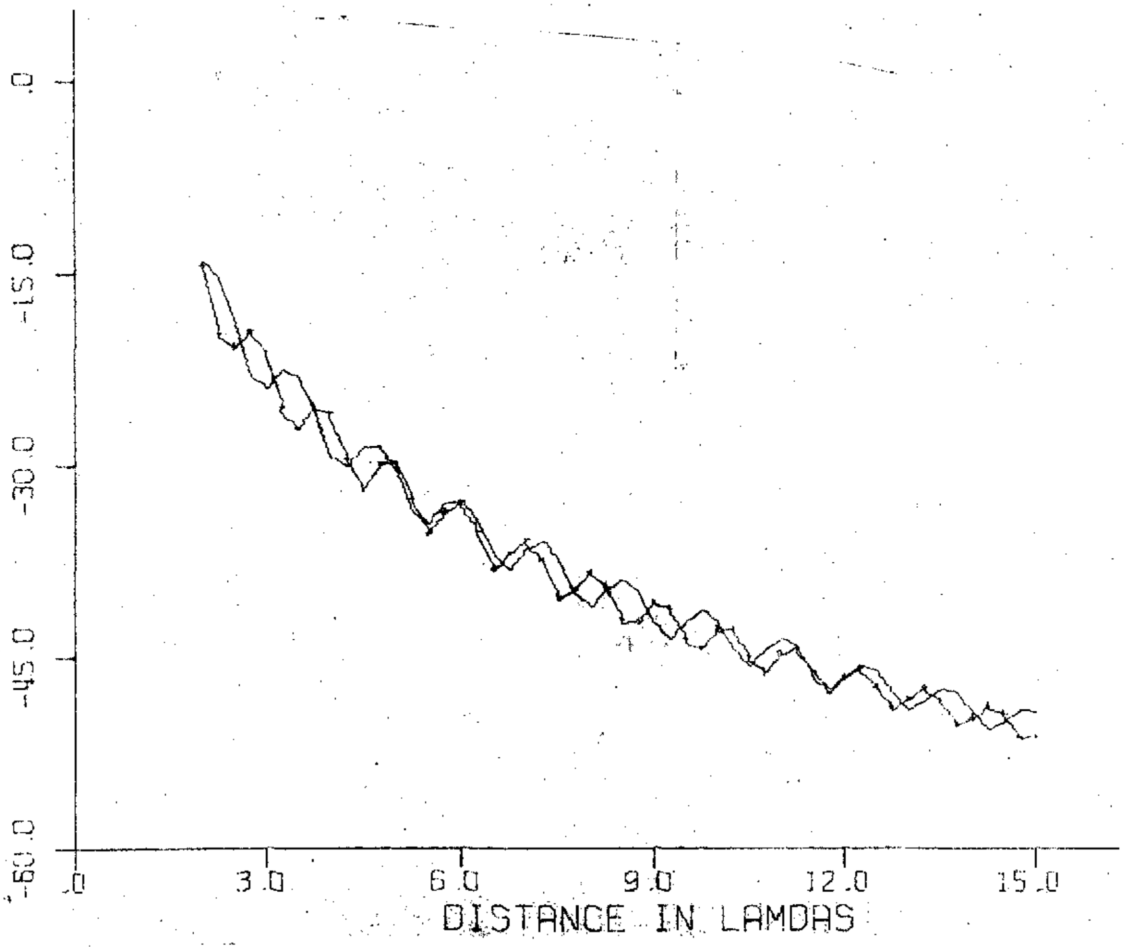

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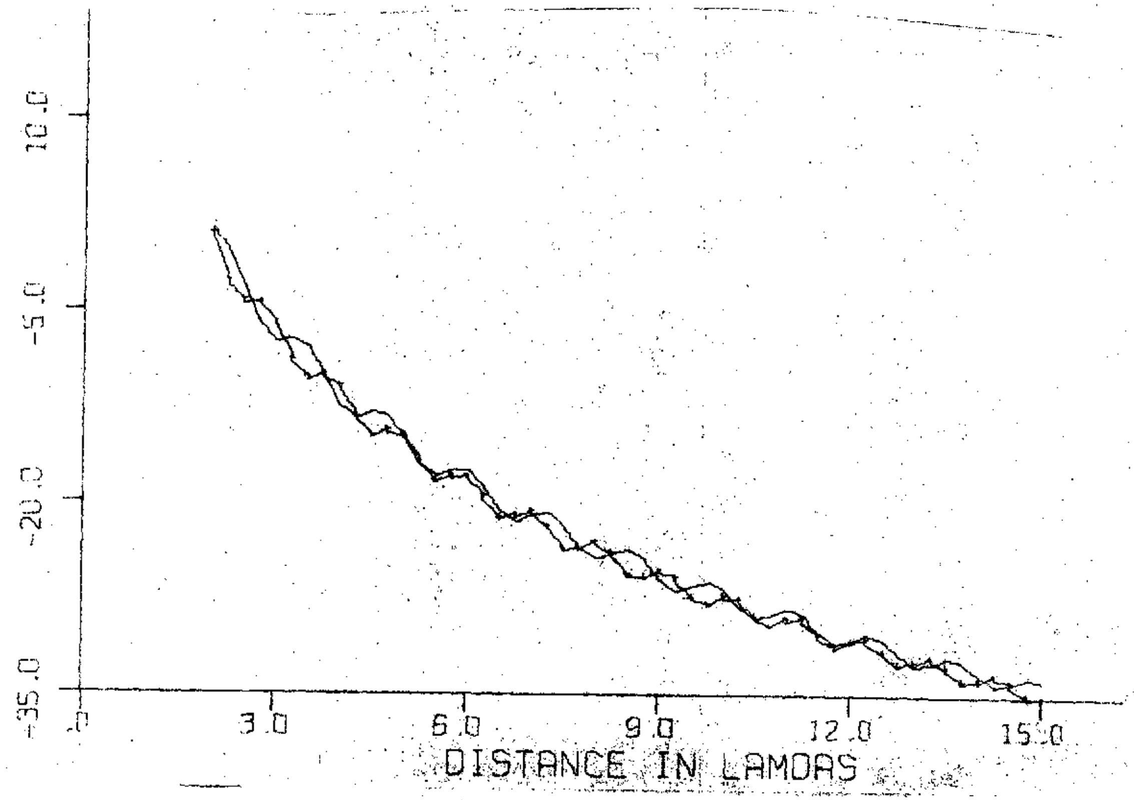

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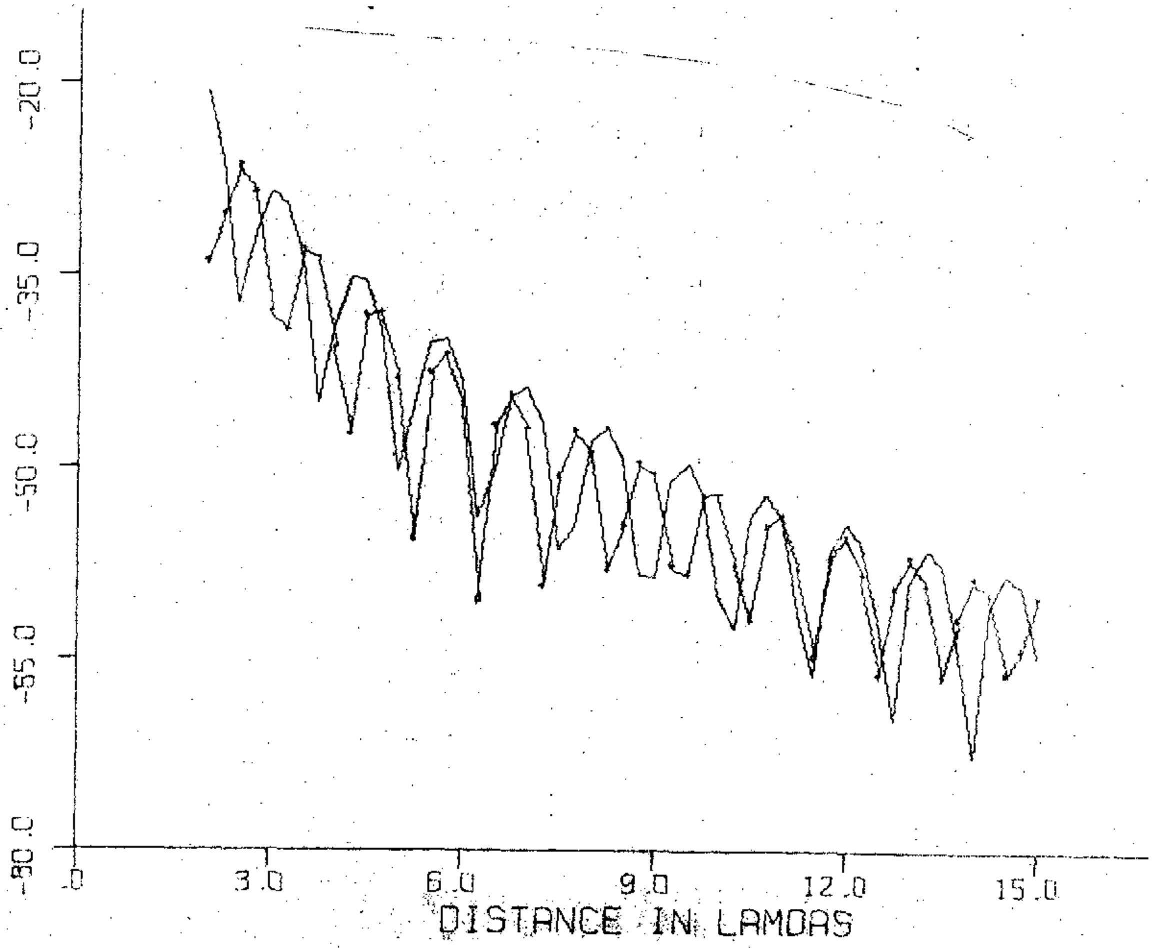

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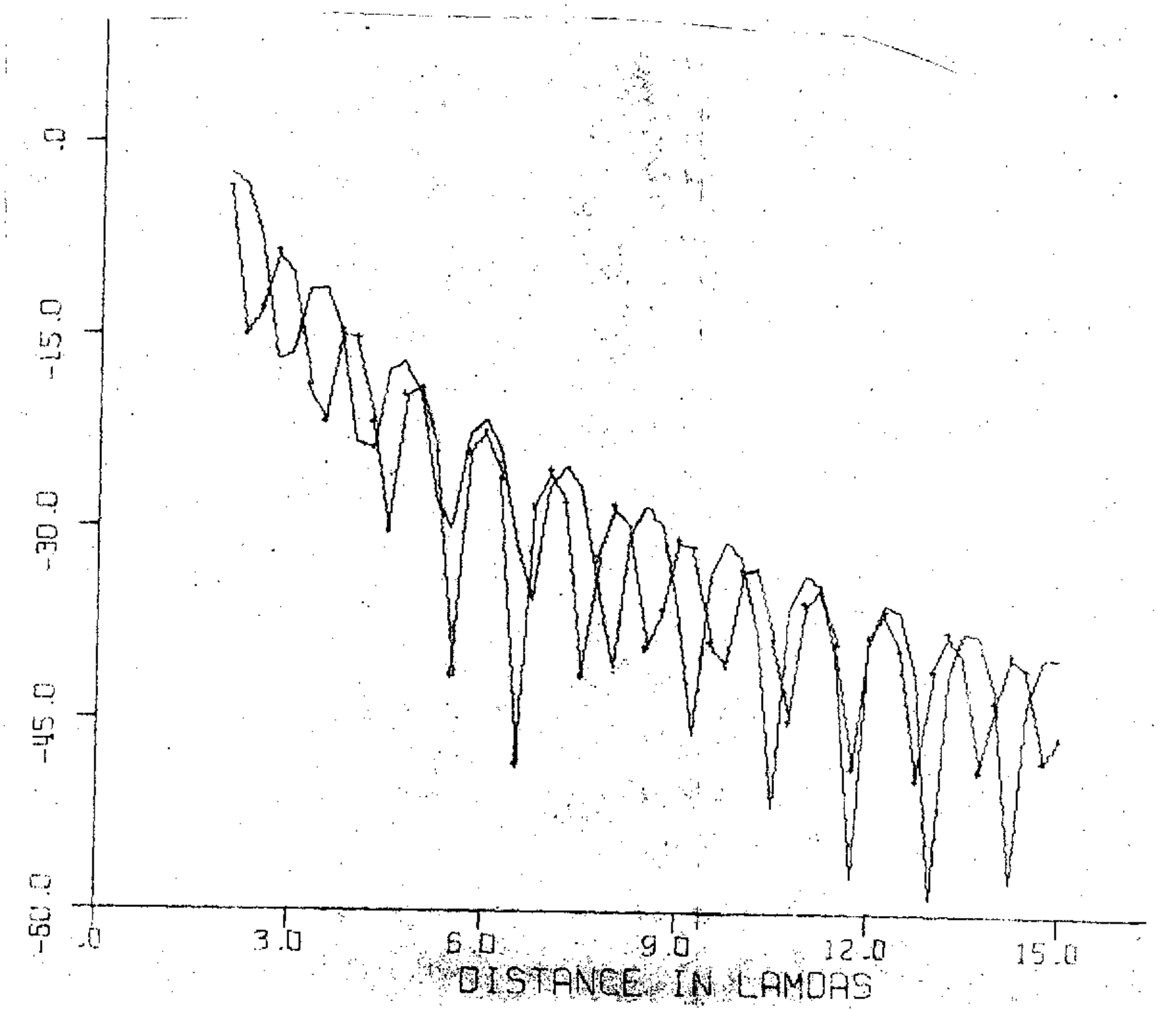

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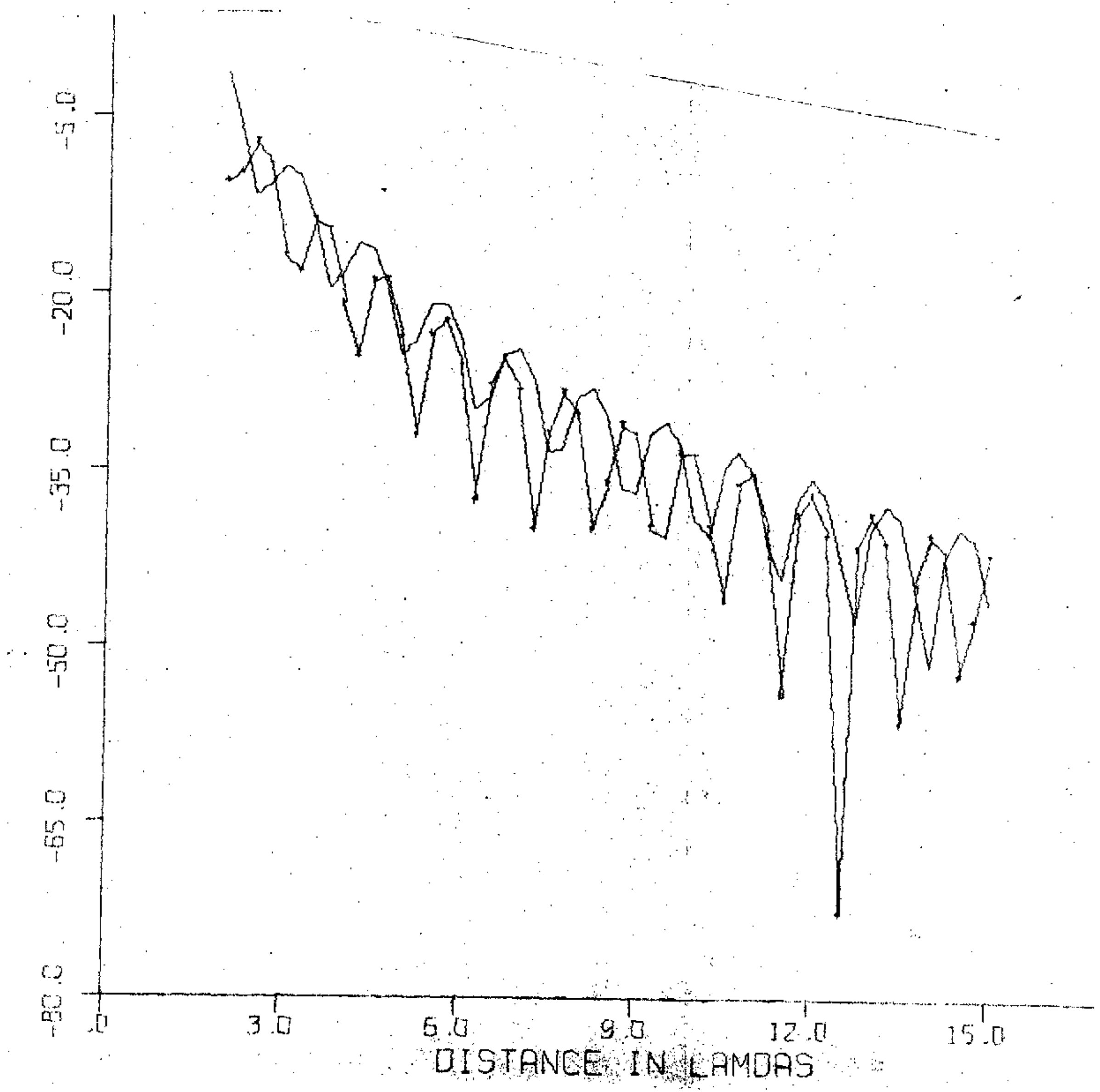

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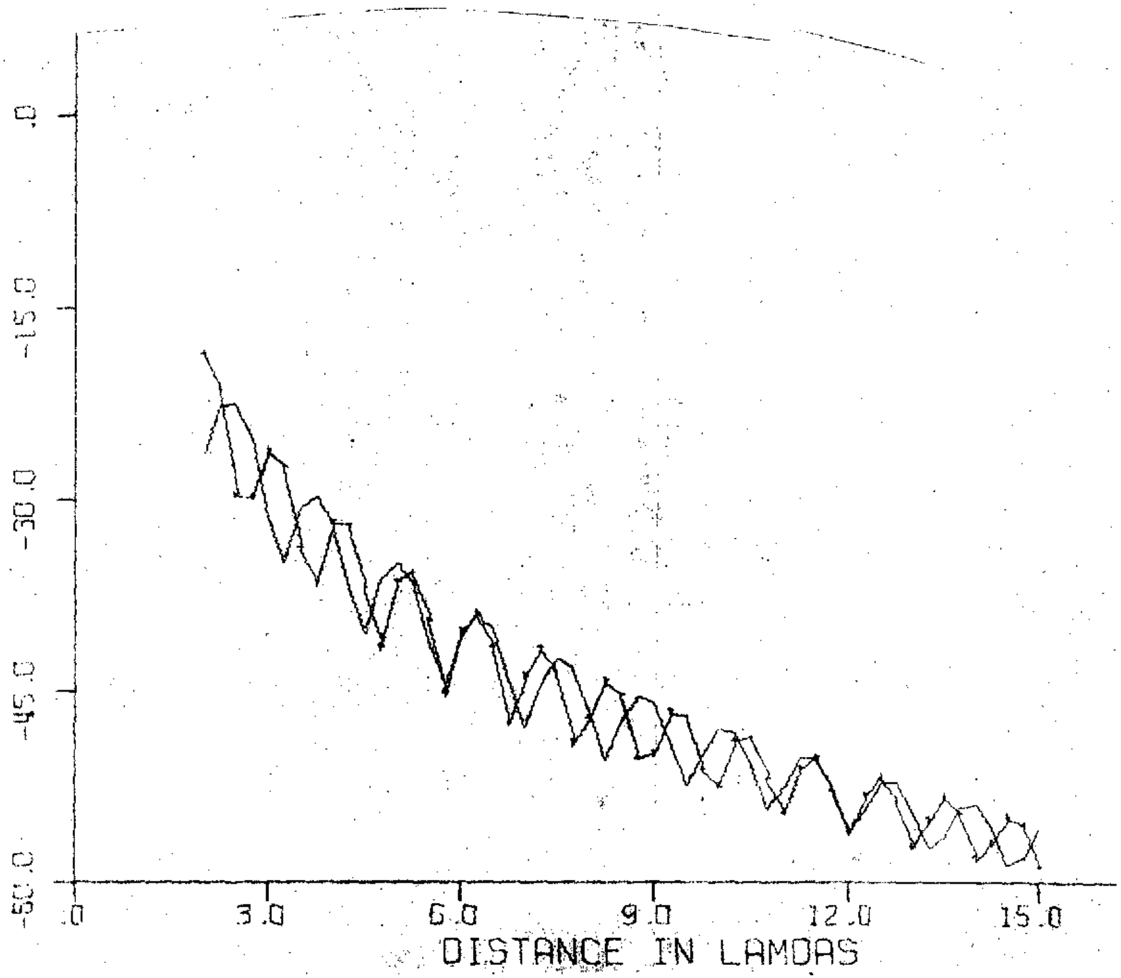

E_z (HED)

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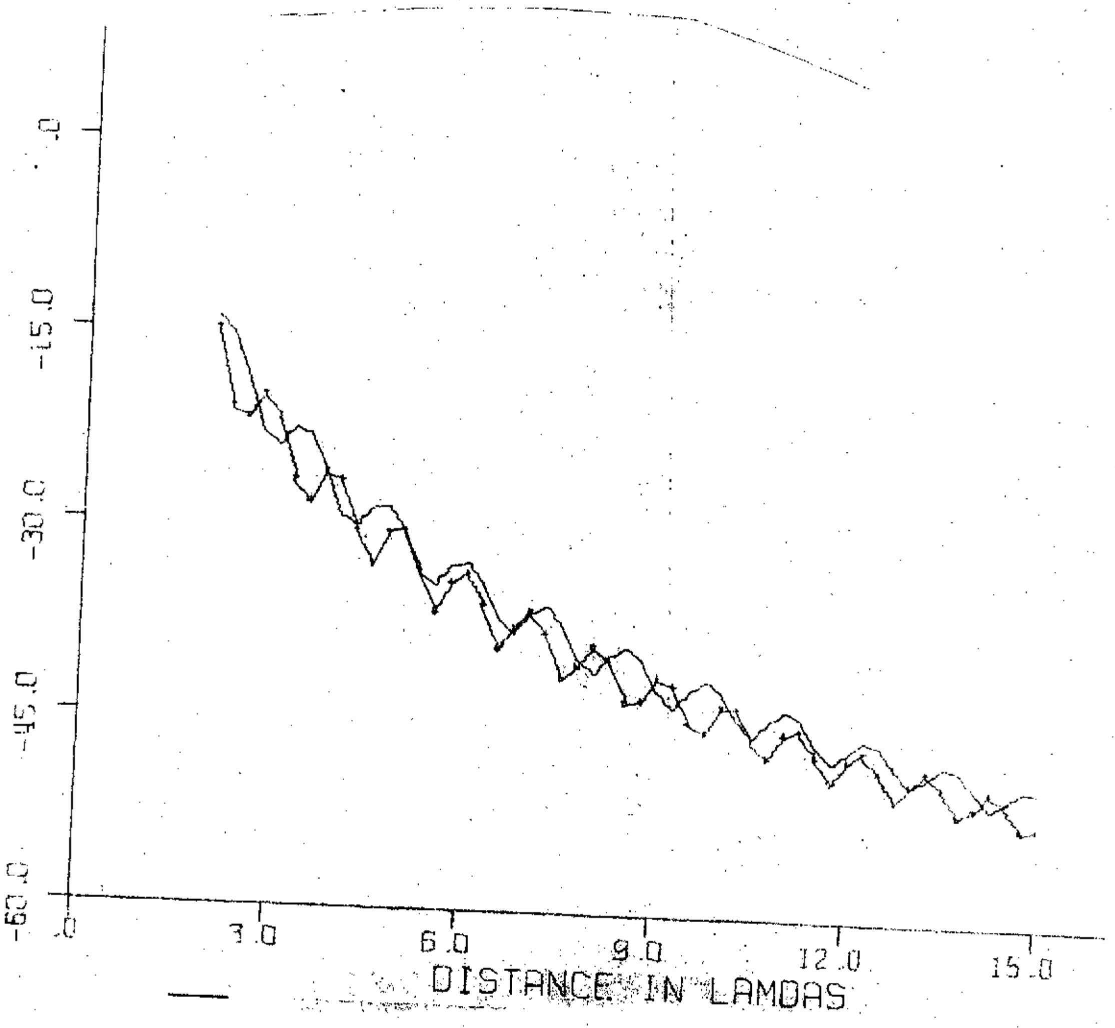
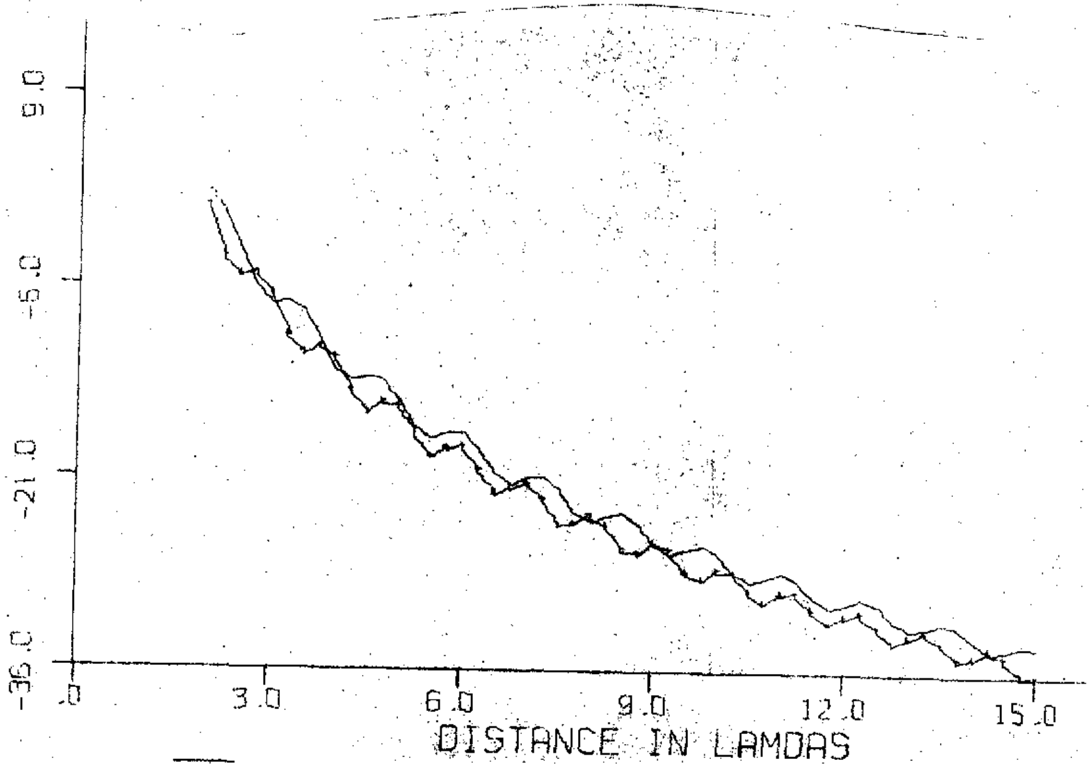
$\mu_1 = 1 \mu_0 , 1.2$
$a = 1$



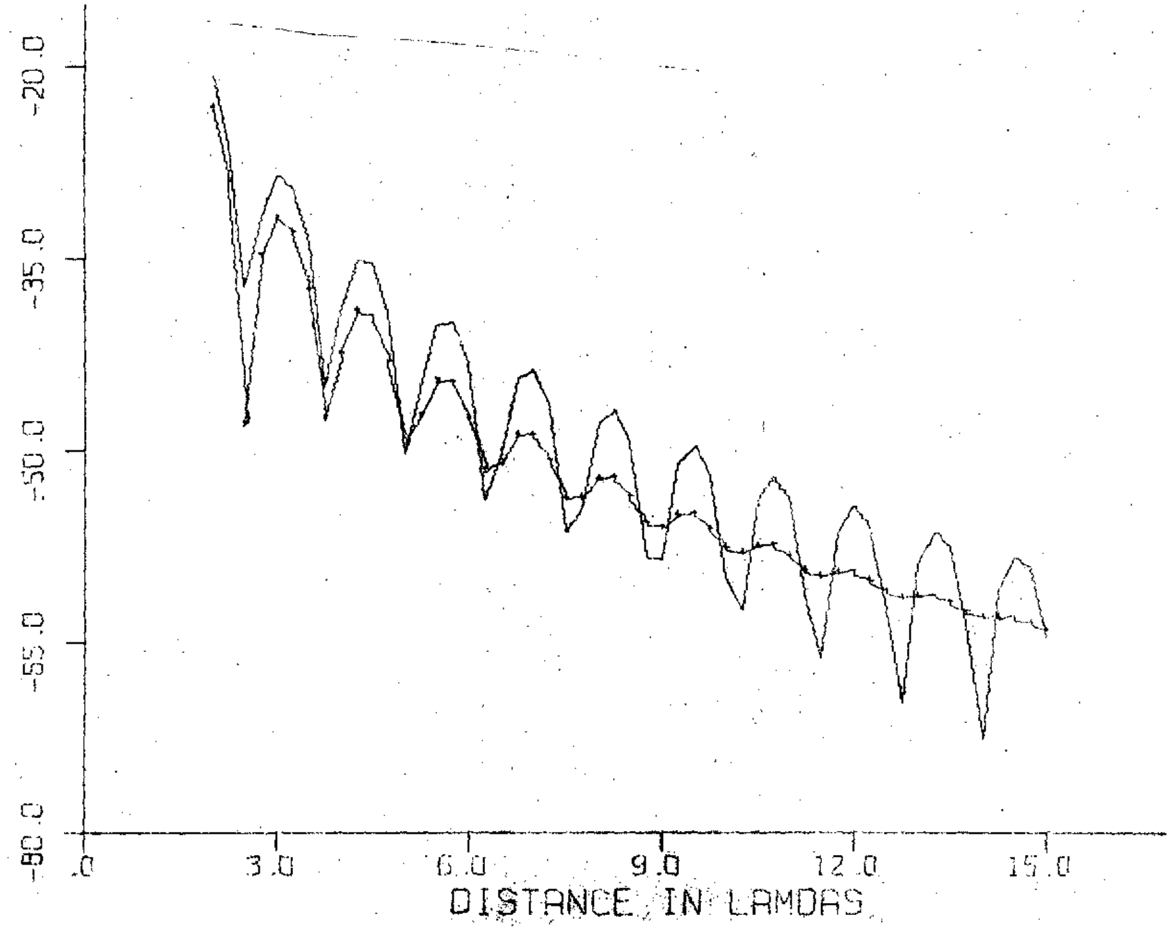
H_φ (HED)

$\varepsilon_1 = 3.2(1 + i.01)\varepsilon_0$
$\mu_1 = 1 \ \mu_0 \ , 1.2$
$a = 1$



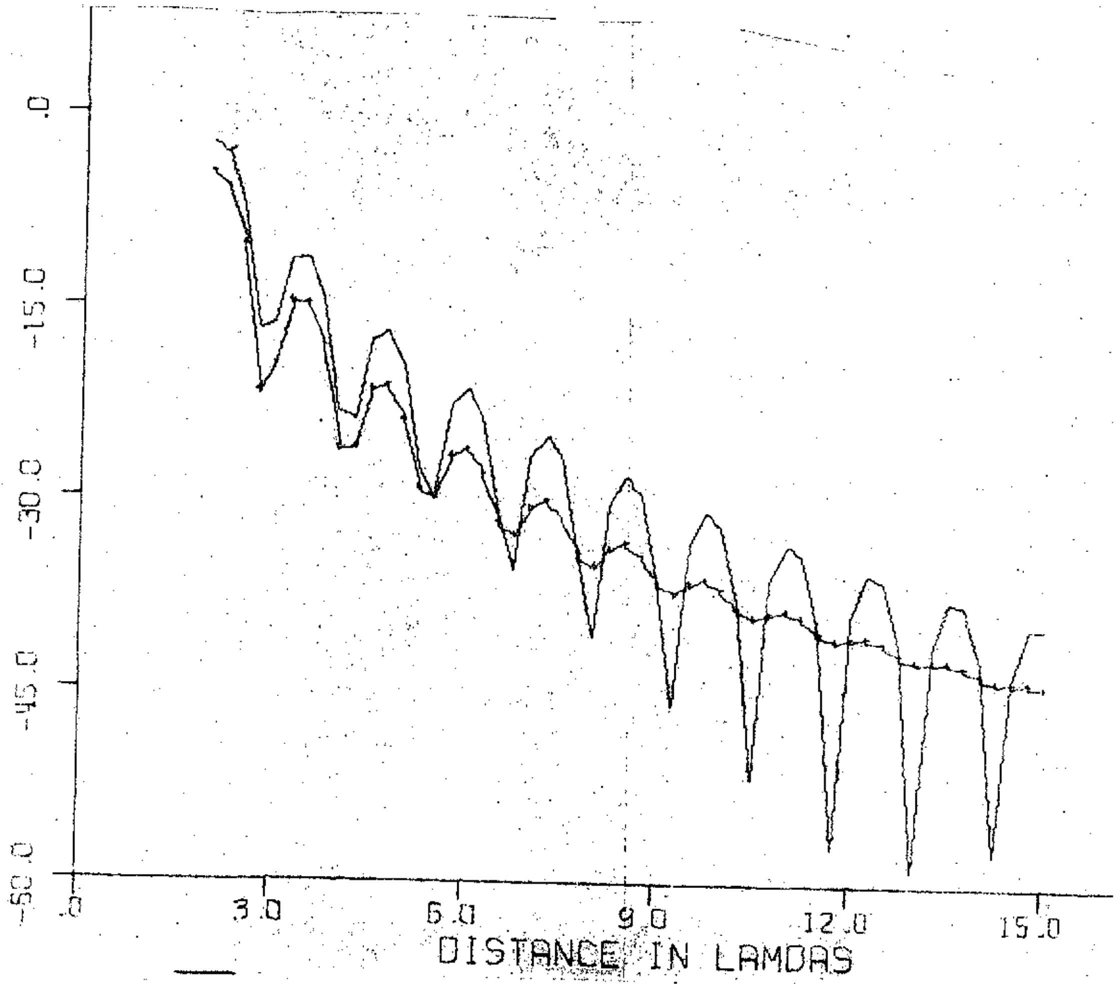
Eφ (HED)

$\varepsilon_1 = 3.2(1+i.05)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = .8$



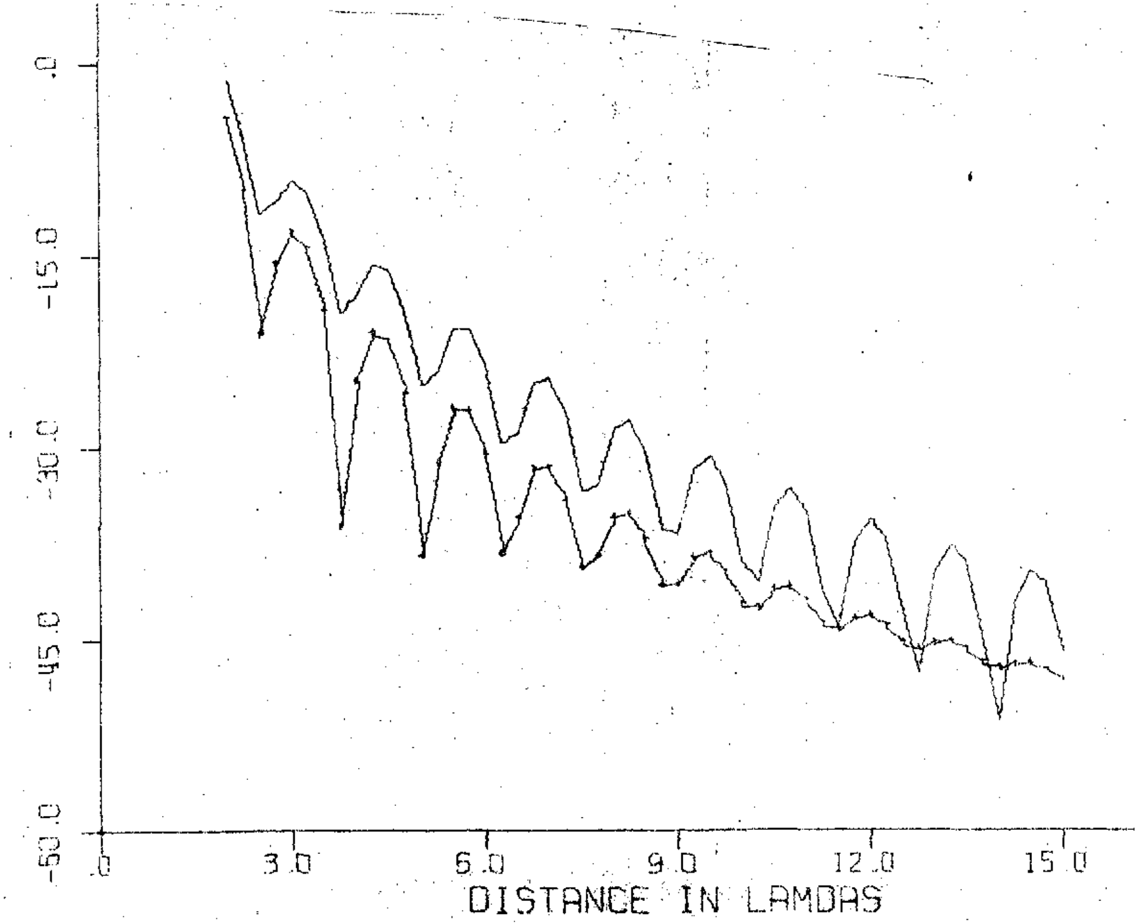
H_z (HED)

$\varepsilon_1 = 3.2(1+i.05)\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = .8$



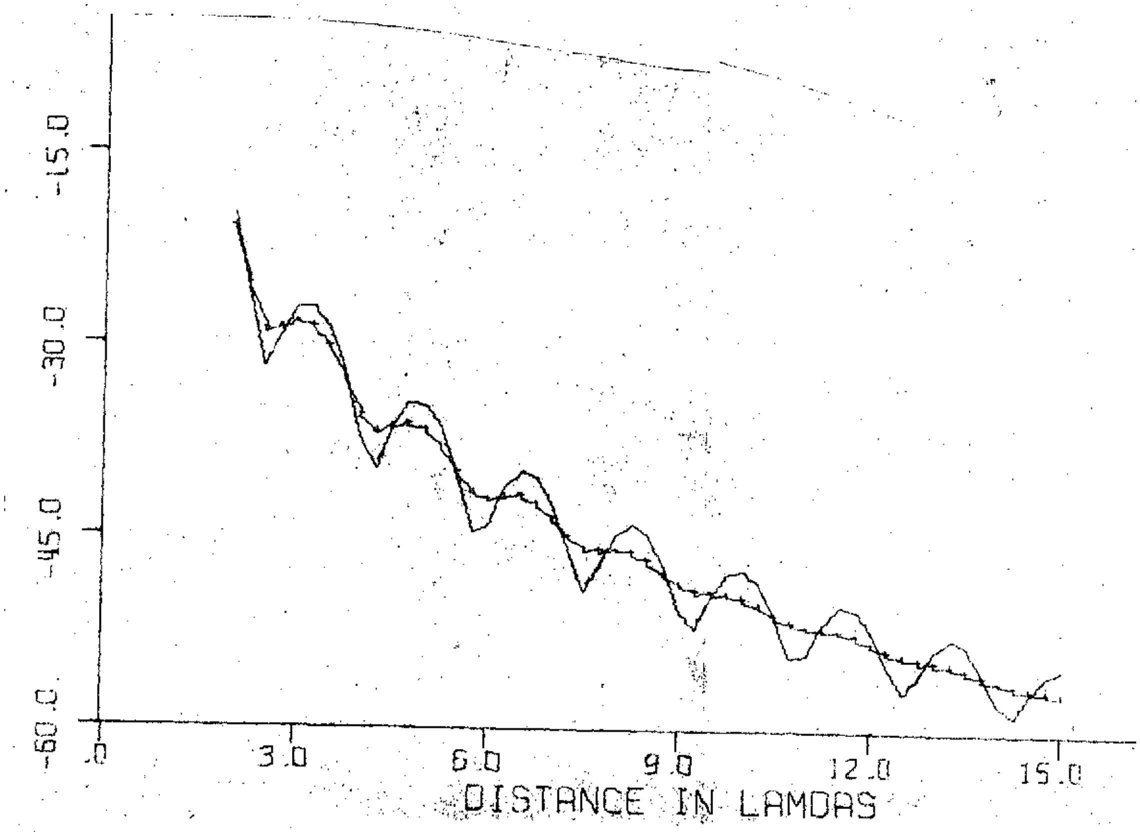
H_z (HED)

$\varepsilon_1 = 3.2(1 + i.05)\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = .8$



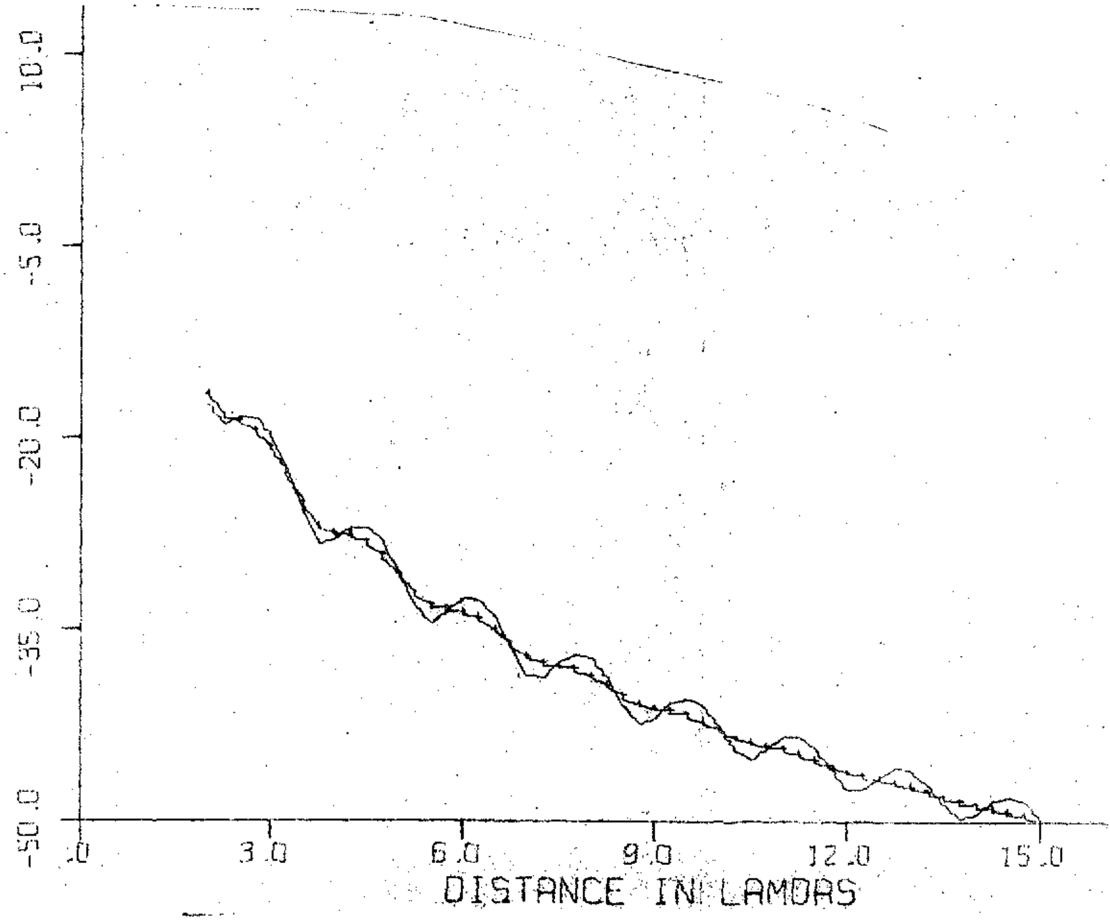
E_ρ (HED)

$\varepsilon_1 = 3.2(1 + i\,.015)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = .8$



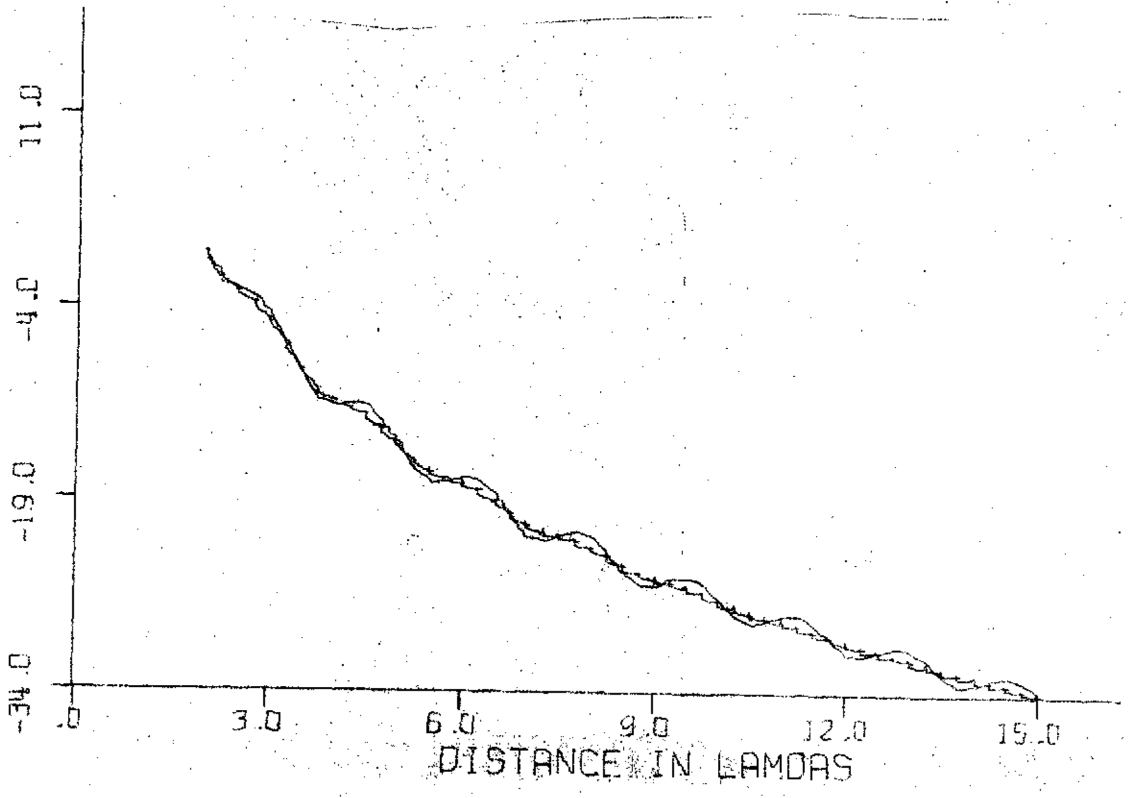
E_z (HED)

$\varepsilon_1 = 3.2(1+i\,.05)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = .8$



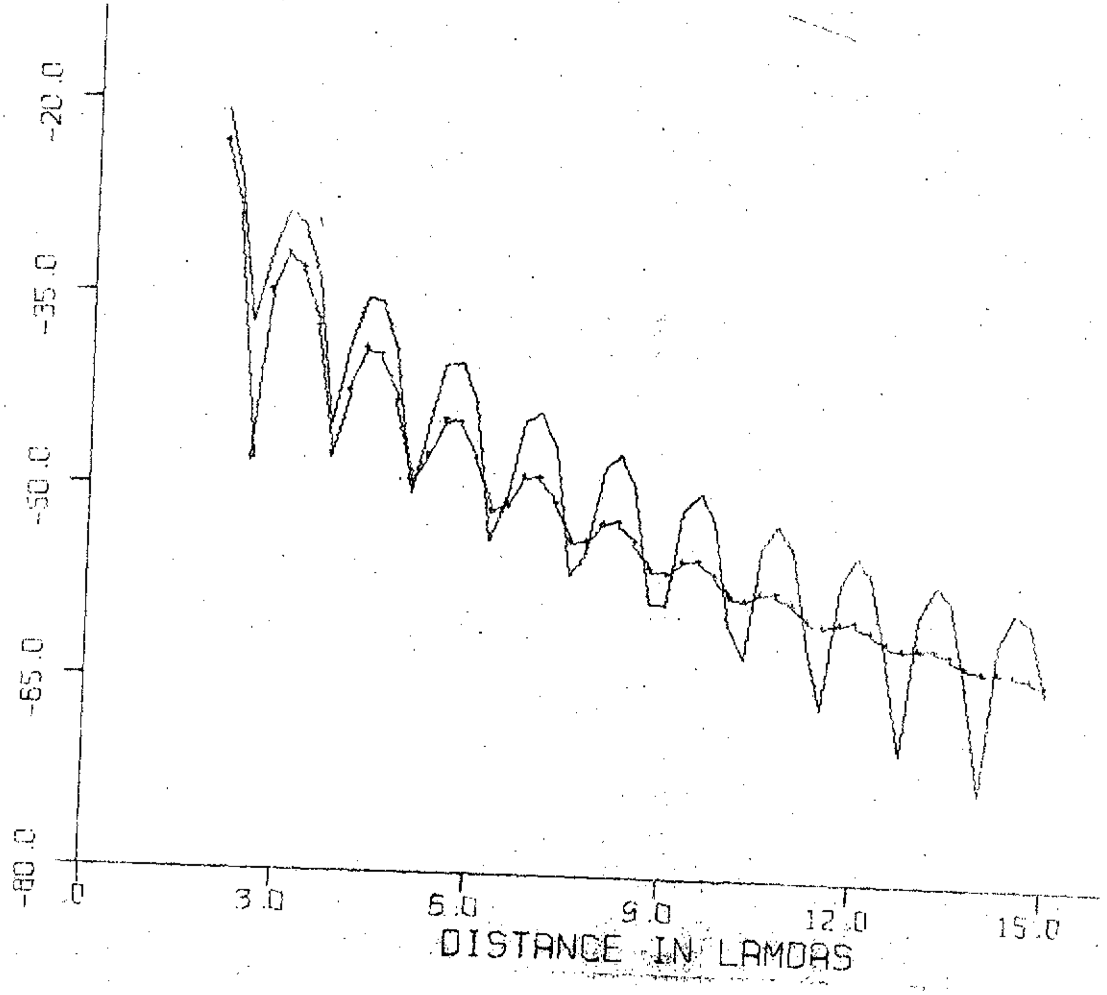
H_ϕ (HED)

$\varepsilon_1 = 3.2(1 + i\,.05)\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = .8$



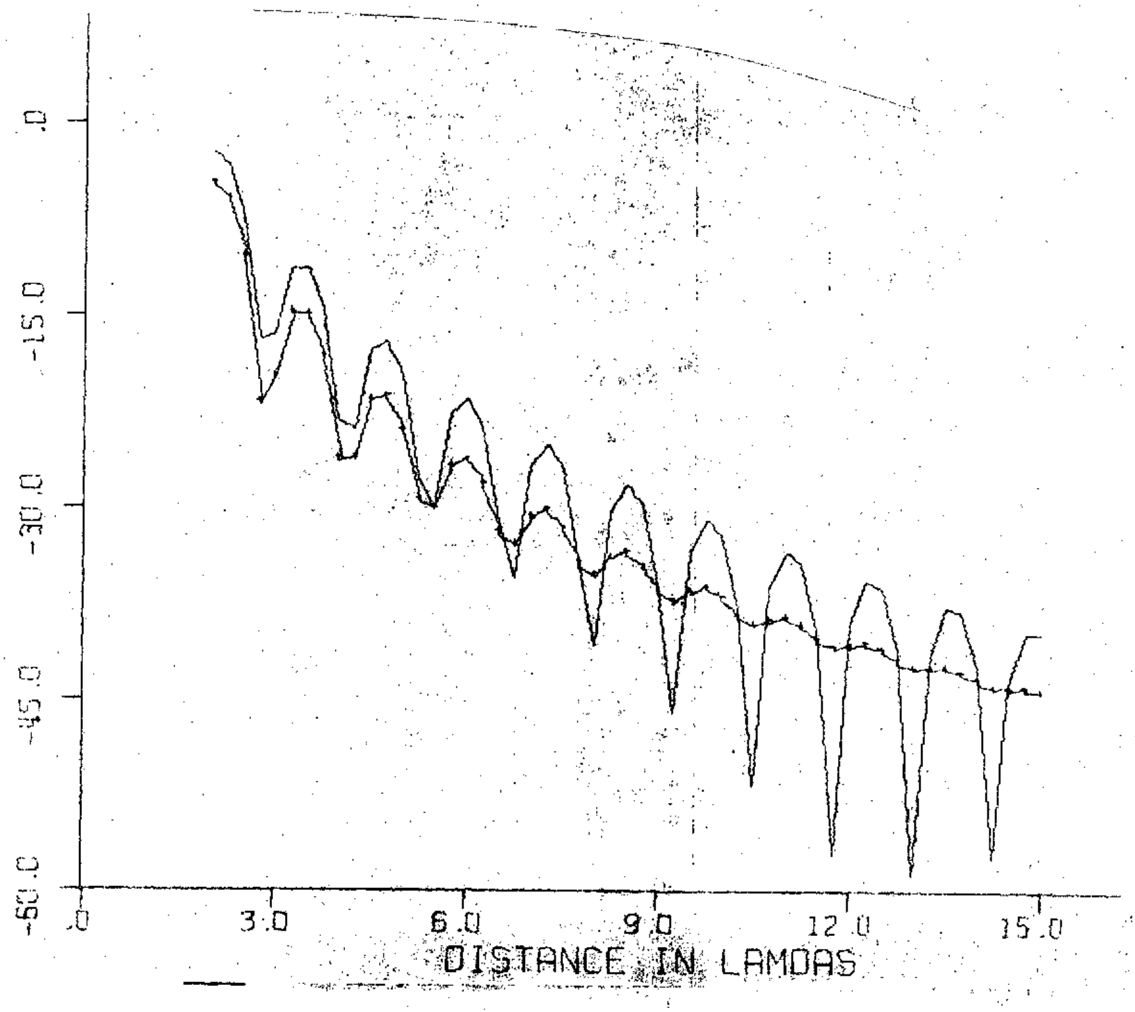
E_ρ (HED)

$\varepsilon_1 = 3.2(1 + i\,\substack{.01\\.05})\varepsilon_0$
$\mu_1 = 1 \quad \mu_0$
$a = 1.2$



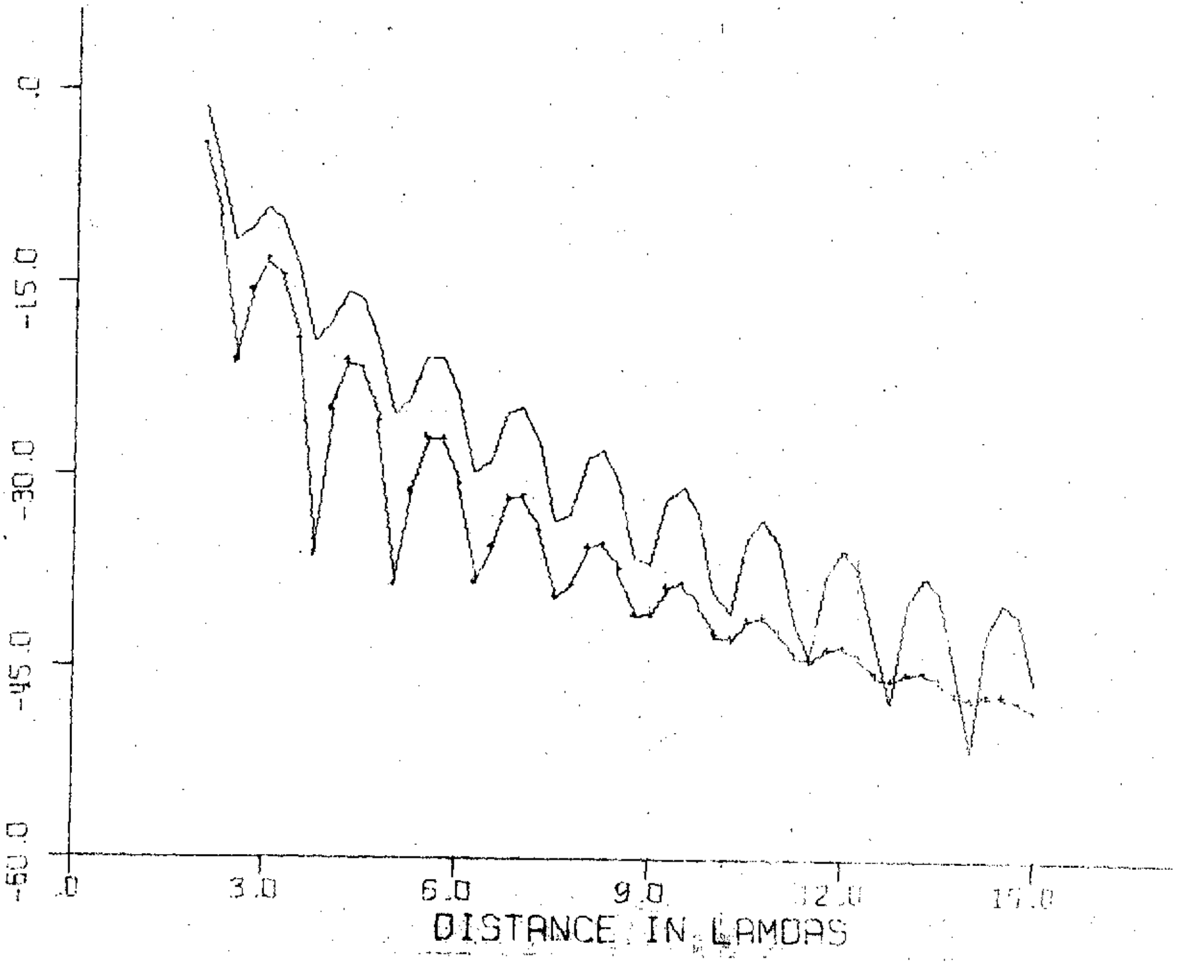
H_z (HED)

$\varepsilon_1 = 3.2(1 + i\,.005)\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = 1.2$



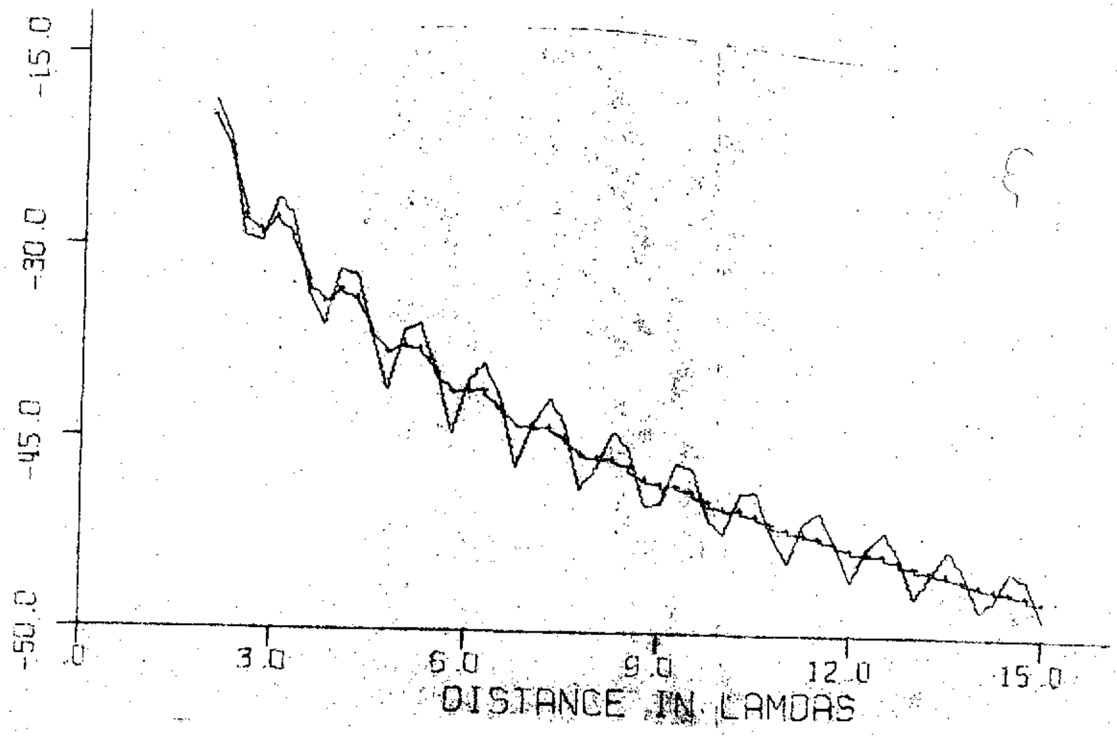
H_y (HED)

$\varepsilon_1 = 32(1 + i\substack{.01\\.05})\varepsilon_0$
$\mu_1 = 1 \;\; \mu_0$
$a = 1.2$



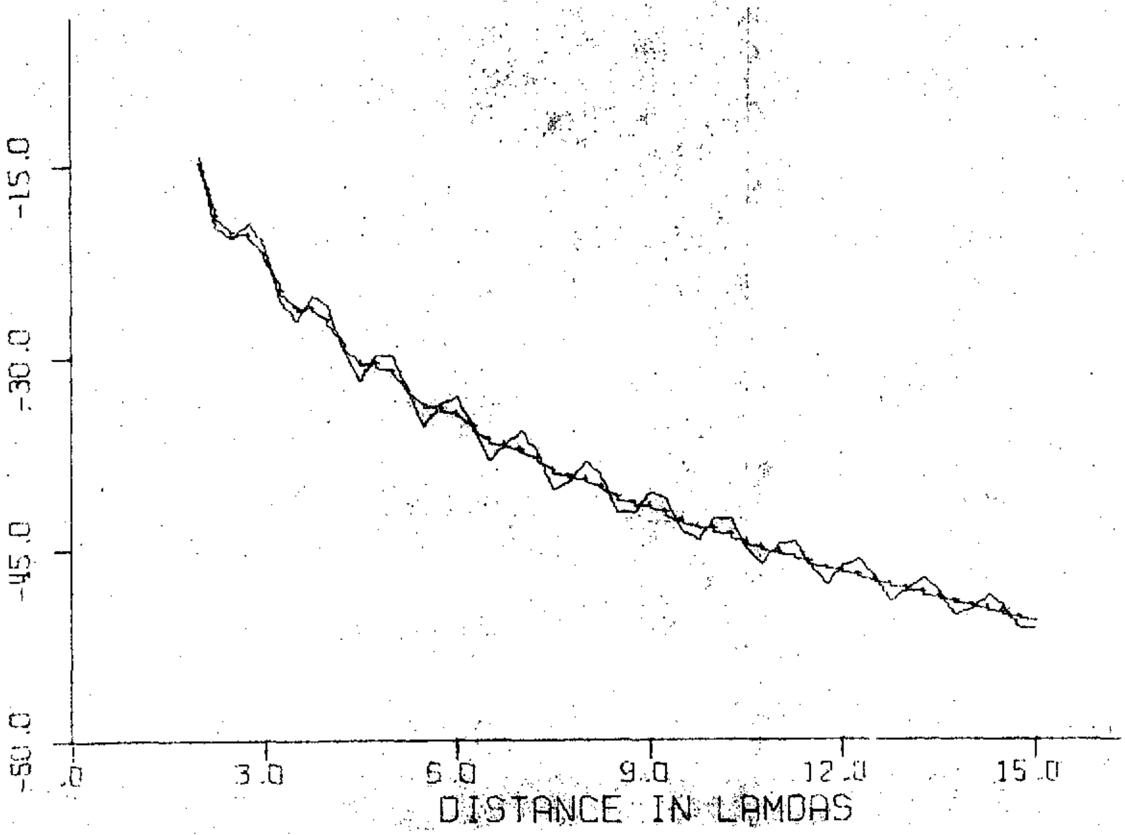
E_ρ (HED)

$\varepsilon_1 = 3.2(1 + i\overset{.01}{.05})\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = 1.2$



E_z (HED)

$\varepsilon_1 = 3.2(1+i\overset{.01}{.05})\varepsilon_0$
$\mu_1 = 1 \ \mu_0$
$a = 1.2$

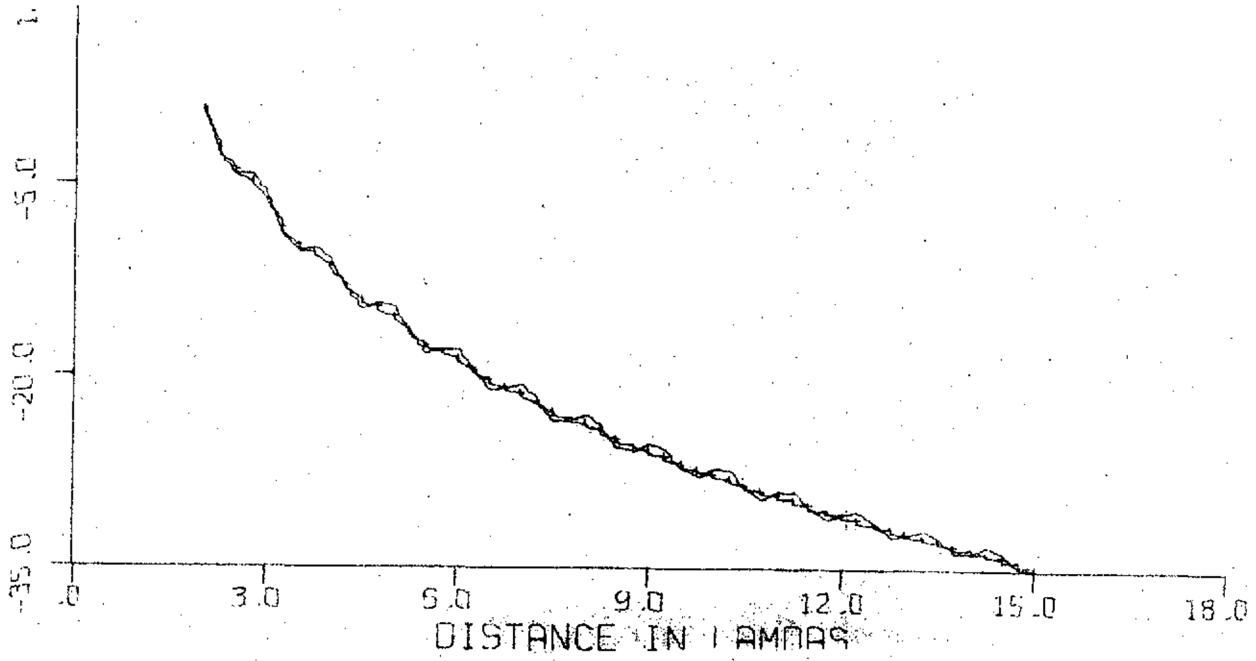


H_φ (HED)

$\varepsilon_1 = 3.2(1 + i\,^{.01}_{.05})\varepsilon_0$

$\mu_1 = 1\ \mu_0$

$a = 1.2$

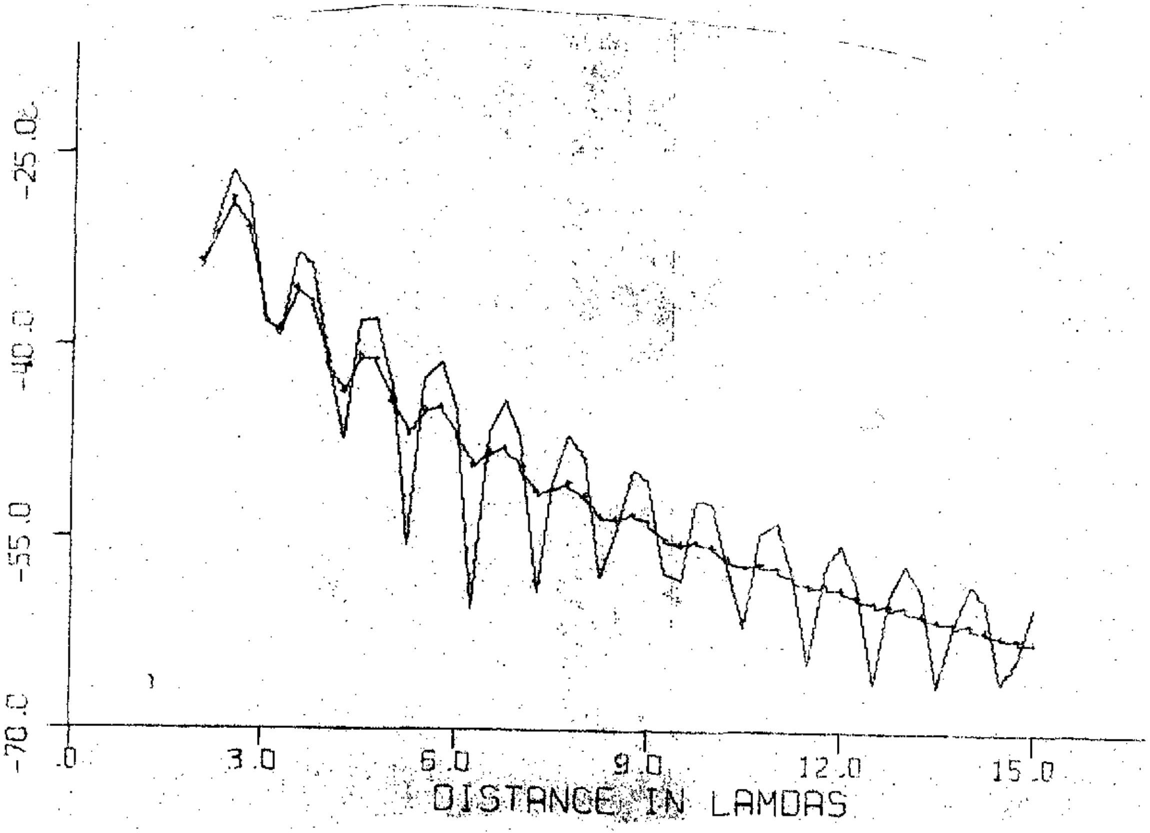


E_φ (HED)

$\varepsilon_1 = 3.2(1+i\,\frac{.01}{.05})\varepsilon_0$

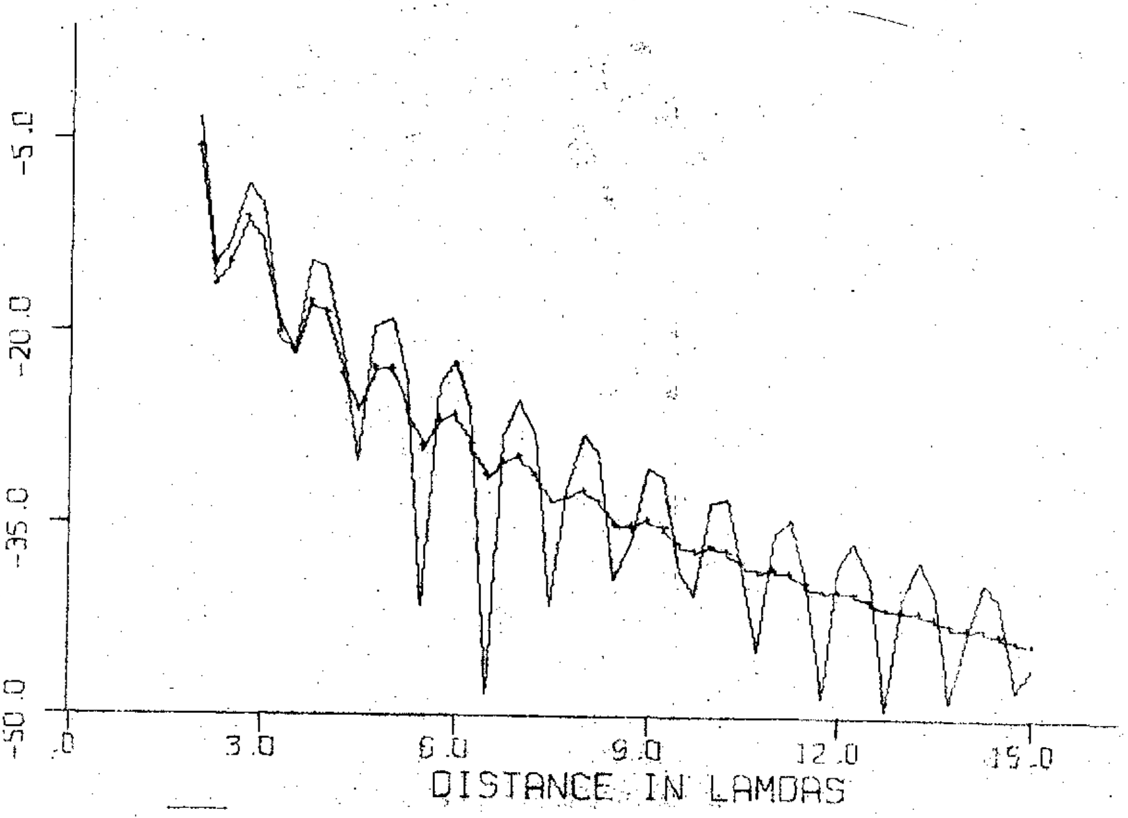
$\mu_1 = 1.2\,\mu_0$

$a = 1$



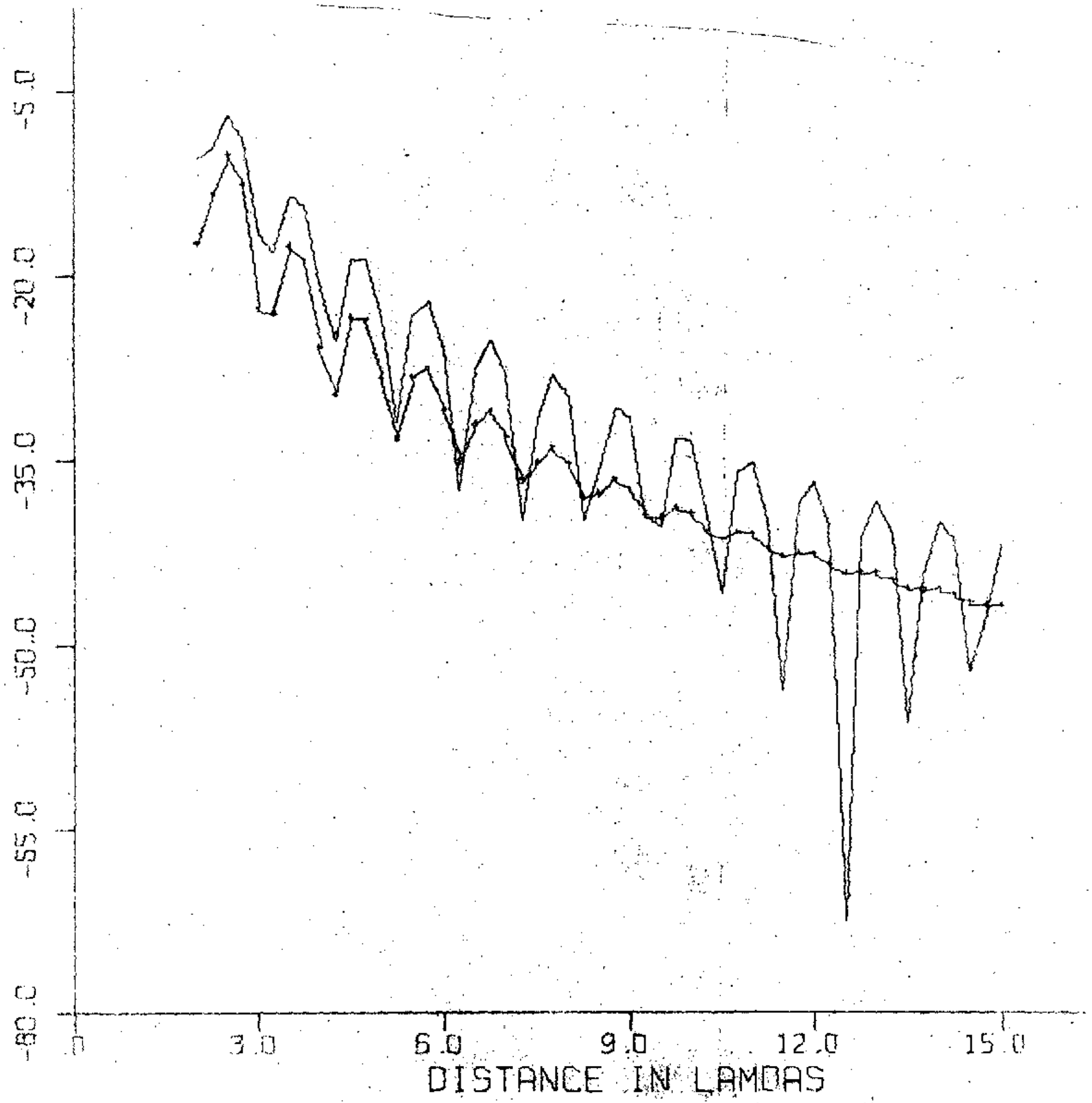
H_ρ (HED)

$\varepsilon_1 = 3.2(1+i\genfrac{}{}{0pt}{}{.01}{.05})\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$



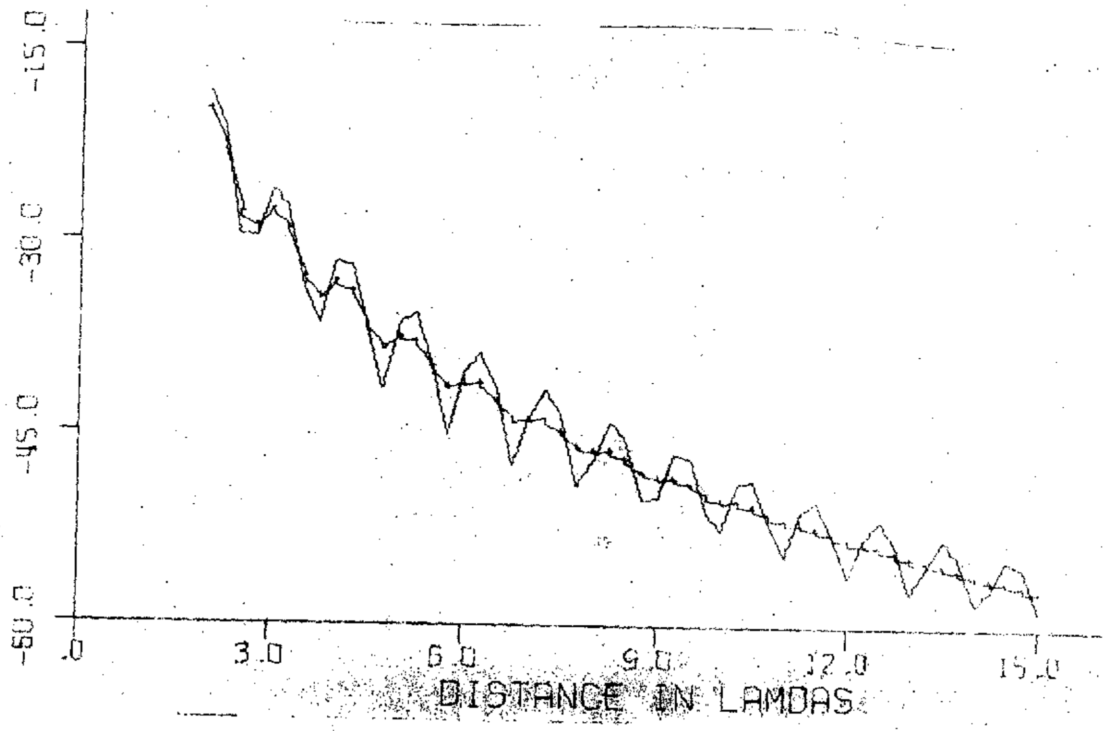
H_z (HED)

$\varepsilon_1 = 3.2(1+i.015)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$



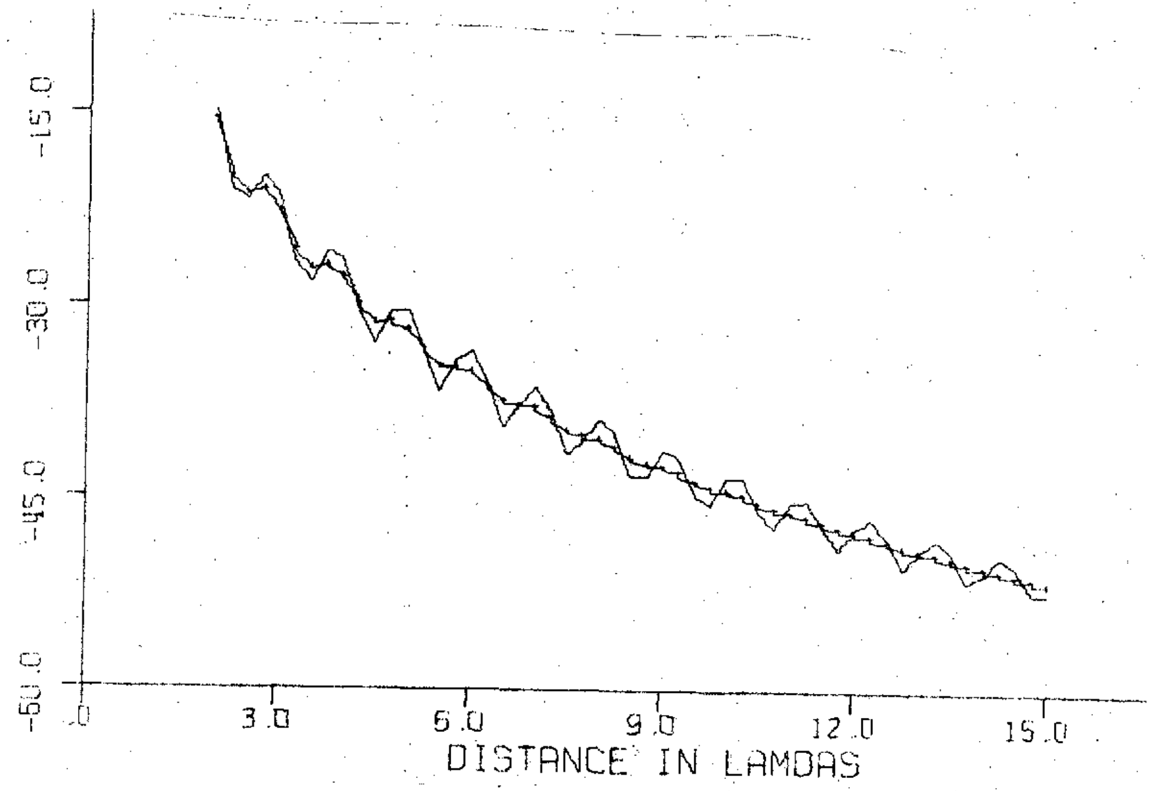
E_z (HED)

$\varepsilon_1 = 3.2(1+i\overset{.01}{.05})\varepsilon_0$
$\mu_1 = 1.2\,\mu_0$
$a = 1$



E_z (HED)

$\varepsilon_1 = 3.2(1 + i\,^{.01}_{.05})\varepsilon_0$
$\mu_1 = 1.2\,\mu_0$
$a = 1$

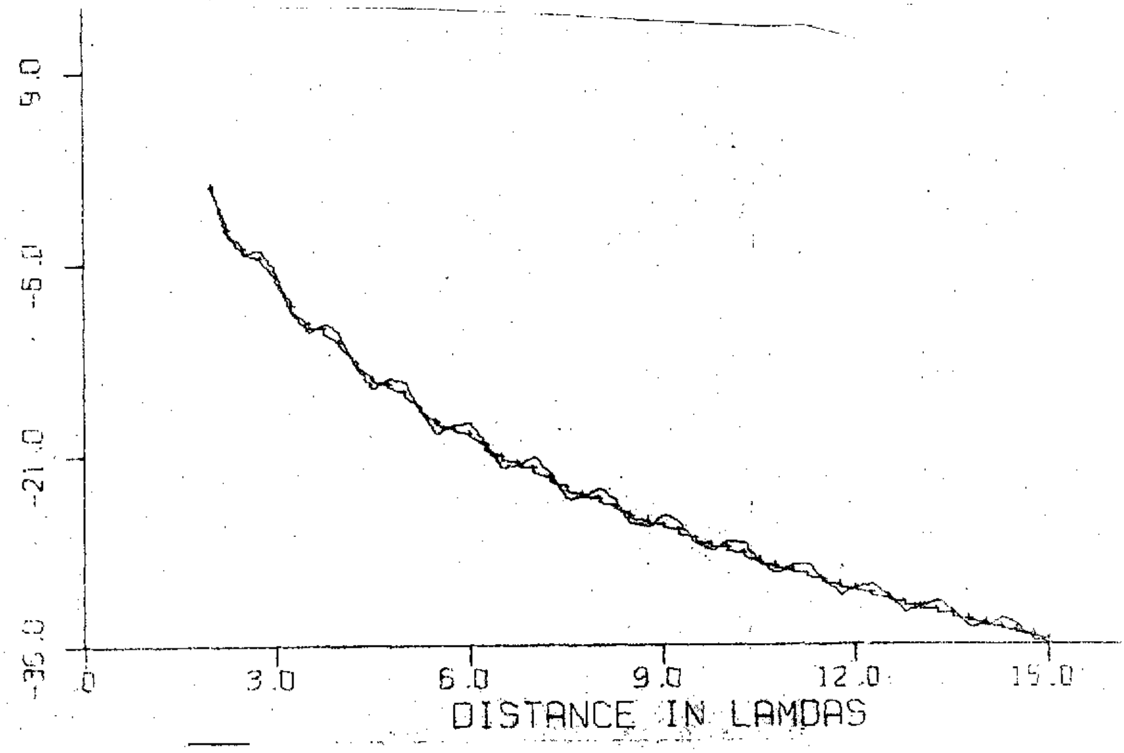


H_φ (HED)

$\varepsilon_1 = 3.2(1 + i\substack{.01\\.05})\varepsilon_0$

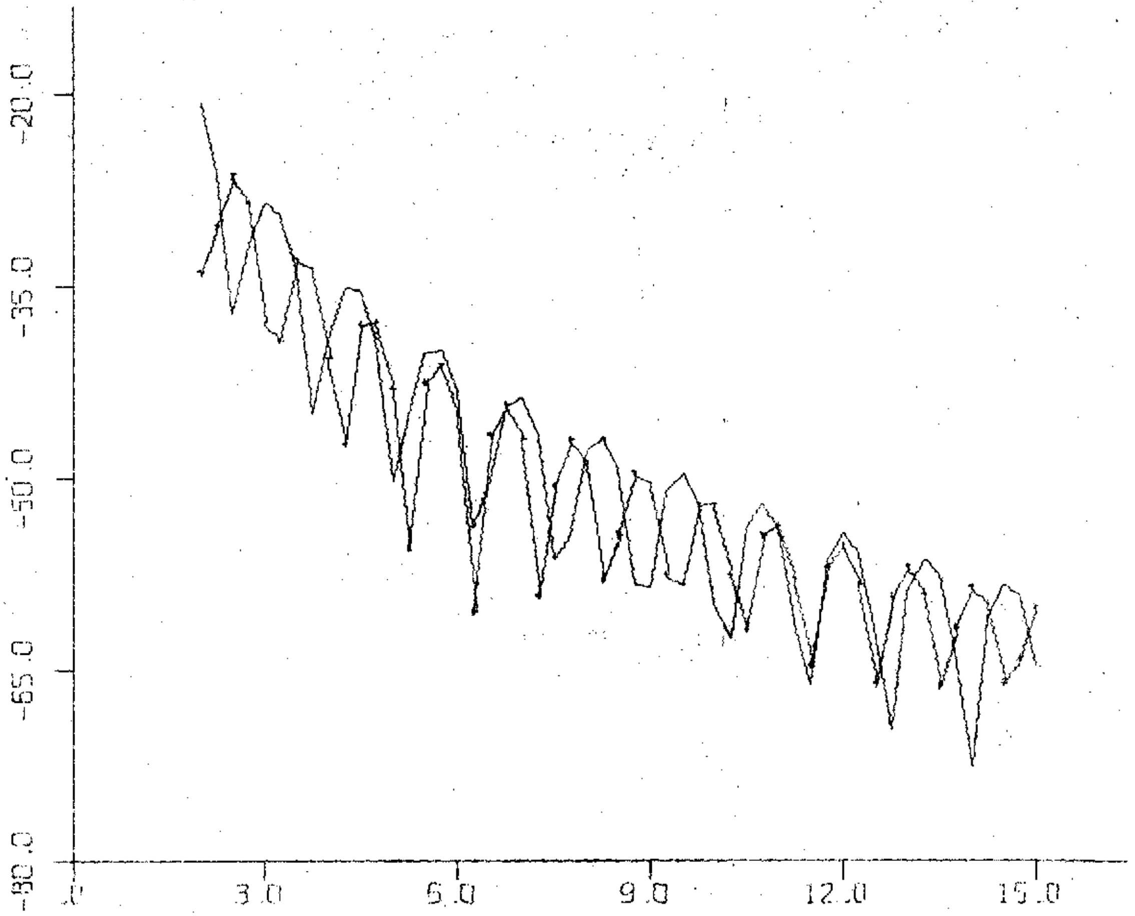
$\mu_1 = 1.2\,\mu_0$

$a = 1$



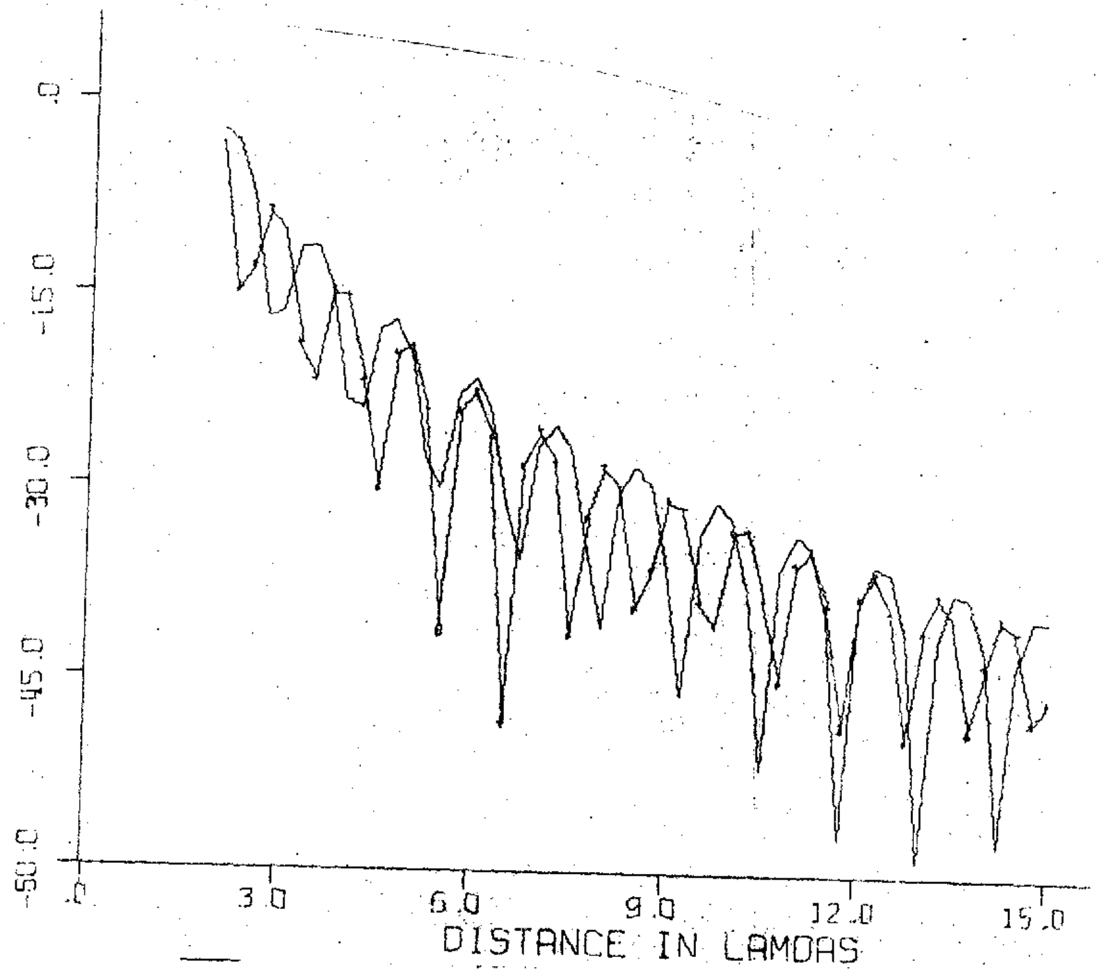
E_φ (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1 \cdot \mu_0, 1.2$
$a = .8$



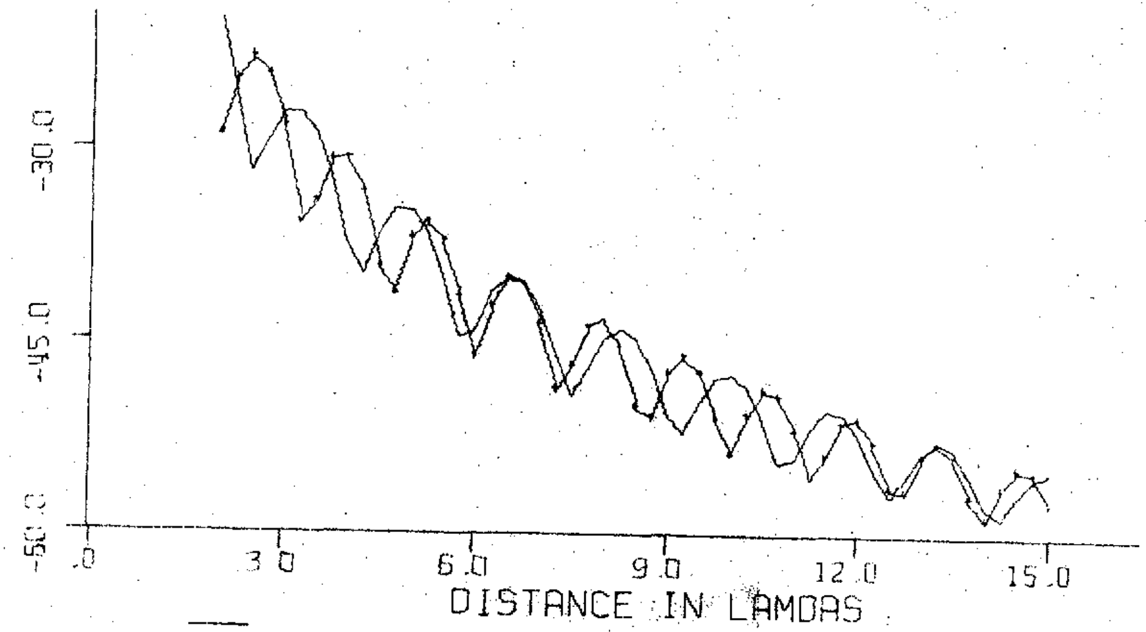
H_z (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$, 1.2
$a = .8$



E_ρ(HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1 \ \mu_0 , 1.2$
$a = .8$



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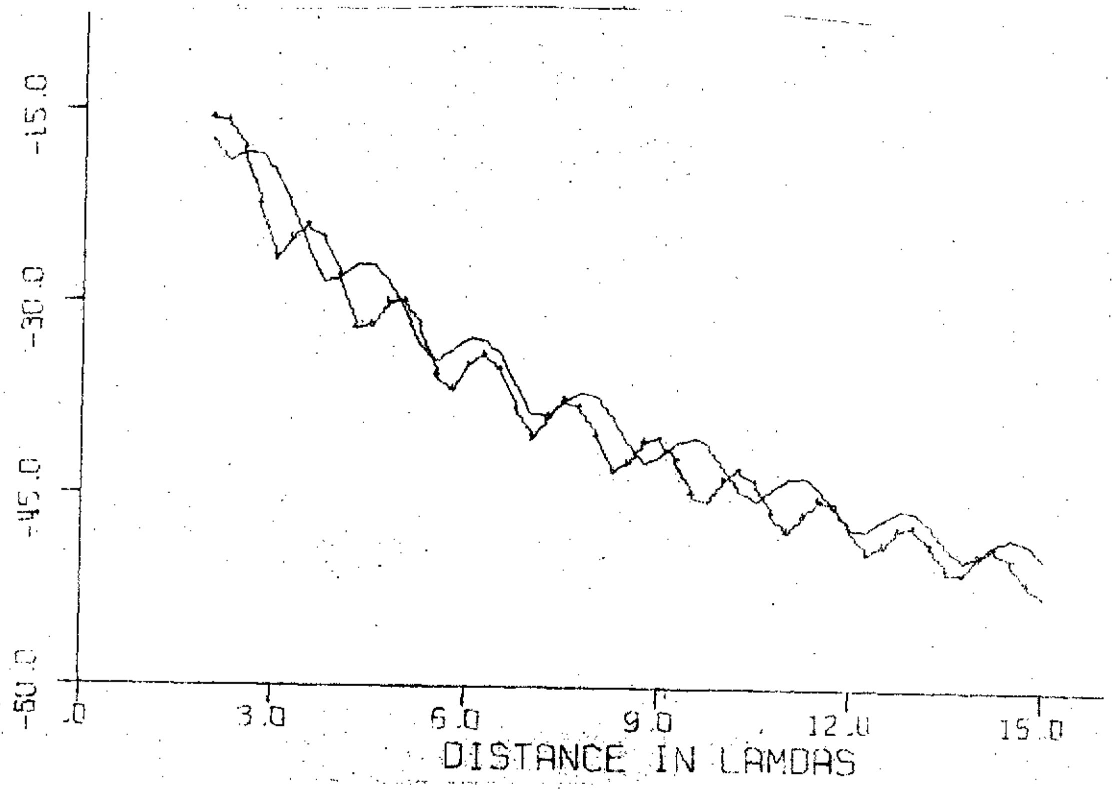
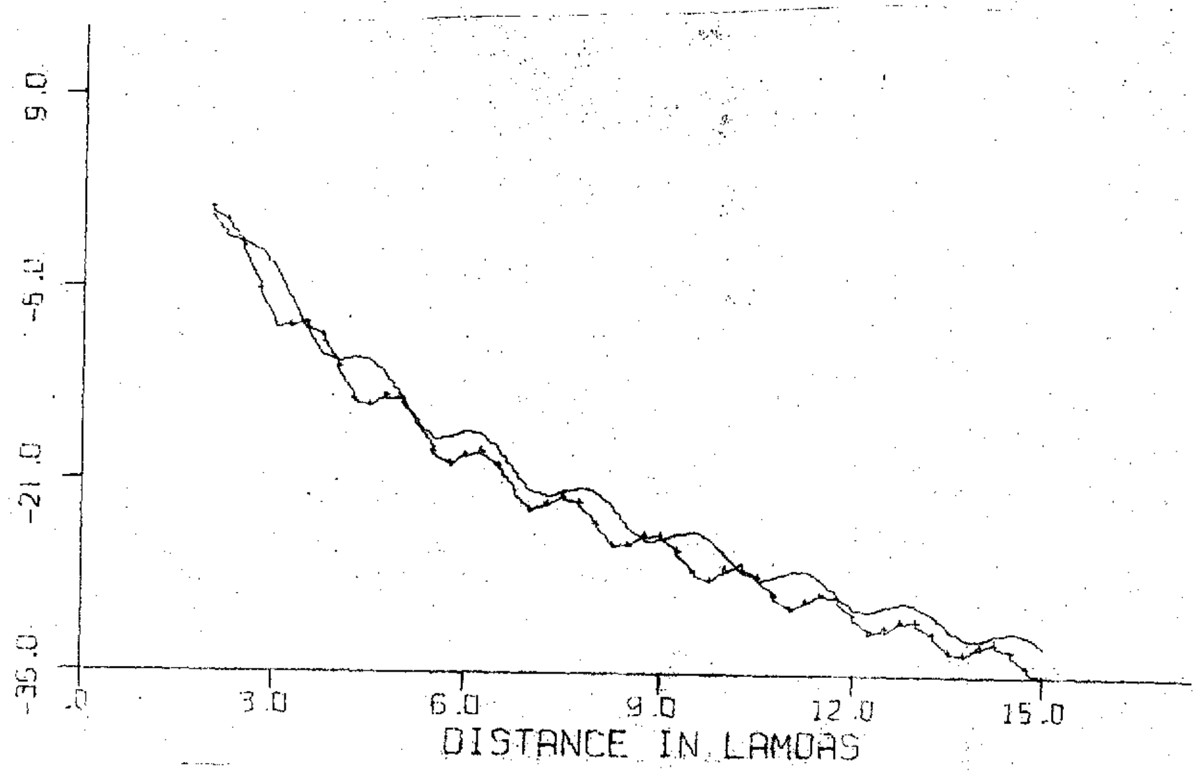
E_z (HED)

$\varepsilon_1 = 3.2(1+i.0)\varepsilon_0$
$\mu_1 = 1 \ \mu_0 \ , 1.2$
$a = .8$



H_φ (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0, 1.2$
$a = .8$

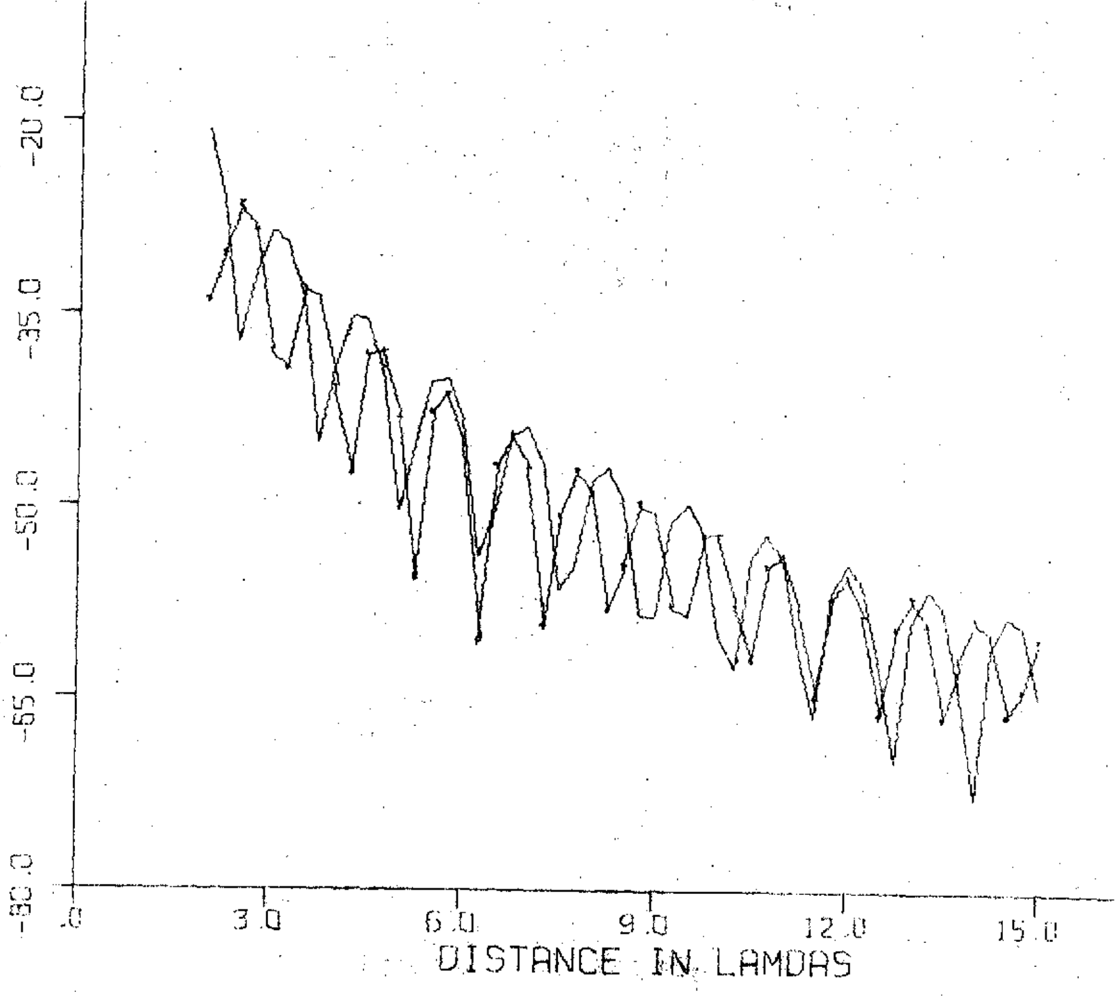


E_φ (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

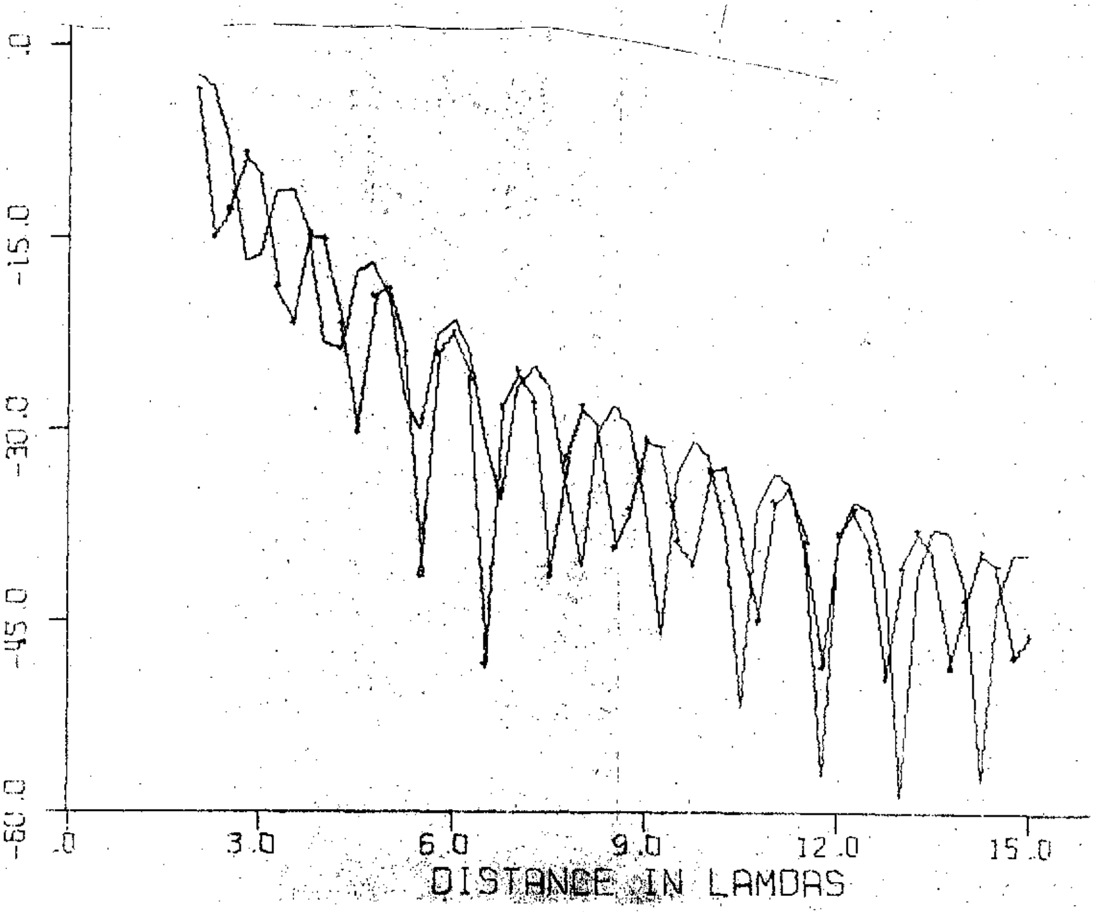
$\mu_1 = 1\ \mu_0$, 1.2

$a = 1.2$



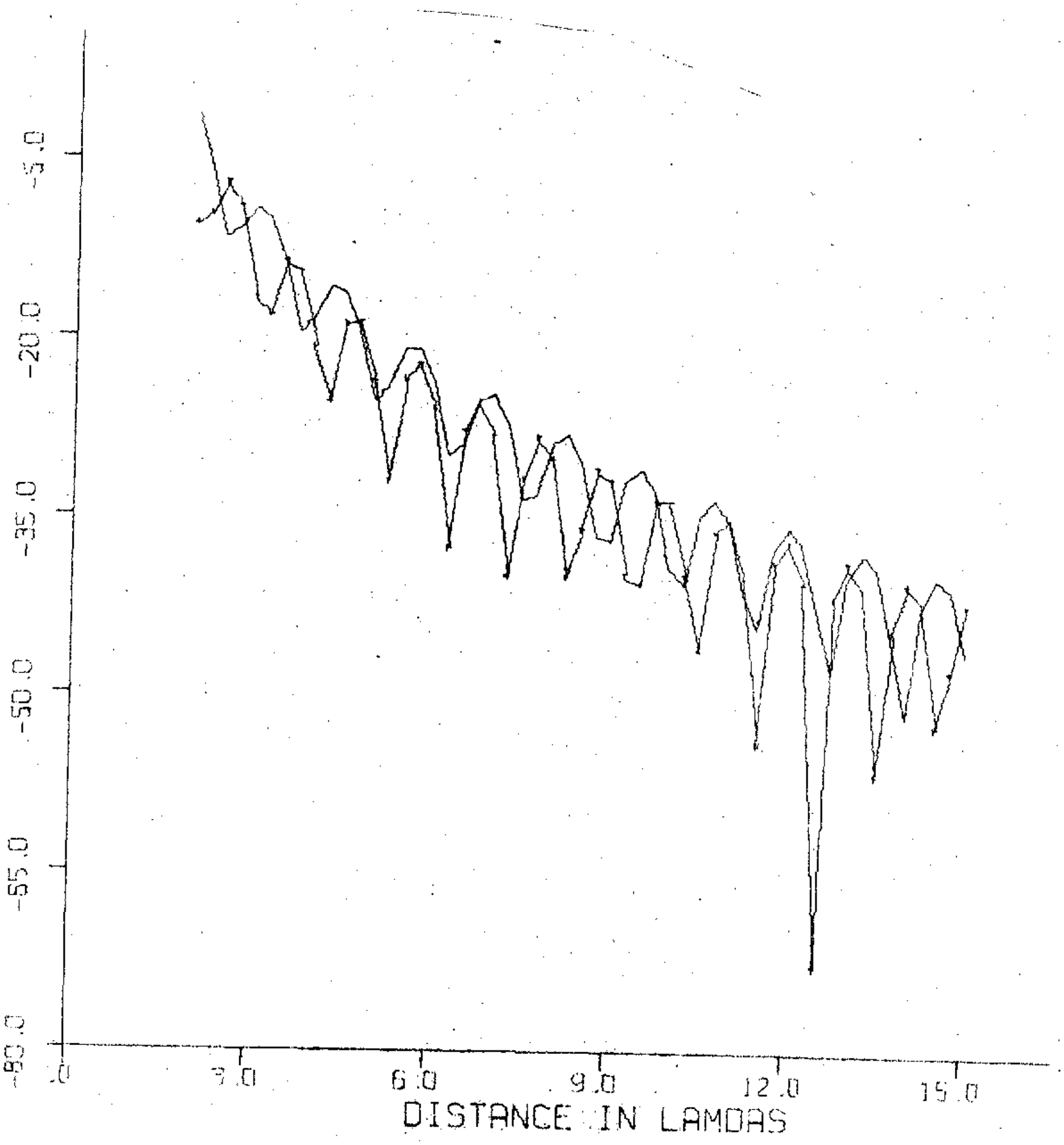
H_ρ (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0\ , 1.2$
$a = 1.2$



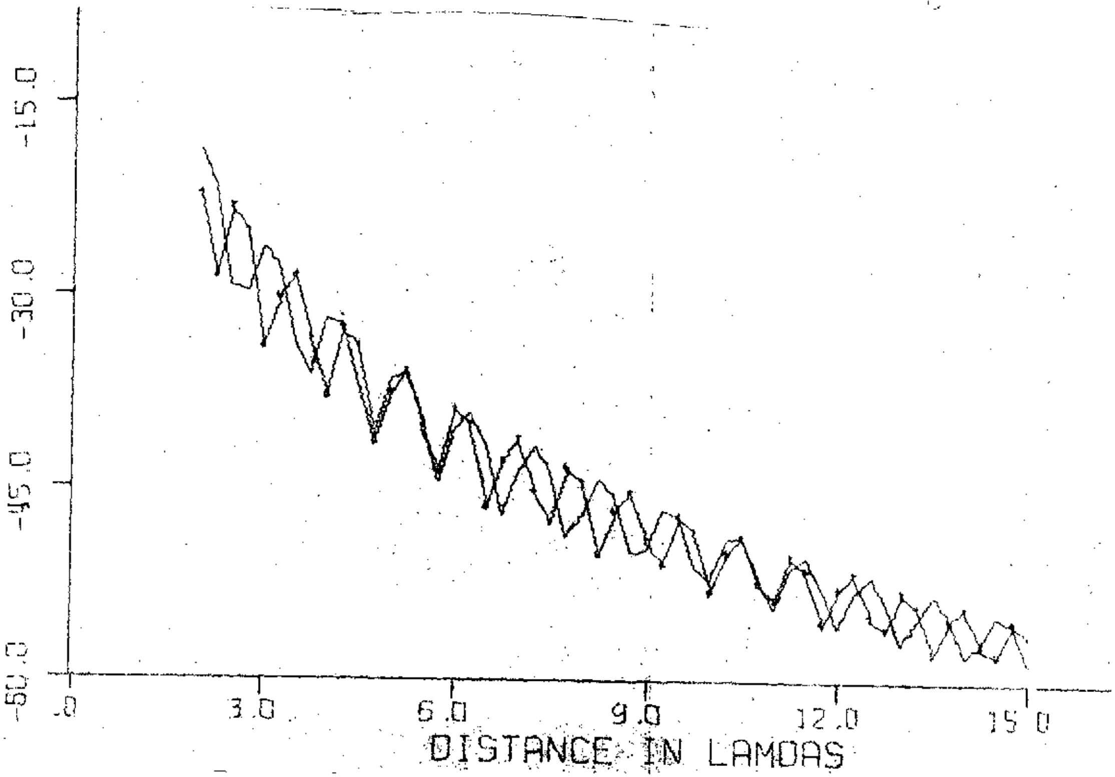
H_z (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$, 1.2
$a = 1.2$



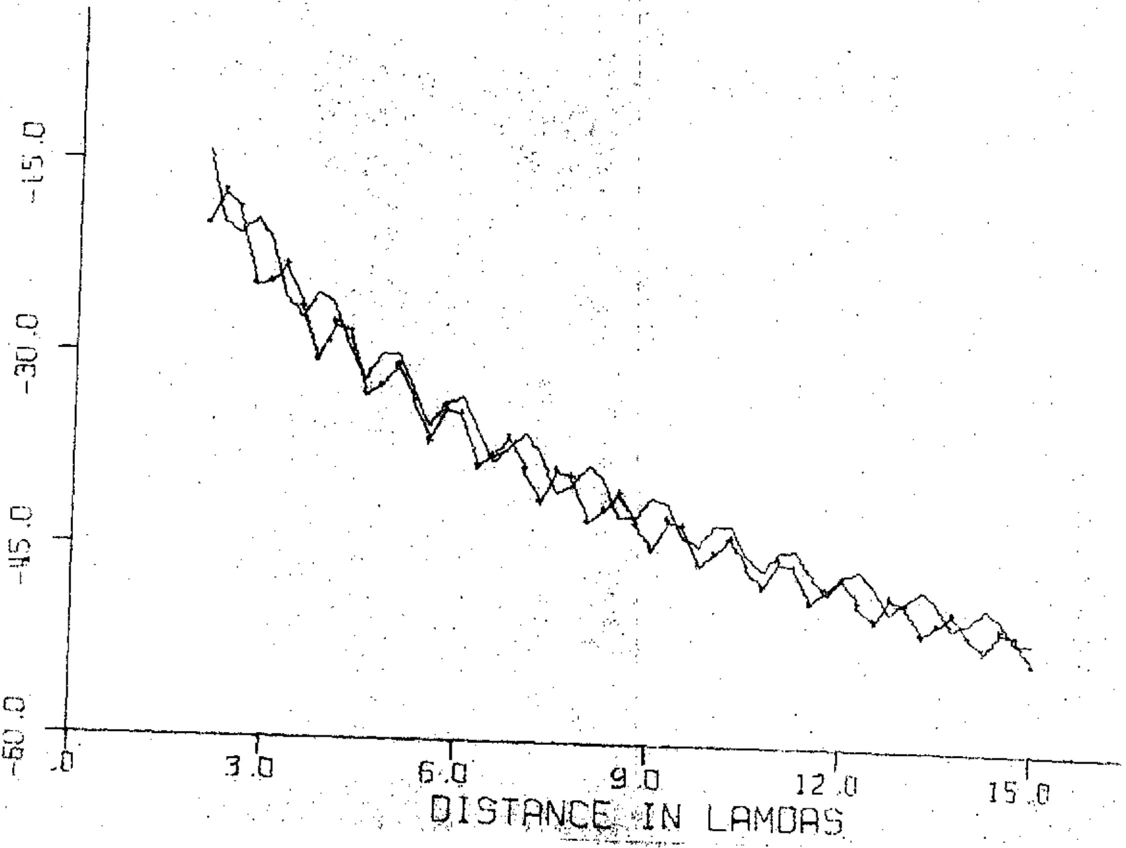
E_g (HED)

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0\ , 1.2$
$a = 1.2$



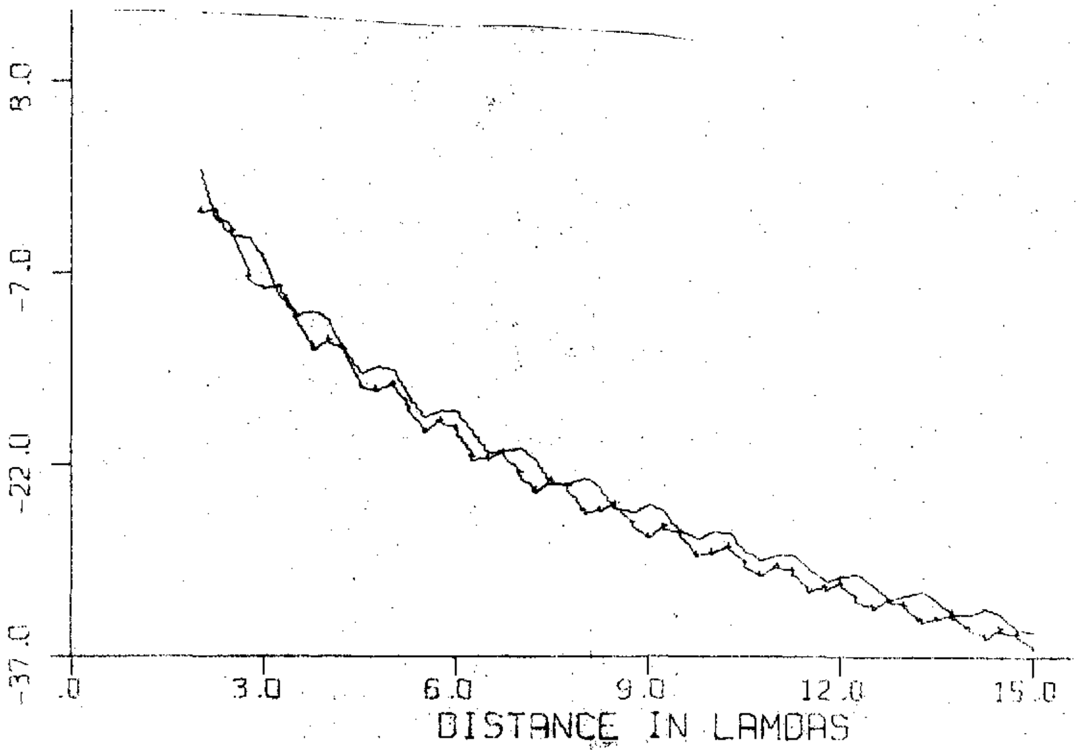
E_z (HED)

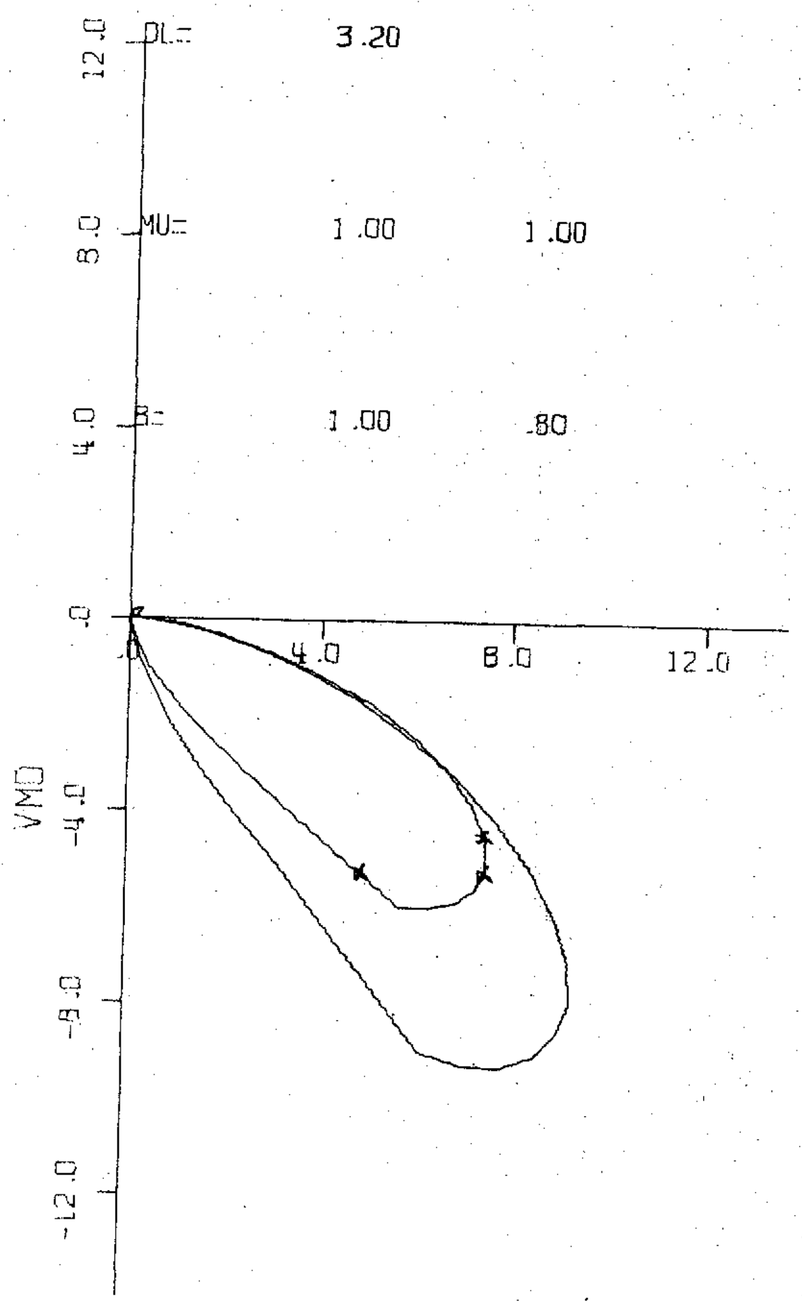
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1 \ \mu_0 \ , 1.2$
$a = 1.2$

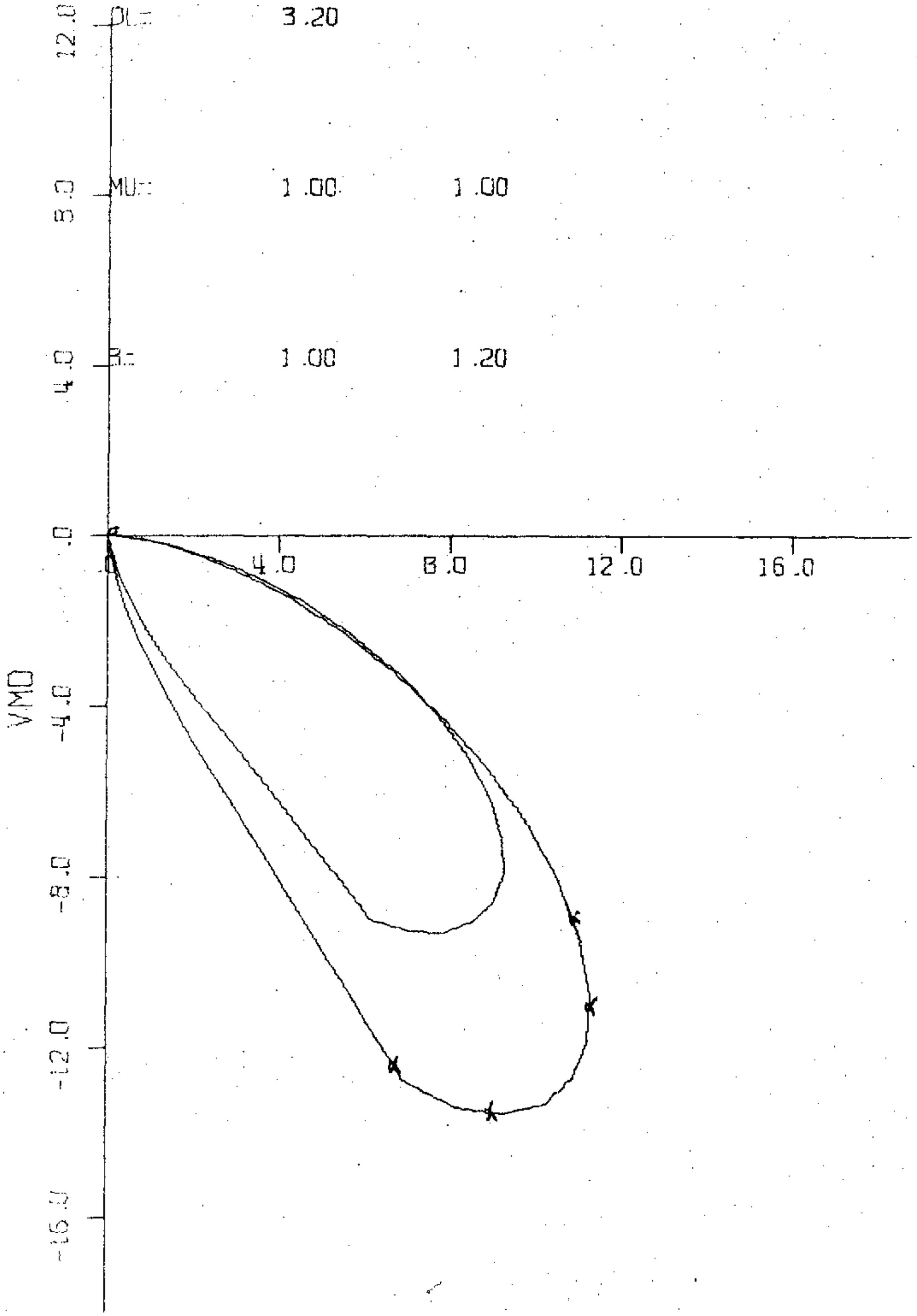


H_φ (HED)

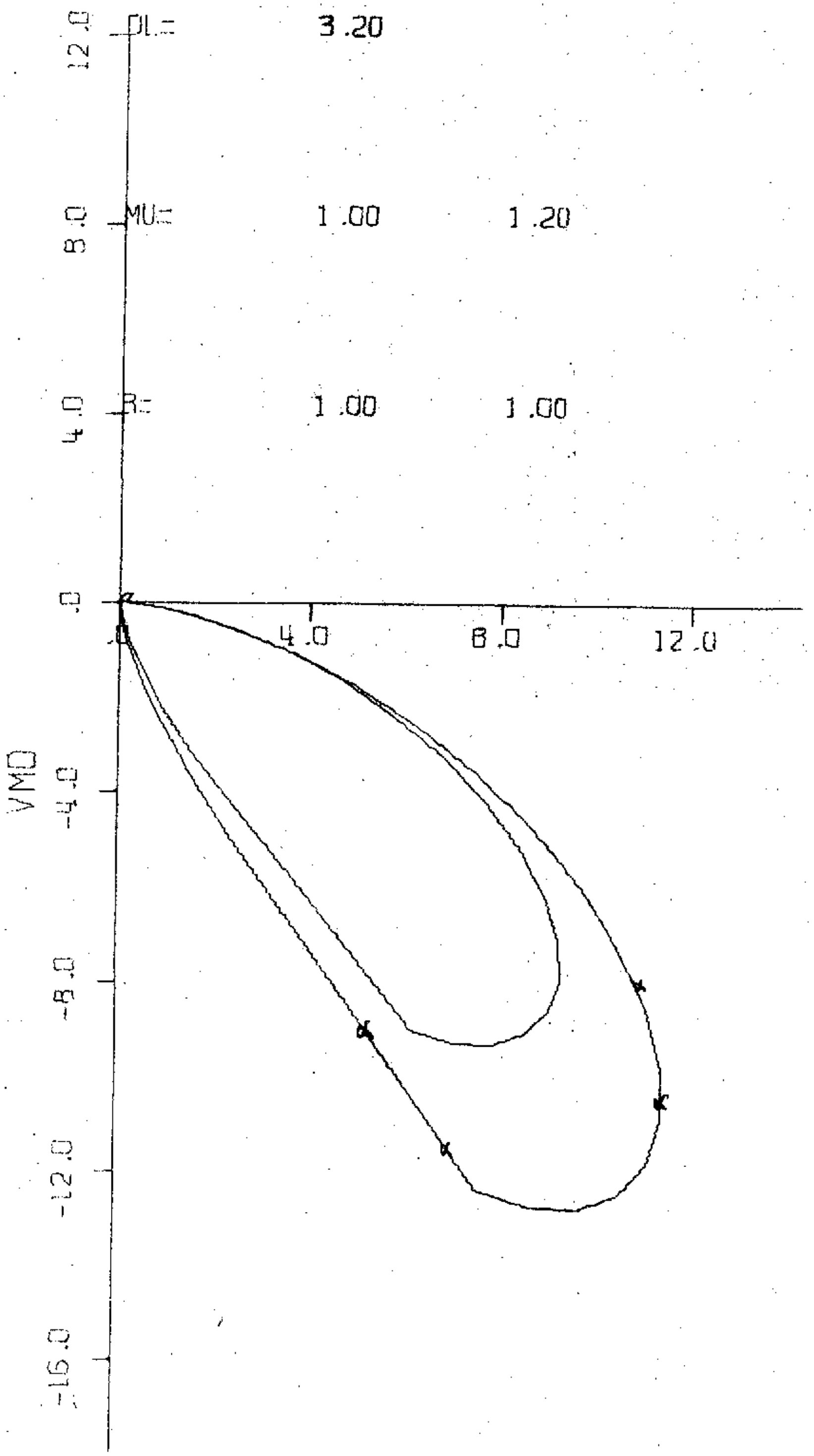
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0\ , 1.2$
$a = 1.2$

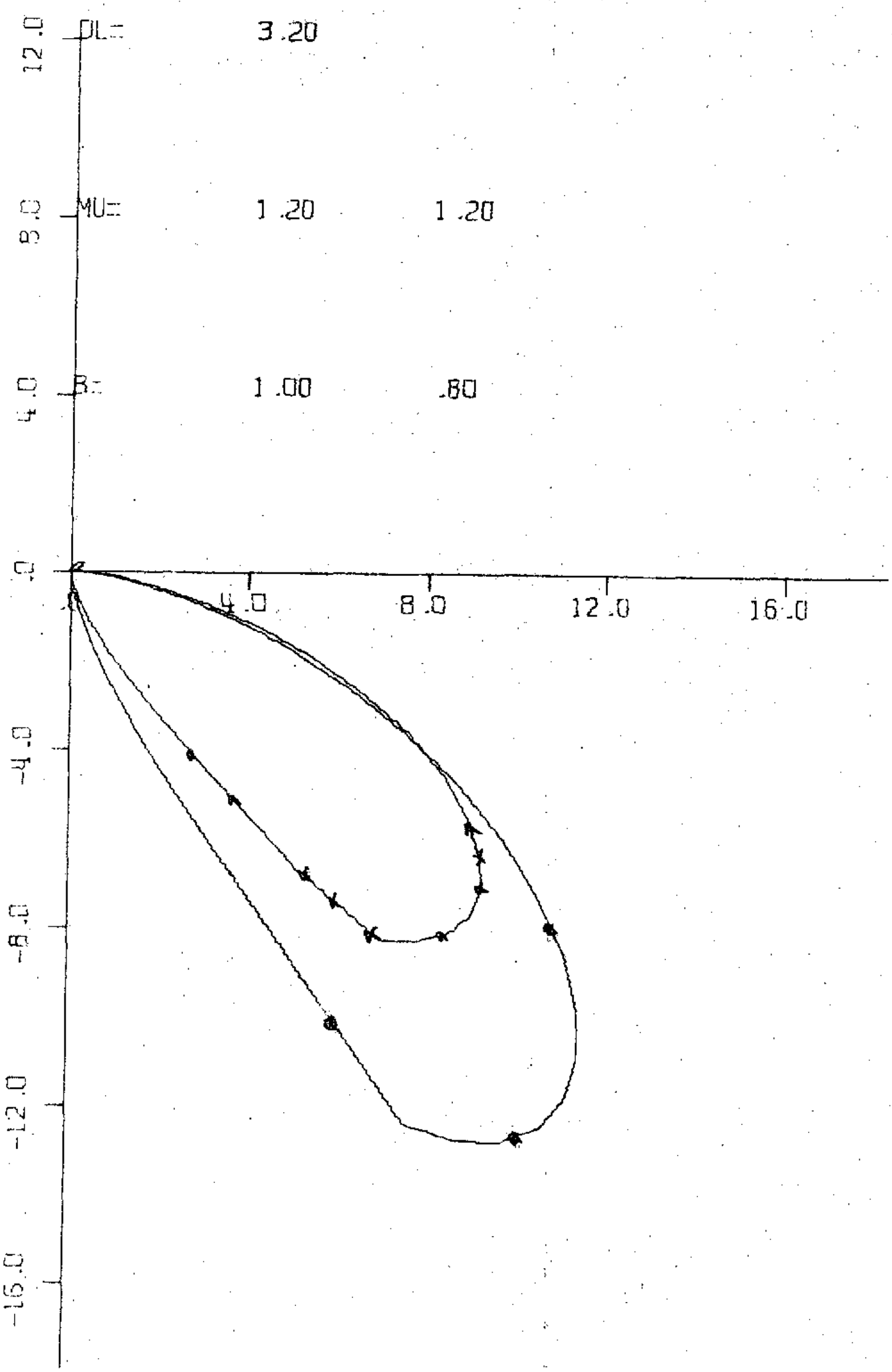


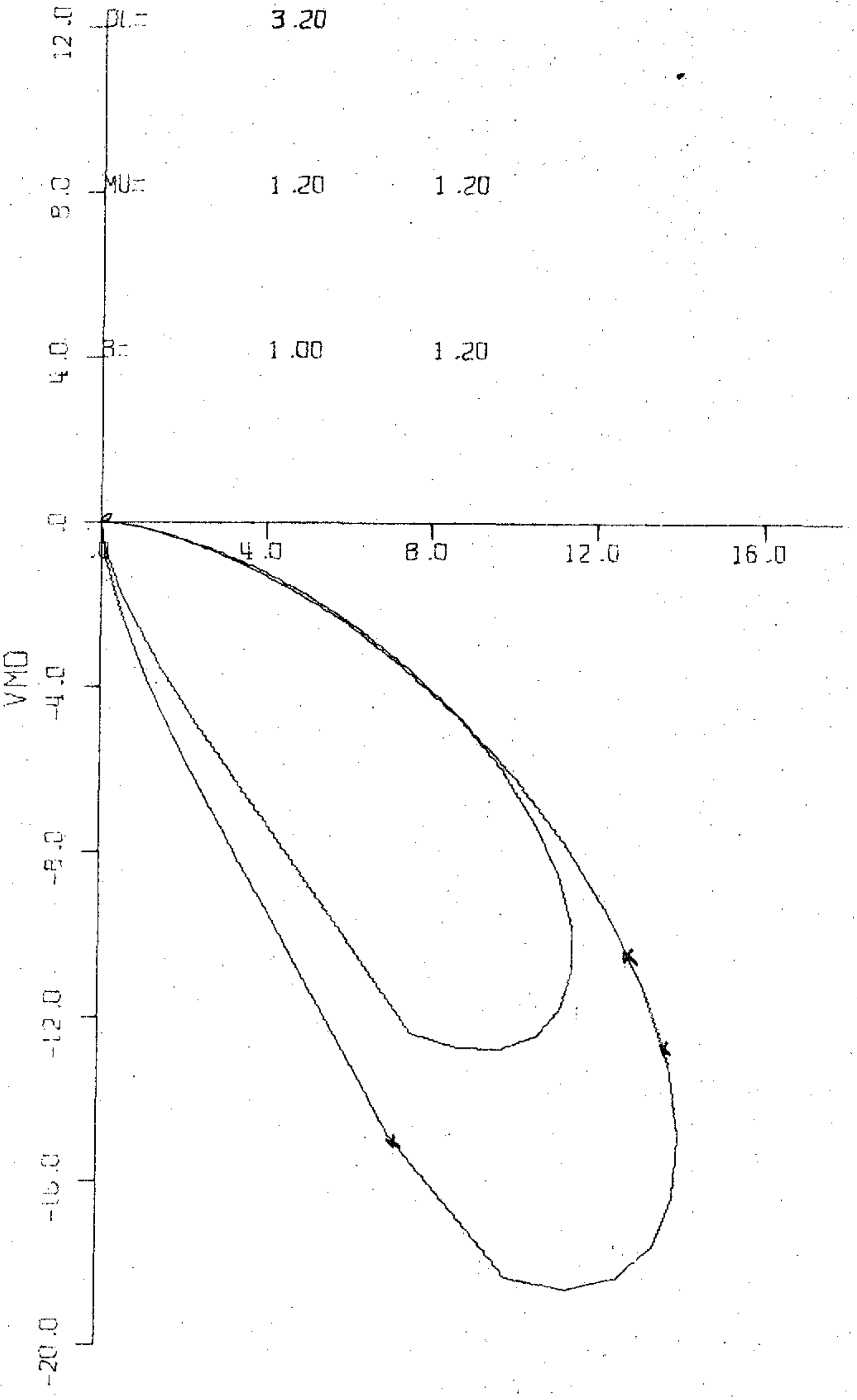

DL= 3.20
MU= 1.00 1.00
B= 1.00 .80
12.0
8.0
4.0
.0
-4.0
-8.0
-12.0
.0
4.0
8.0
12.0
VMD



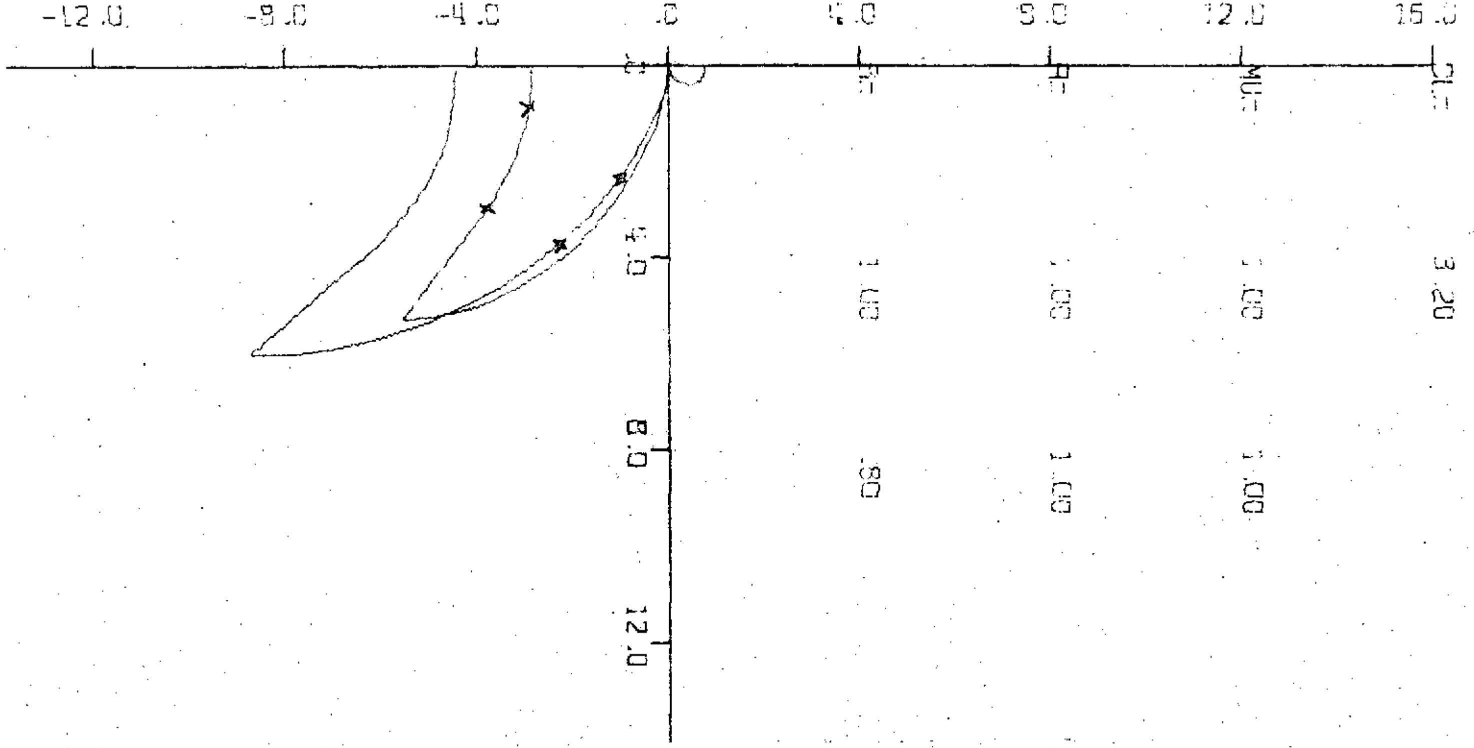
DL= 3.20
MU= 1.00 1.00
B= 1.00 1.20
VMD
12.0
8.0
4.0
.0
-4.0
-8.0
-12.0
-16.0
4.0
8.0
12.0
16.0


DL= 3.20
MU= 1.00 1.20
R= 1.00 1.00
12.0
8.0
4.0
.0
-4.0
-8.0
-12.0
-16.0
VMD
.0
4.0
8.0
12.0

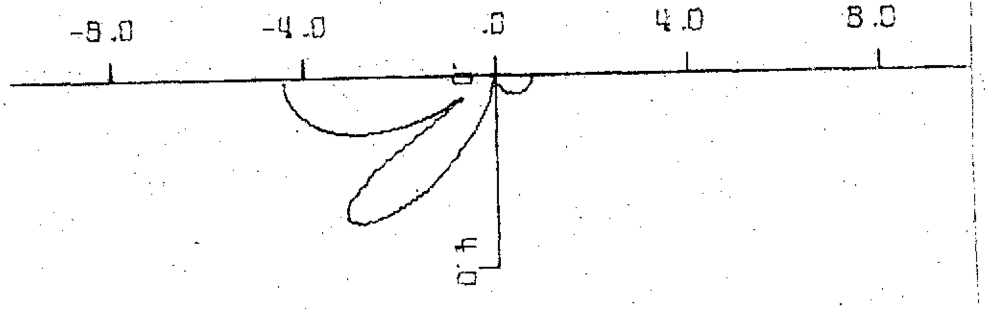

DL= 3.20
MU= 1.20 1.20
B= 1.00 .80
VMD
12.0
8.0
4.0
0
-4.0
-8.0
-12.0
-16.0
4.0
8.0
12.0
16.0


DL= 3.20
MU= 1.20 1.20
R= 1.00 1.20
VMD
12.0
8.0
4.0
0
-4.0
-8.0
-12.0
-16.0
-20.0
.0
4.0
8.0
12.0
16.0

HED BROADSIDE



HED ENDFIRE



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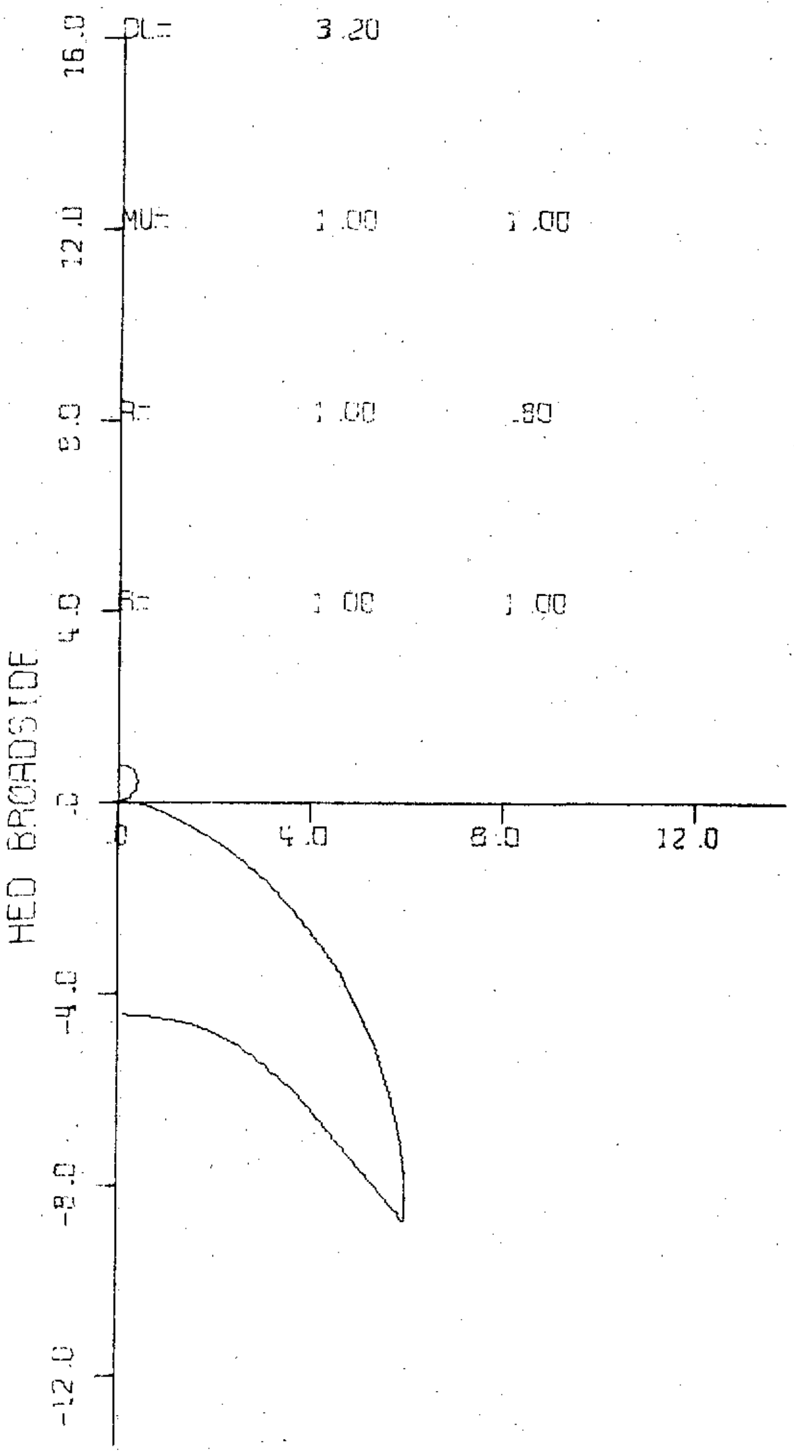
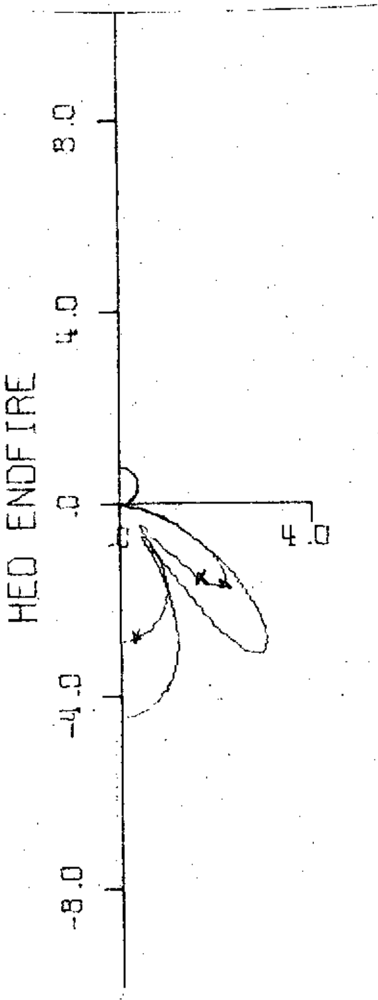
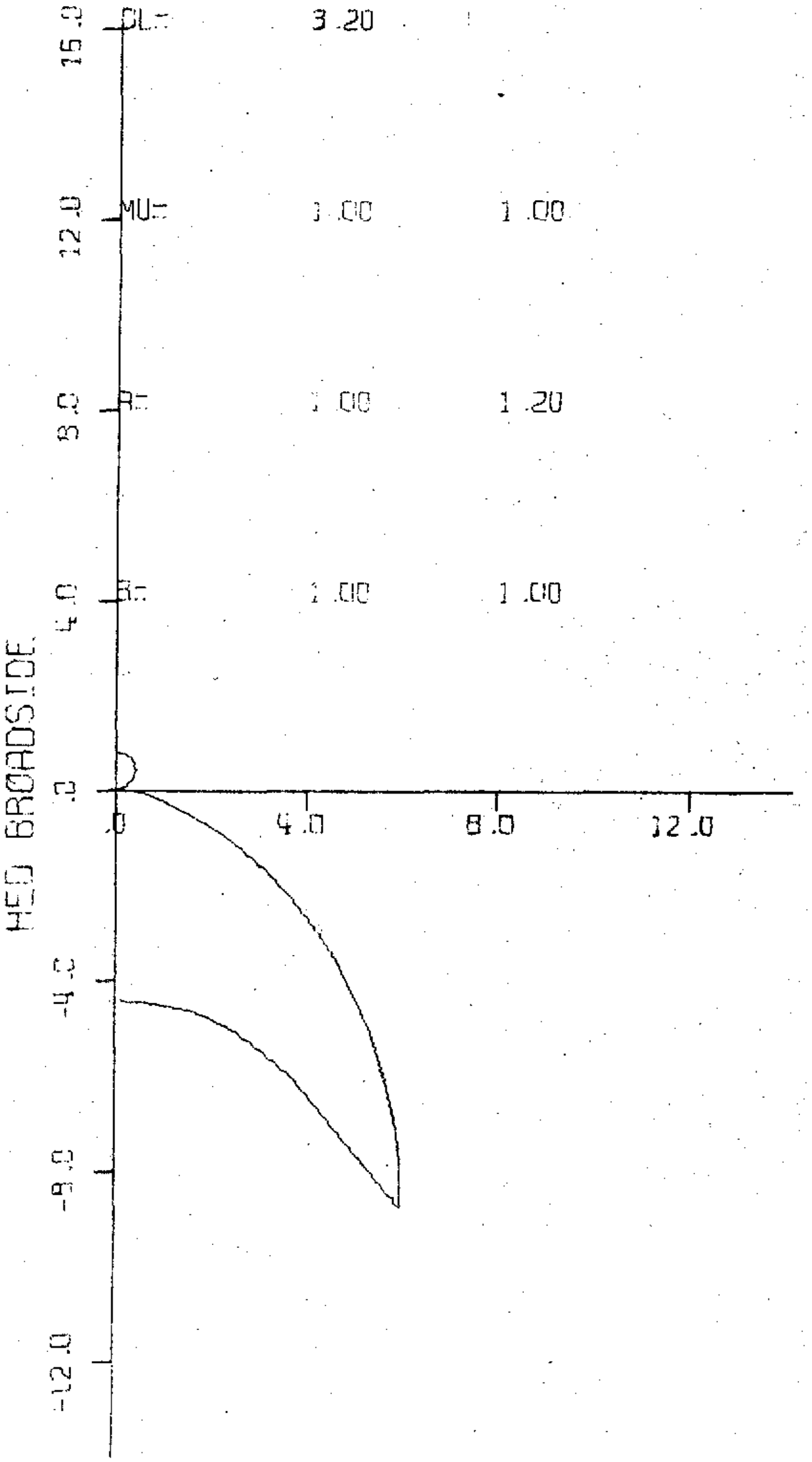
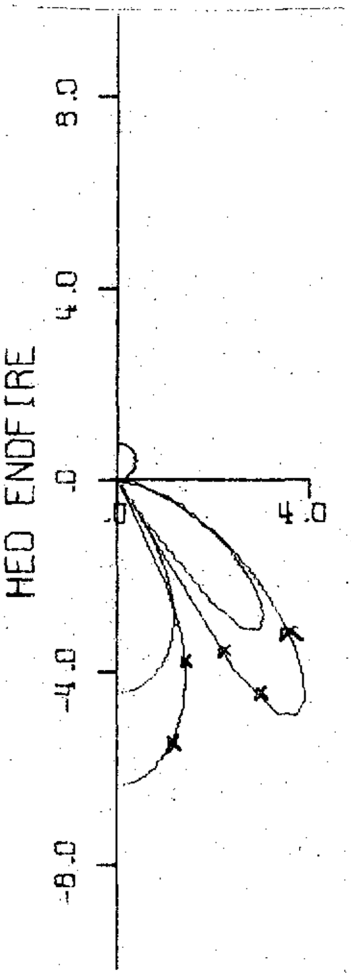





HED BROADSIDE
DL= 3.20
MU= 1.00 1.00
R= 1.00 1.20
E= 1.00 1.00
15.0
12.0
8.0
4.0
.0
-4.0
-8.0
-12.0
.0
4.0
8.0
12.0


HED ENDFIRE
8.0
4.0
.0
-4.0
-8.0
.0
4.0

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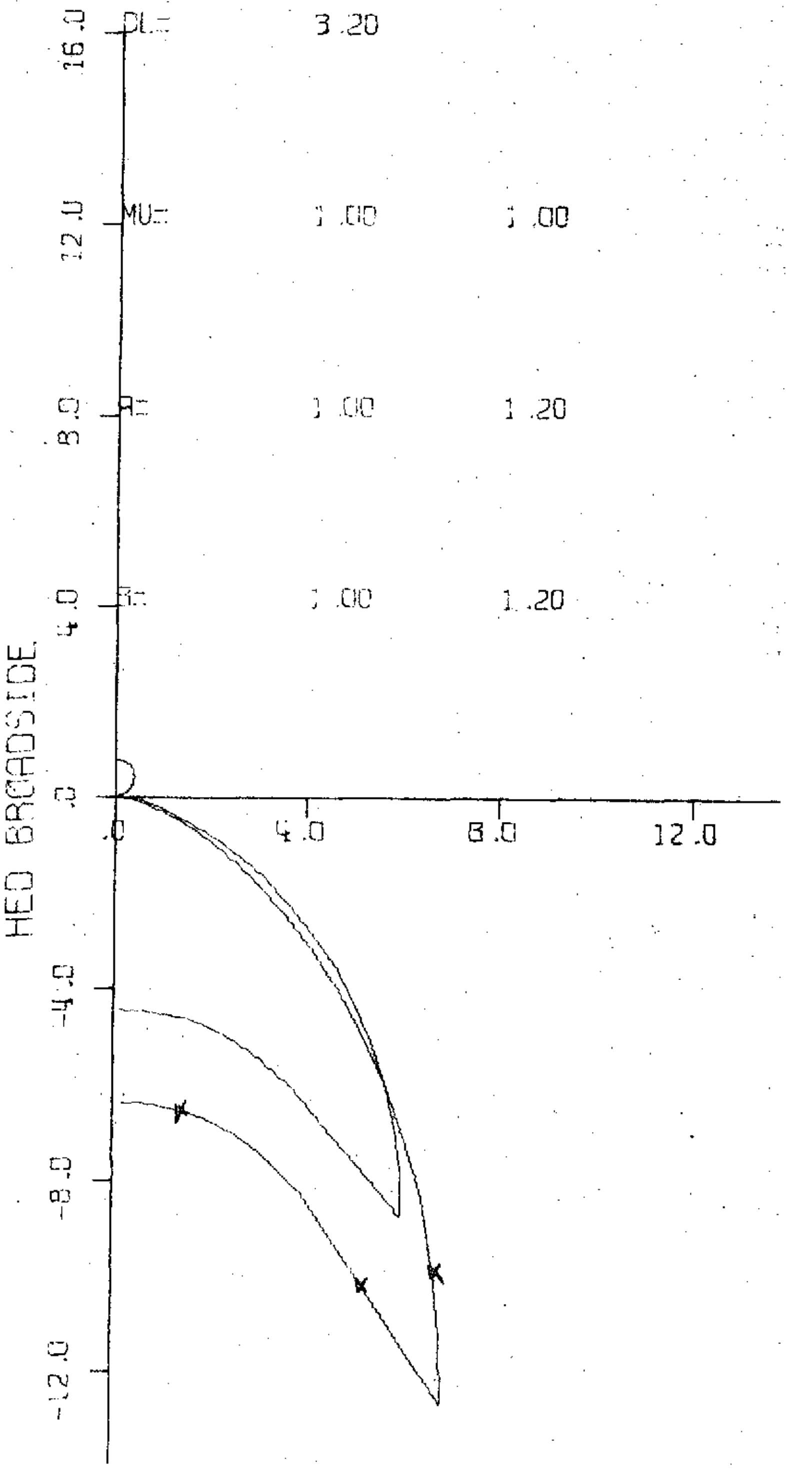
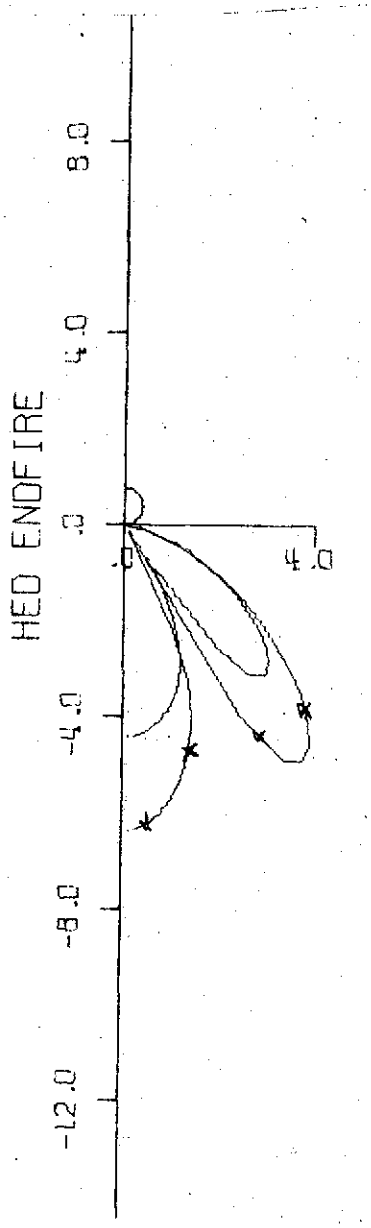


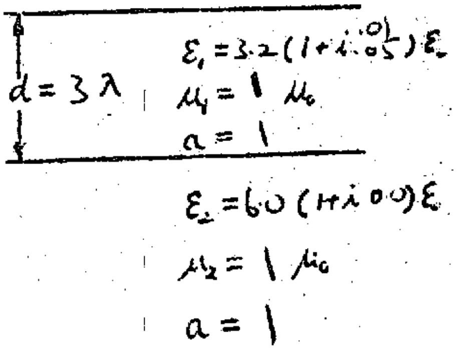


APPENDIX B

Figures 4.1-4.48 present interference patterns due to a vertical magnetic dipole (VMD).

Figures 4.49-4.144 present interference patterns due to a horizontal electric dipole (HED).

Eφ (VMD) GoA



$\varepsilon_1 = 3.2(1+i\,\overset{.01}{.05})\varepsilon_0$

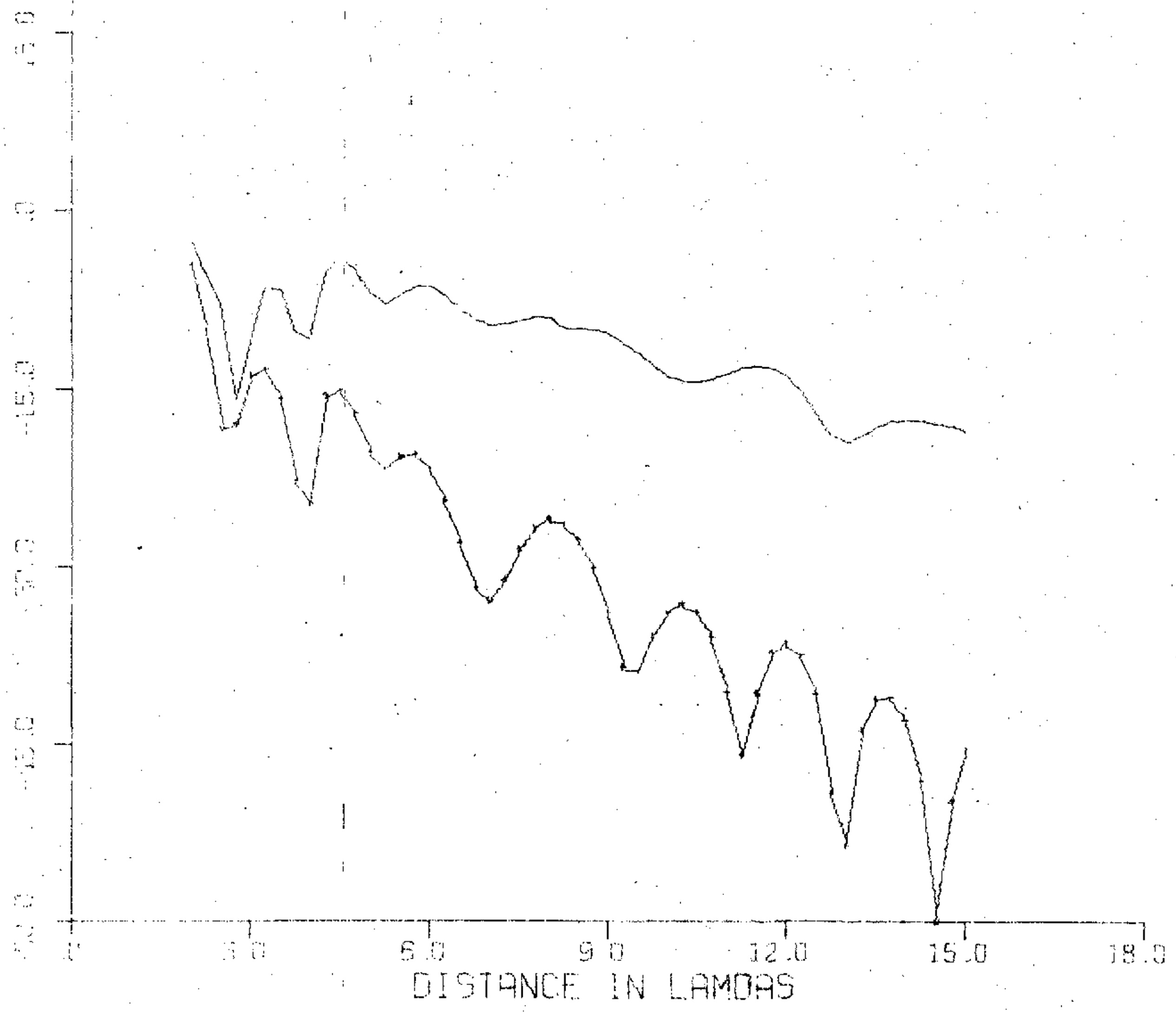
$\mu_1 = 1\ \mu_0$

$a = 1$

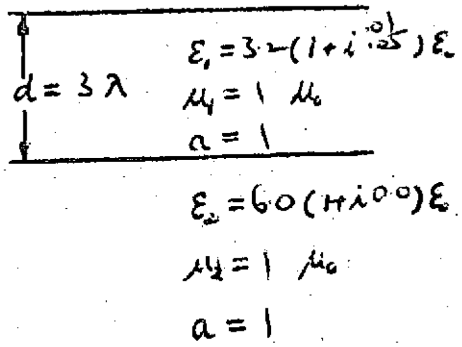
$\varepsilon_2 = 60(1+i\,0.0)\varepsilon_0$

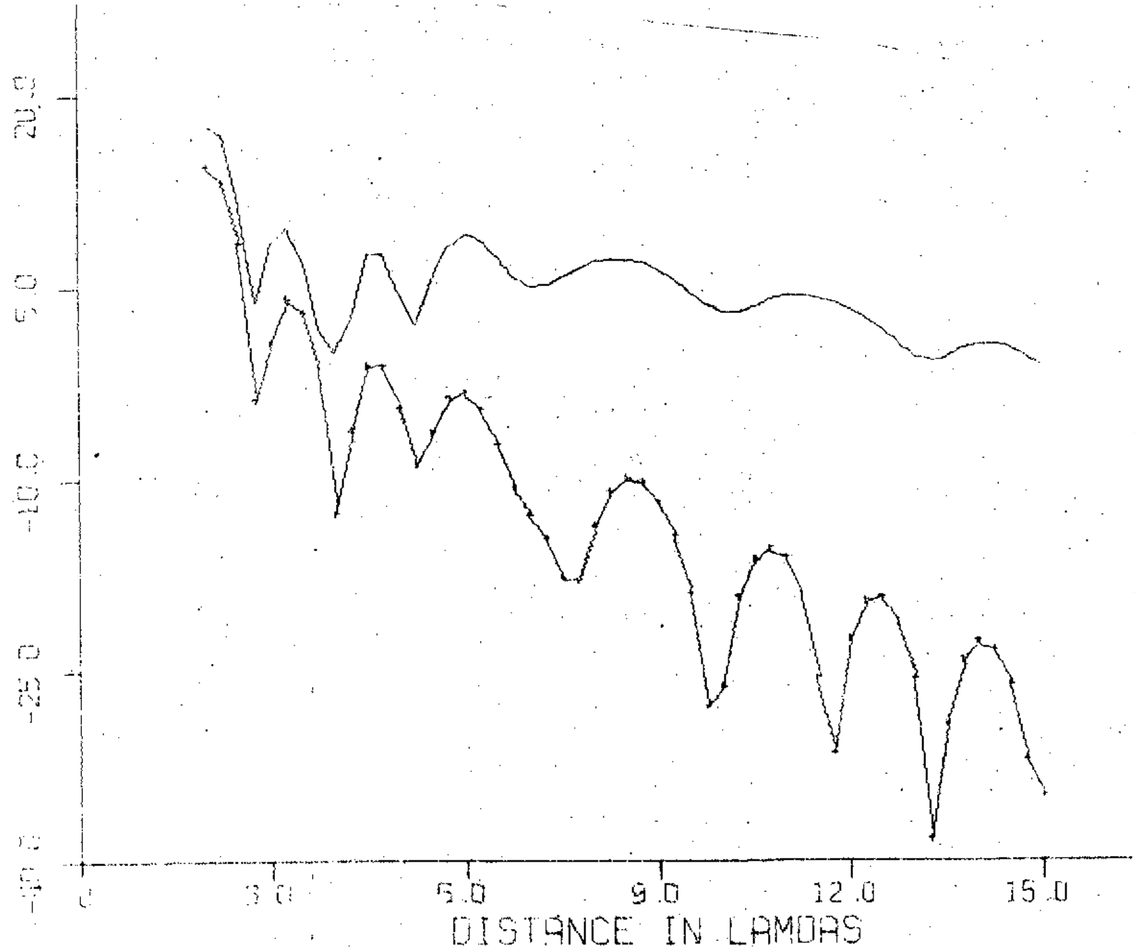
$\mu_2 = 1\ \mu_0$

$a = 1$

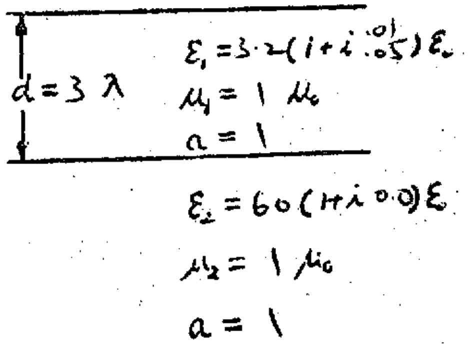


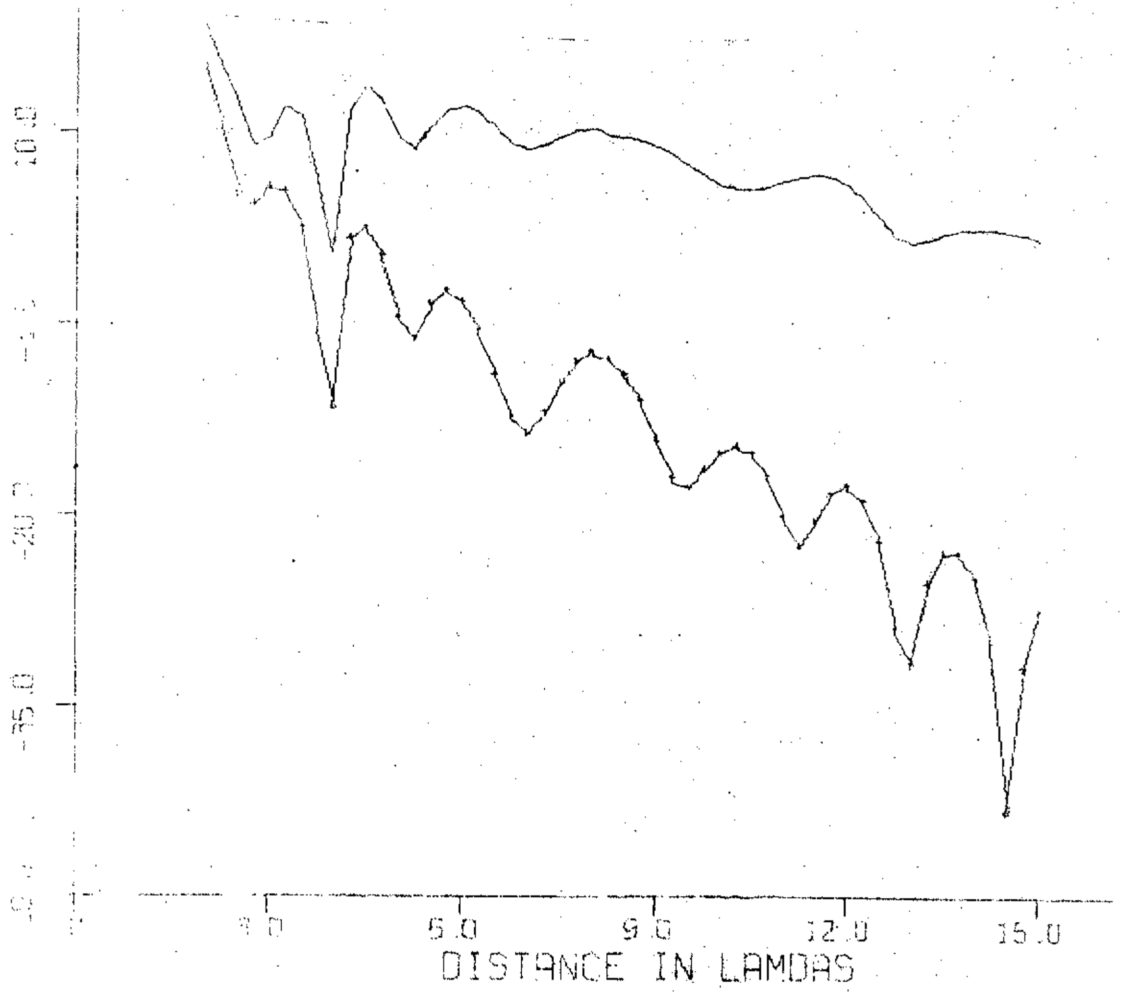
Hg(VMD) GOA


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\overset{.01}{.25})\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 60(1+i0.0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

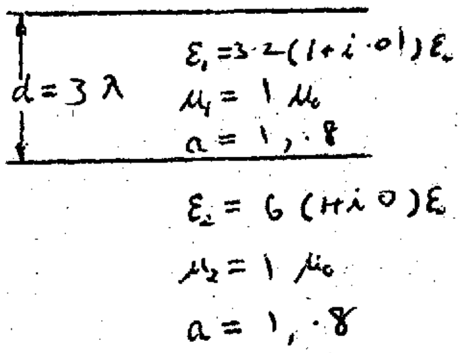

20.0
5.0
-10.0
-25.0
-40.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

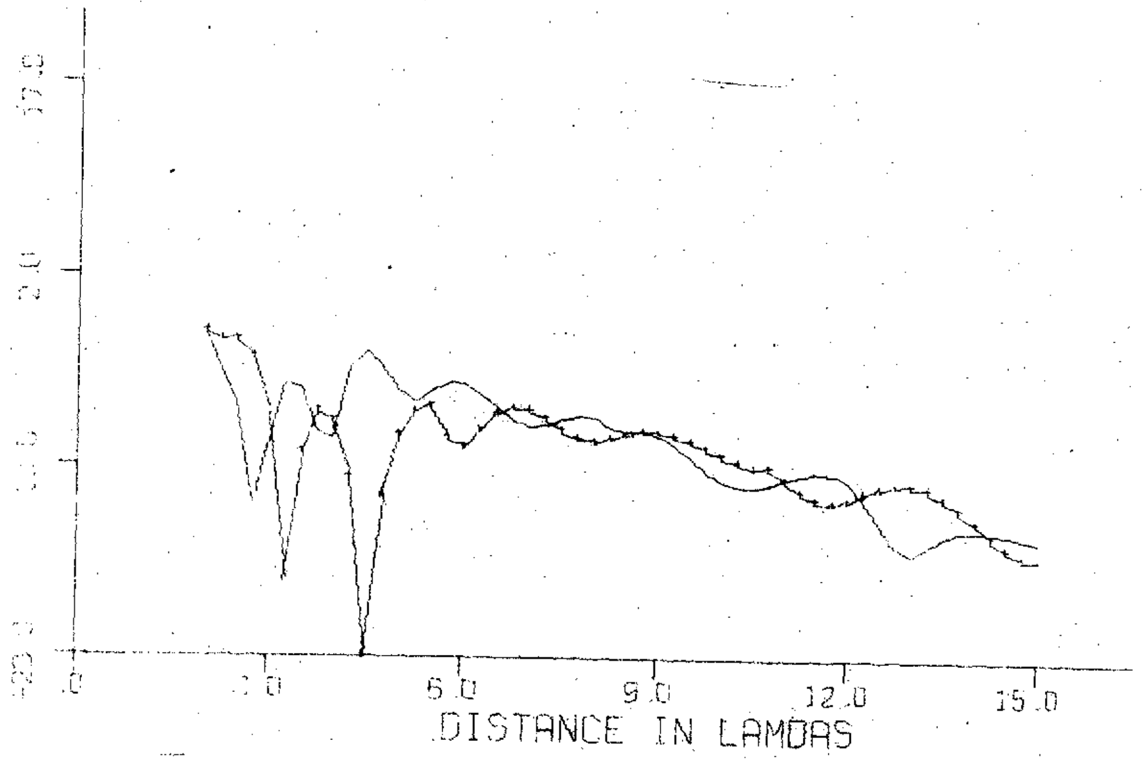
H_z (VMD) GTOA


d = 3 λ
ε₁ = 3.2(1 + i .01/.05) ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 60(1 + i 0.0) ε₀
μ₂ = 1 μ₀
a = 1

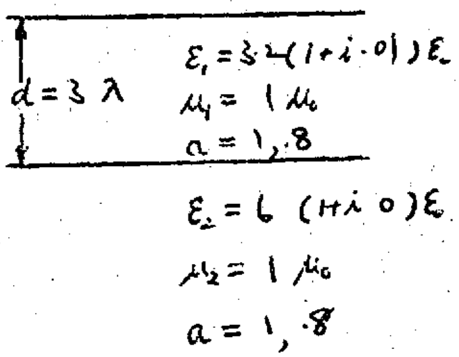

10.0
-5.0
-20.0
-35.0
-50.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)

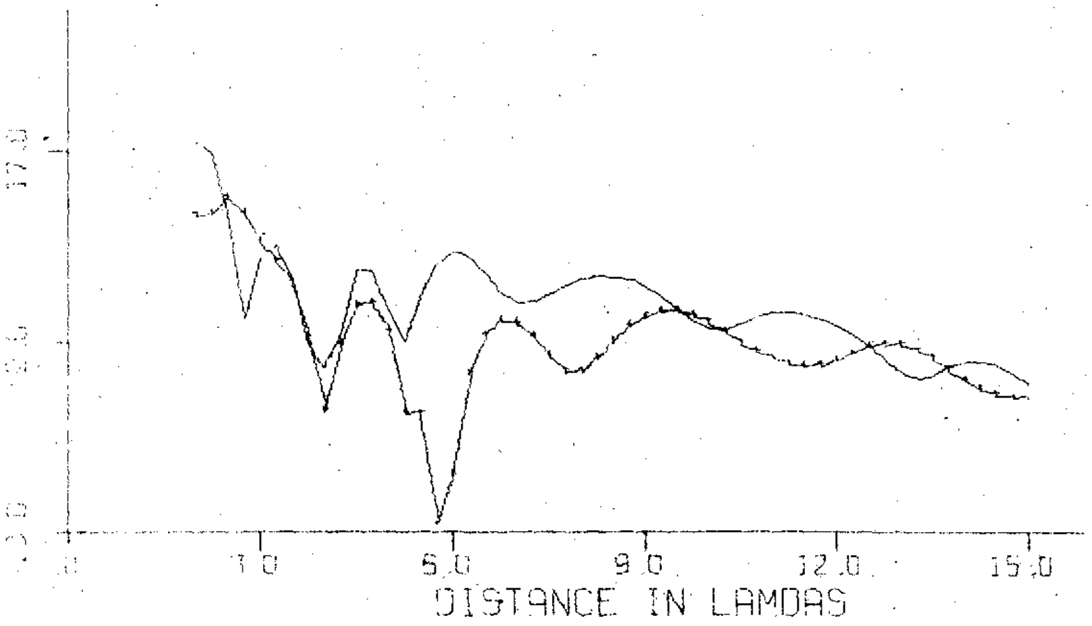

$d = 3\lambda$
$\varepsilon_1 = 3.2(1 + i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, .8$
$\varepsilon_2 = 6\,(1 + i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, .8$


.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_g (VHO)



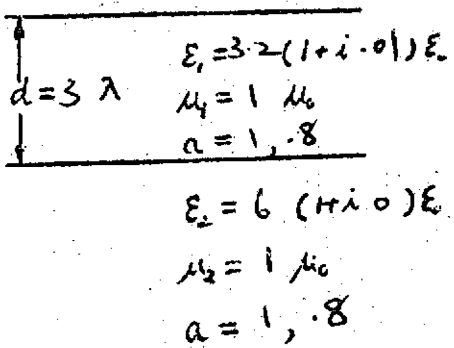
$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, .8$
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, .8$



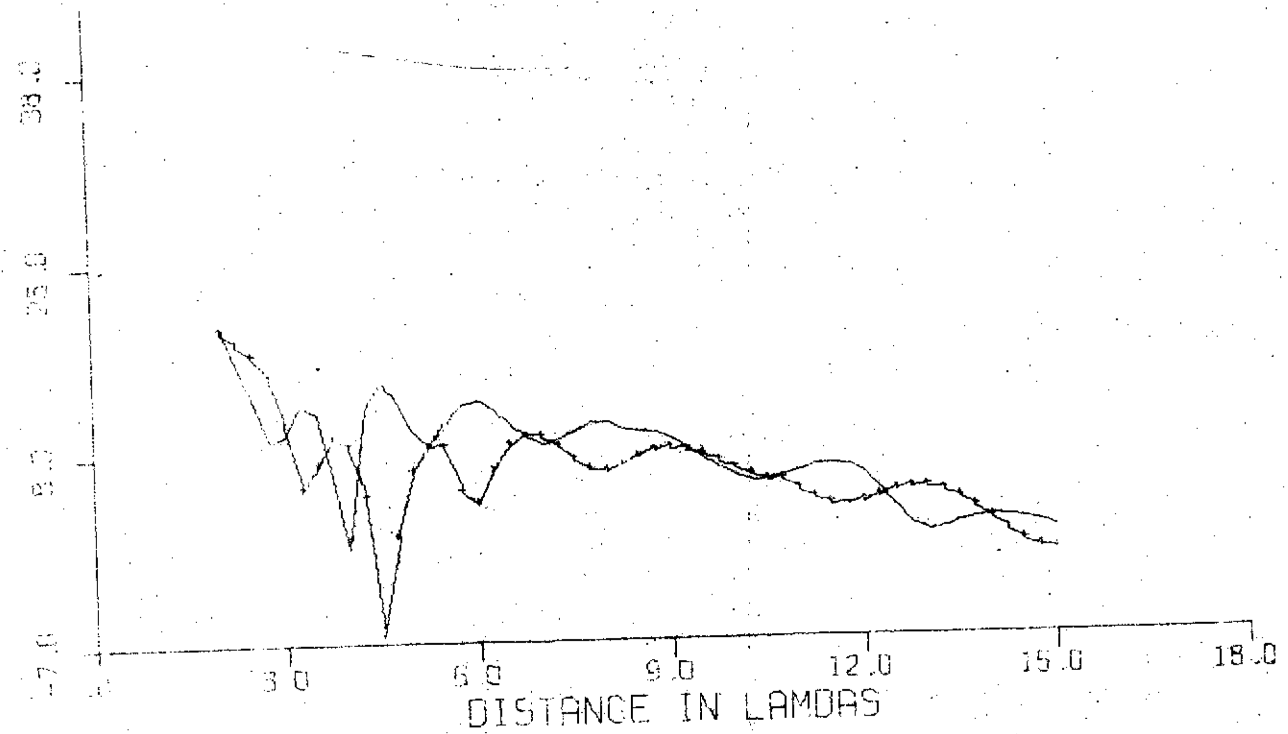
17.0
8.5
0.0
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

C-2

H_z (VMD)

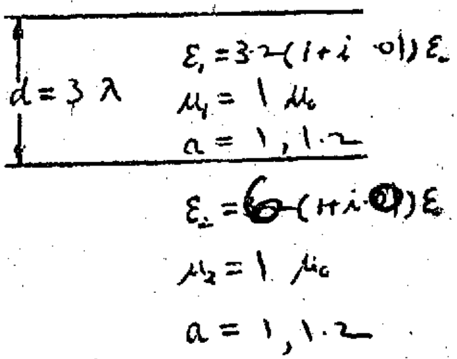


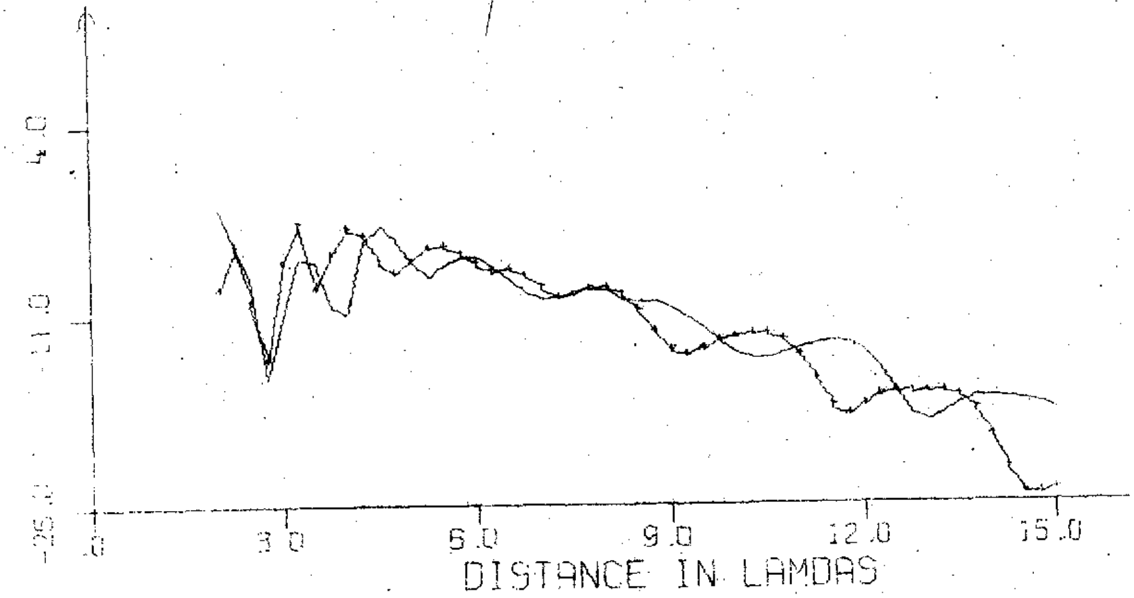
$d = 3\lambda$
$\varepsilon_1 = 3.2(1 + i\cdot.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, .8$
$\varepsilon_2 = 6\ (1 + i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1, .8$



38.0
23.0
8.0
-7.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

E_φ (VMD)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6(1+i\cdot$[illegible]$)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$


4.0
-11.0
-26.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Hg (VMD)

$d = 3\lambda$

$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$

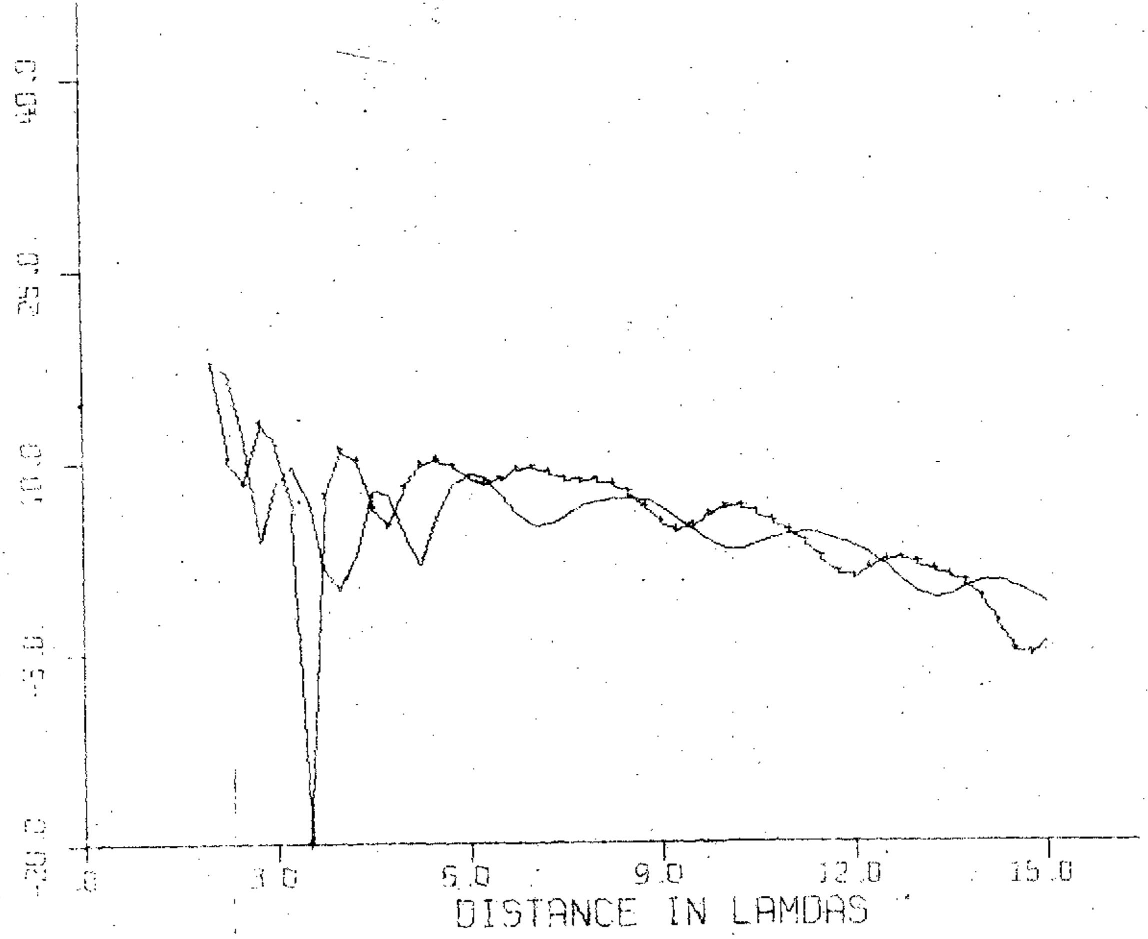
$\mu_1 = 1\,\mu_0$

$a = 1, 1.2$

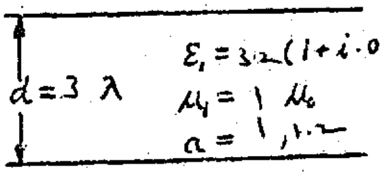
$\varepsilon_2 = 6(1+i\,0)\varepsilon$

$\mu_2 = 1\,\mu_0$

$a = 1, 1.2$

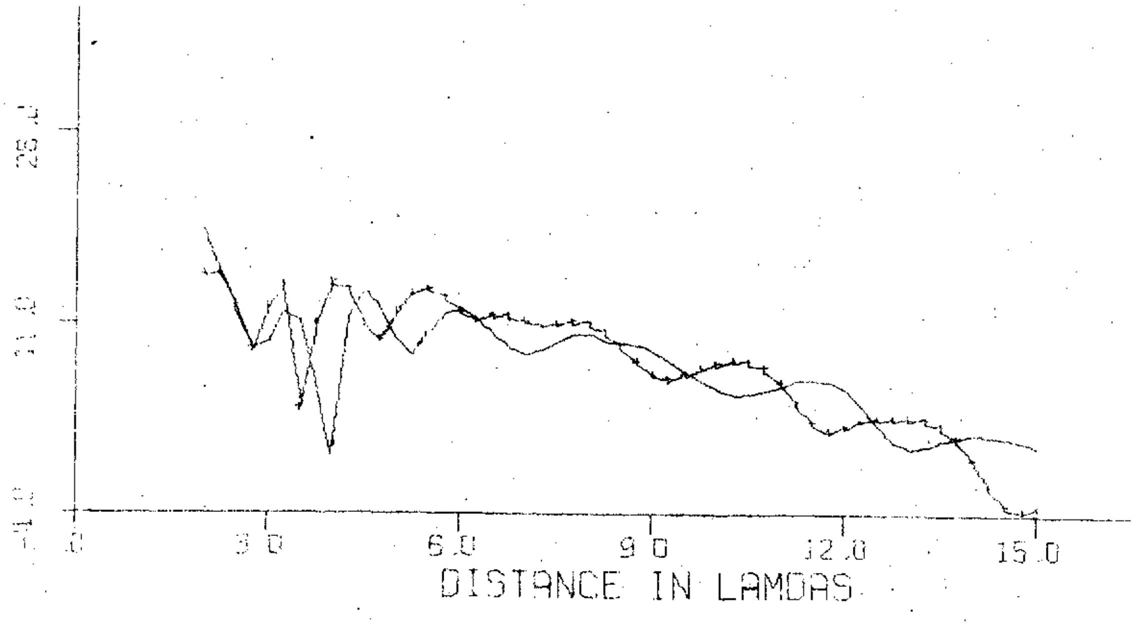


H_y (VMO)

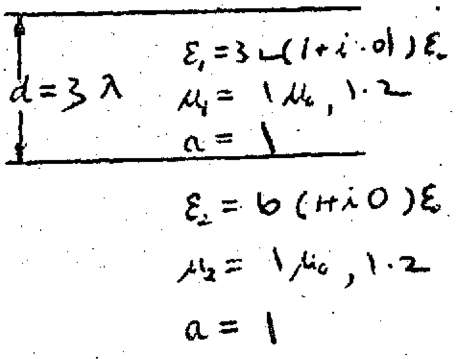


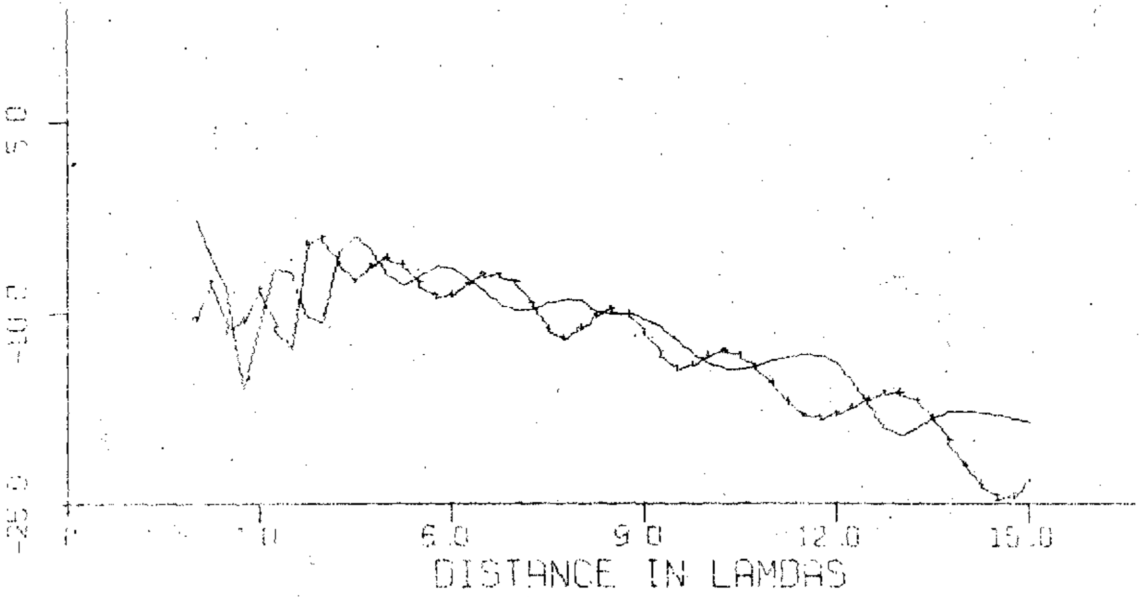
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$

$\varepsilon_2 = 60(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$

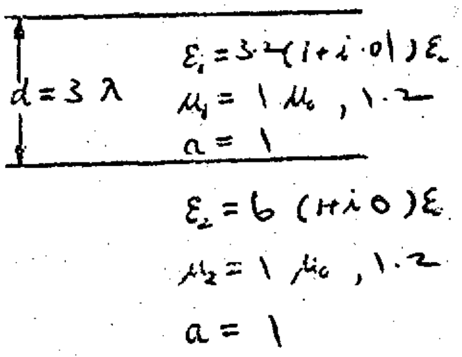


E_φ (VMD)


$d = 3\lambda$
$\varepsilon_1 = 3(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\mu_0, 1.2$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\mu_0, 1.2$
$a = 1$

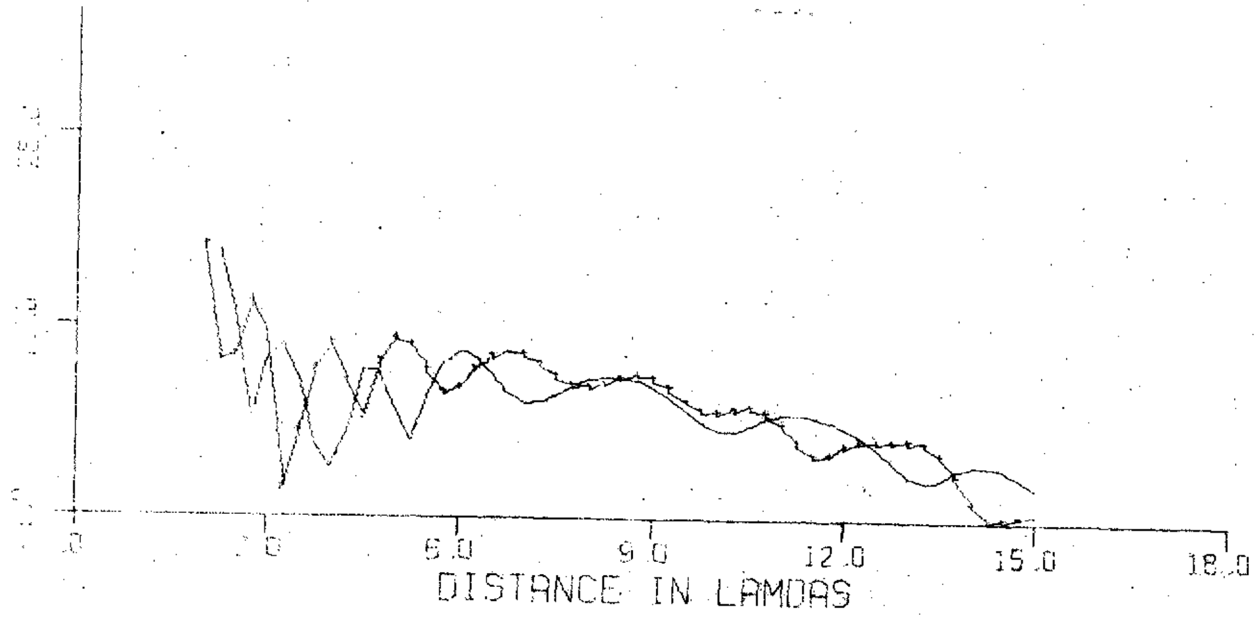

5.0
-10.0
-25.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Hg (VMD)

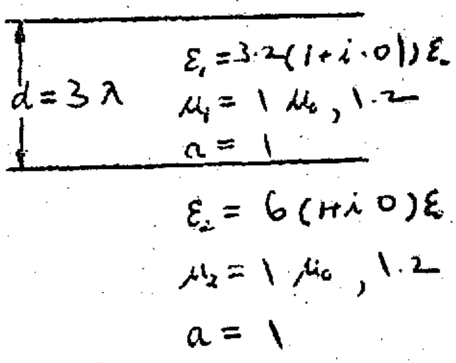


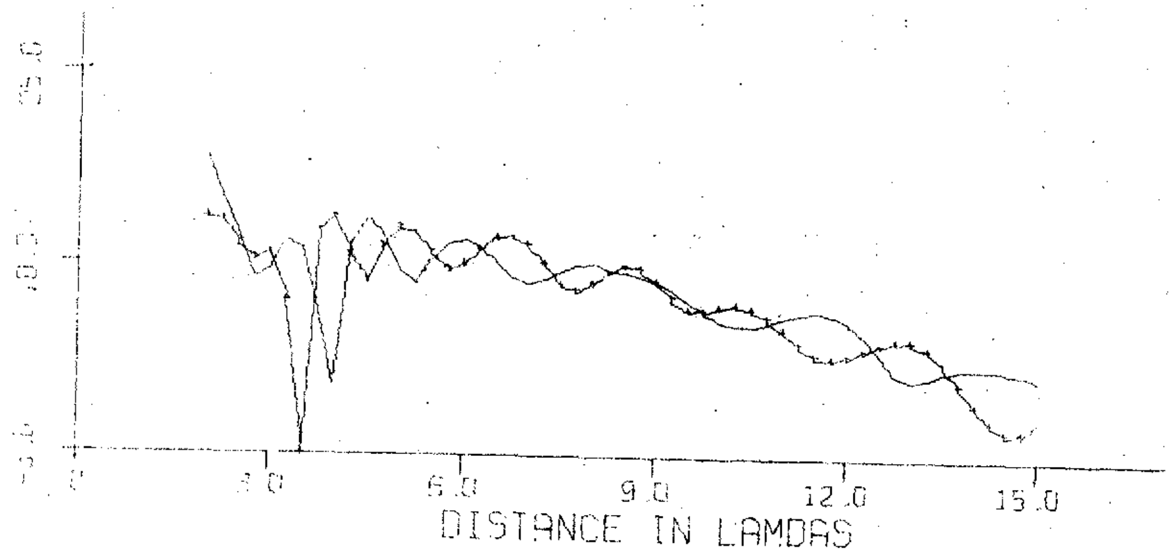
$\varepsilon_1 = 3.4(1 + i\,.01)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$, 1.2
$a = 1$

$\varepsilon_2 = 6\,(1 + i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$, 1.2
$a = 1$

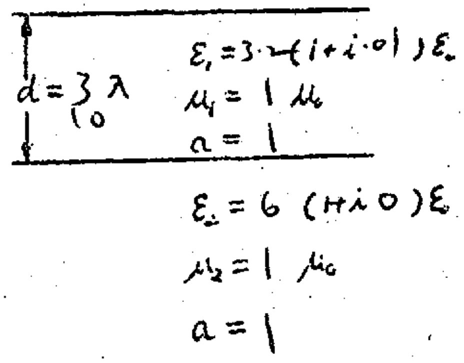


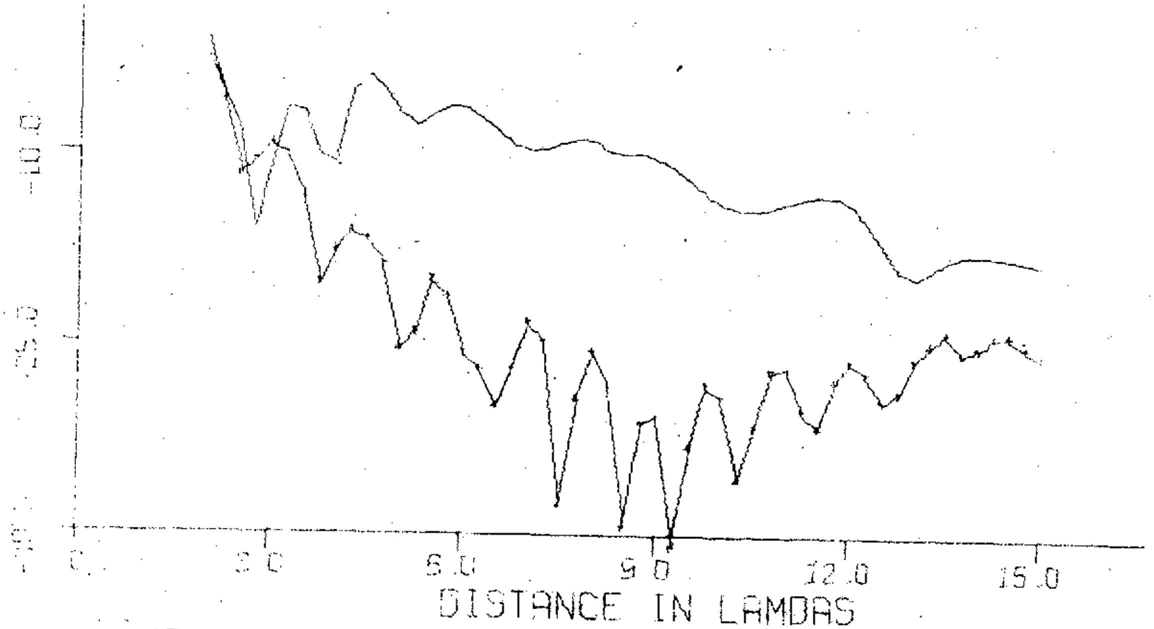
H_z (VMD)


d = 3λ
ε₁ = 3.2(1+i·0)ε₀
μ₁ = 1 μ₀ , 1.2
a = 1
ε₂ = 6(1+i 0)ε
μ₂ = 1 μ₀ , 1.2
a = 1

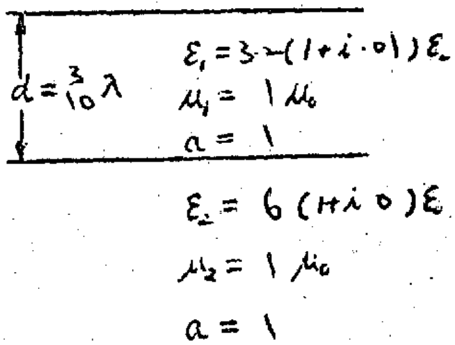

0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

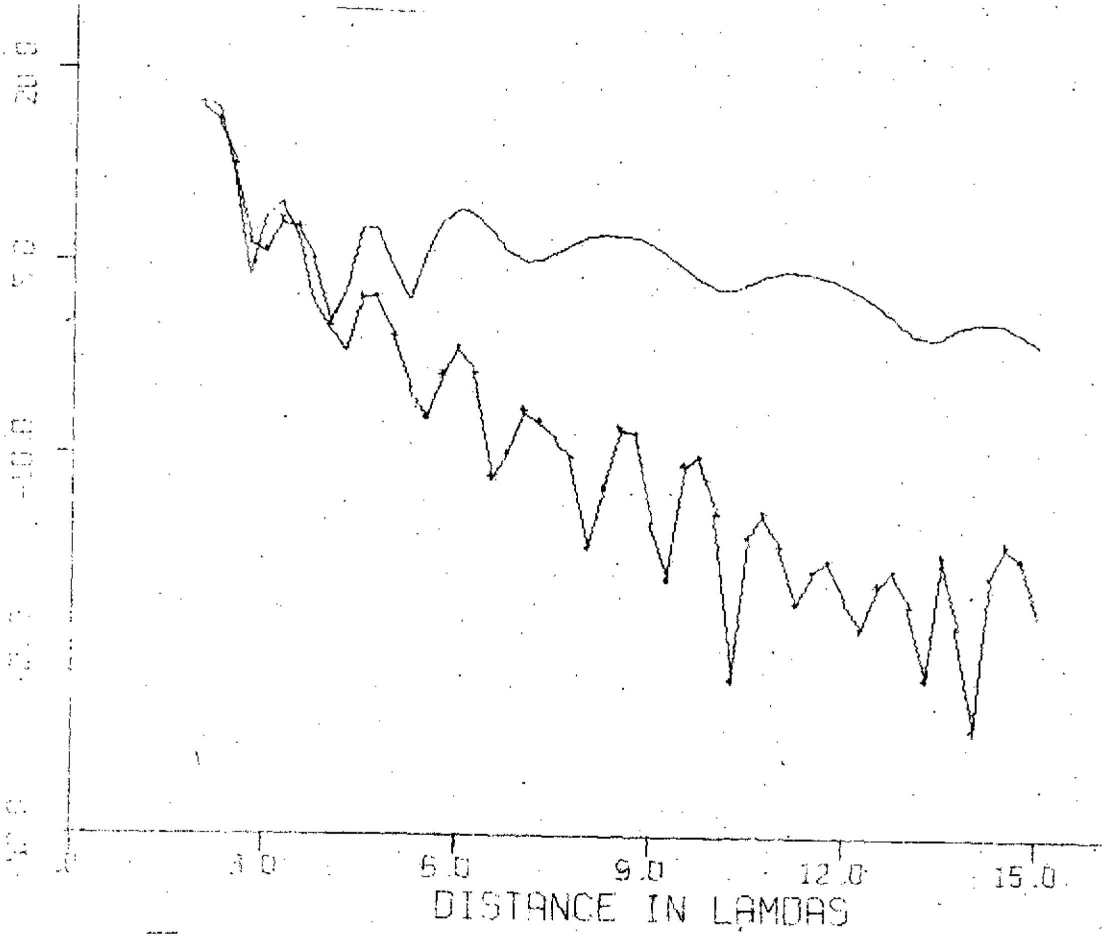
E_φ (VMD)


d = 3/10 λ
ε₁ = 3·2(1+i·0)ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 6 (1+i0)ε₀
μ₂ = 1 μ₀
a = 1

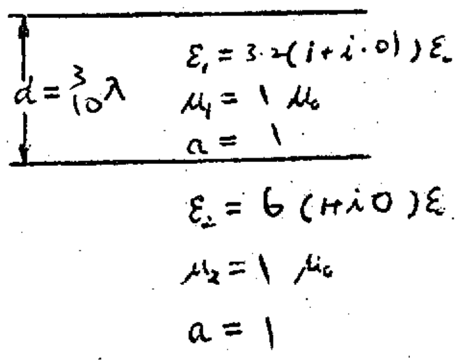

-10.0
-25.0
-40.0
0.
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

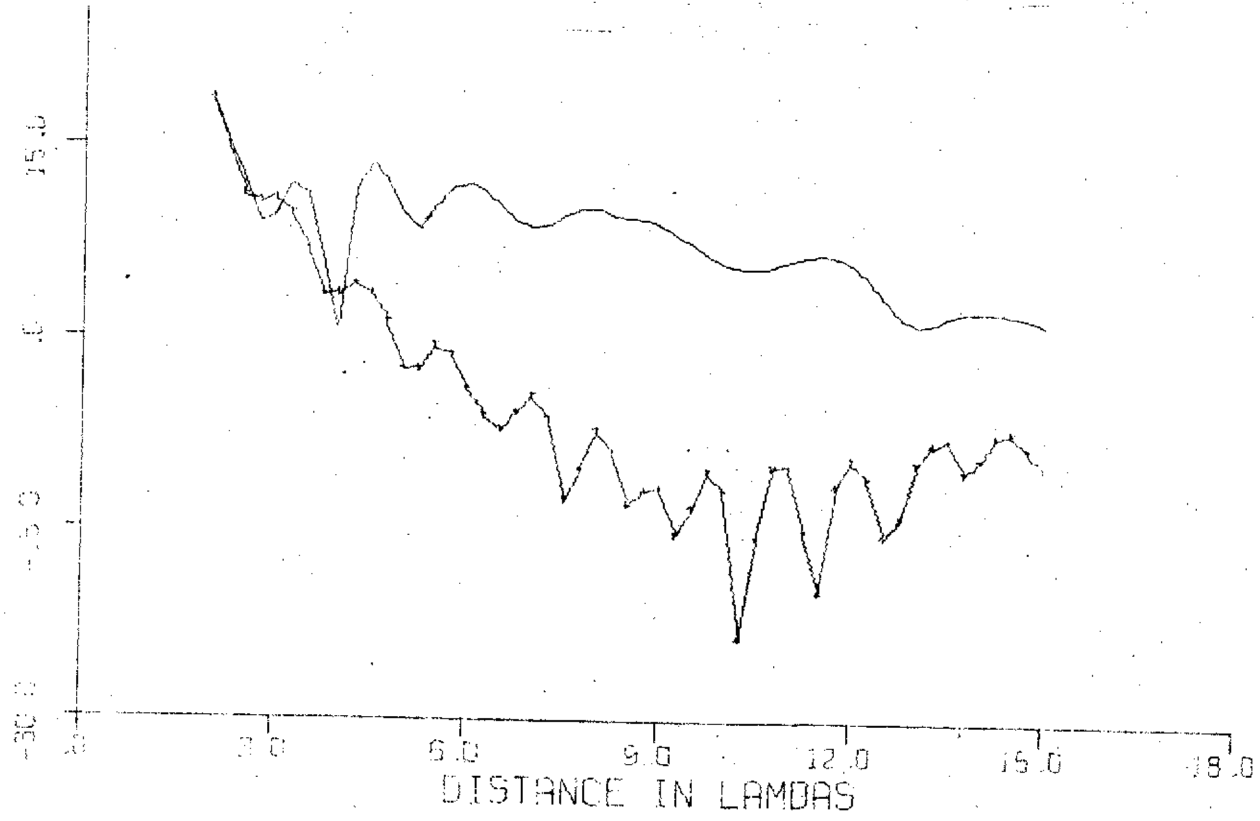
Hg(VMD)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 3\cdot(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$

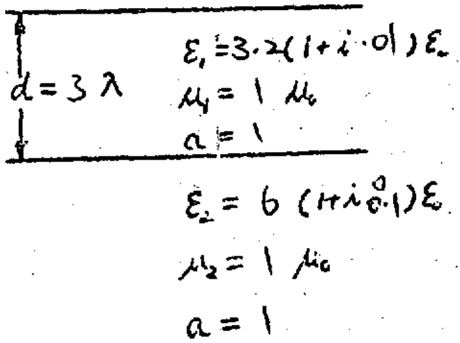

20.0
5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

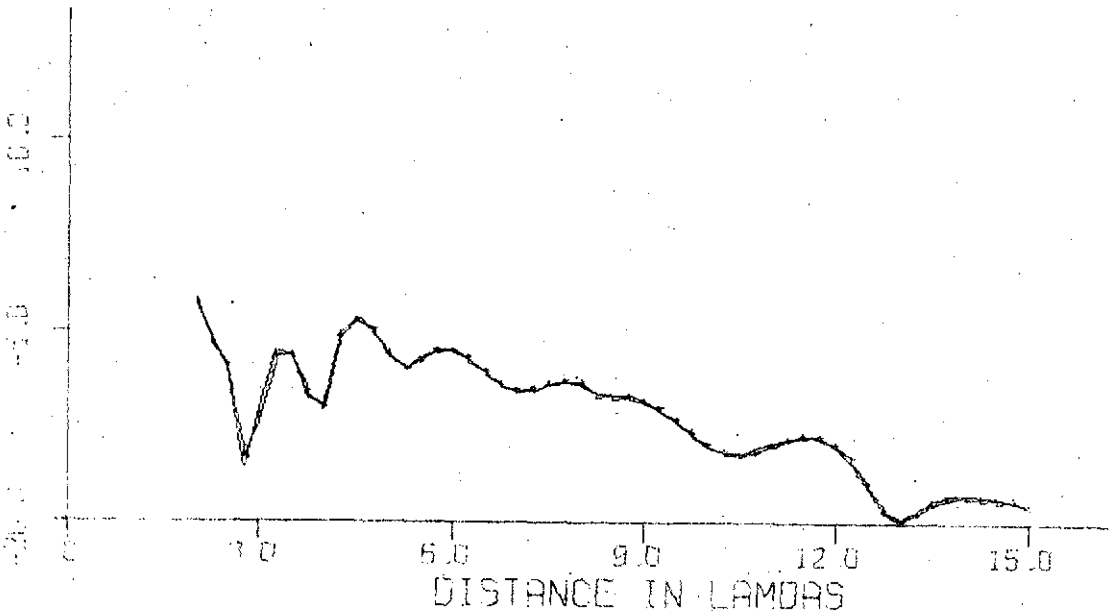
H_z (VMD)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

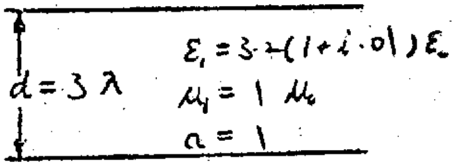

15.0
.0
-15.0
-30.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

Eφ (VMD)


d = 3 λ
ε₁ = 3.2(1+i·01)ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 6 (1+i 0.1)ε₀
μ₂ = 1 μ₀
a = 1


10.0
-10.0
-30.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_g (VMD)



$\varepsilon_1 = 3\cdot2(1+i\cdot01)\varepsilon_0$

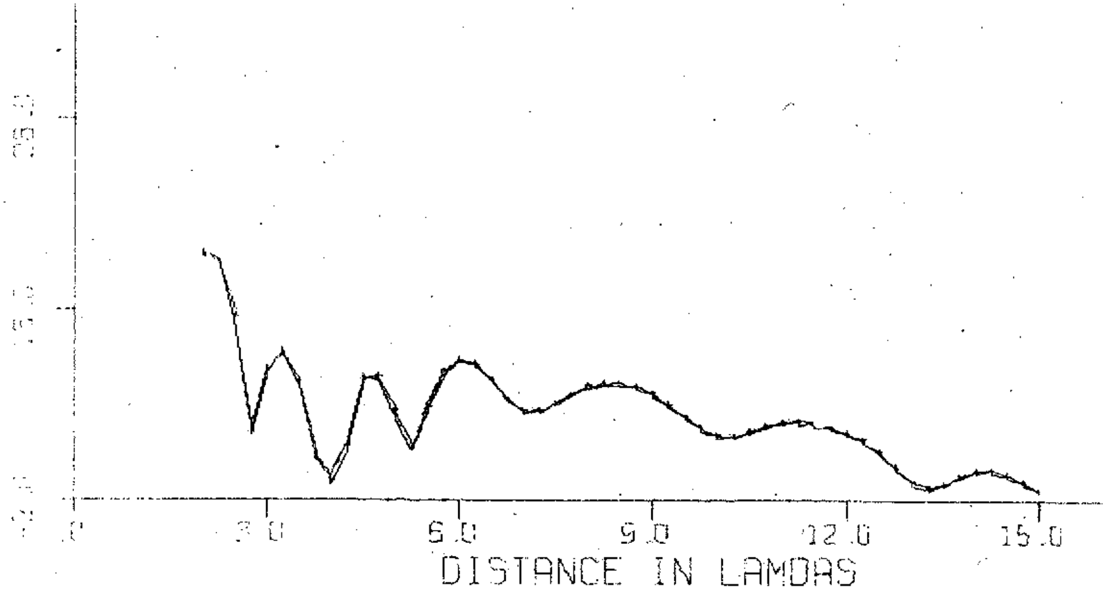
$\mu_1 = 1\ \mu_0$

$a = 1$

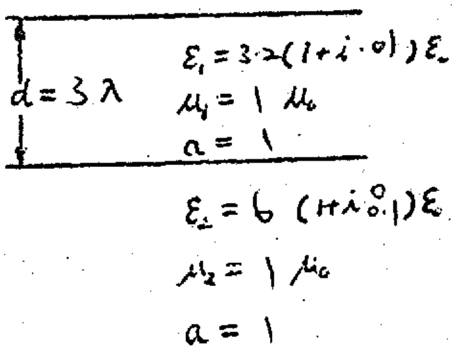
$\varepsilon_2 = 6\ (1+i^{0}_{0.1})\varepsilon_0$

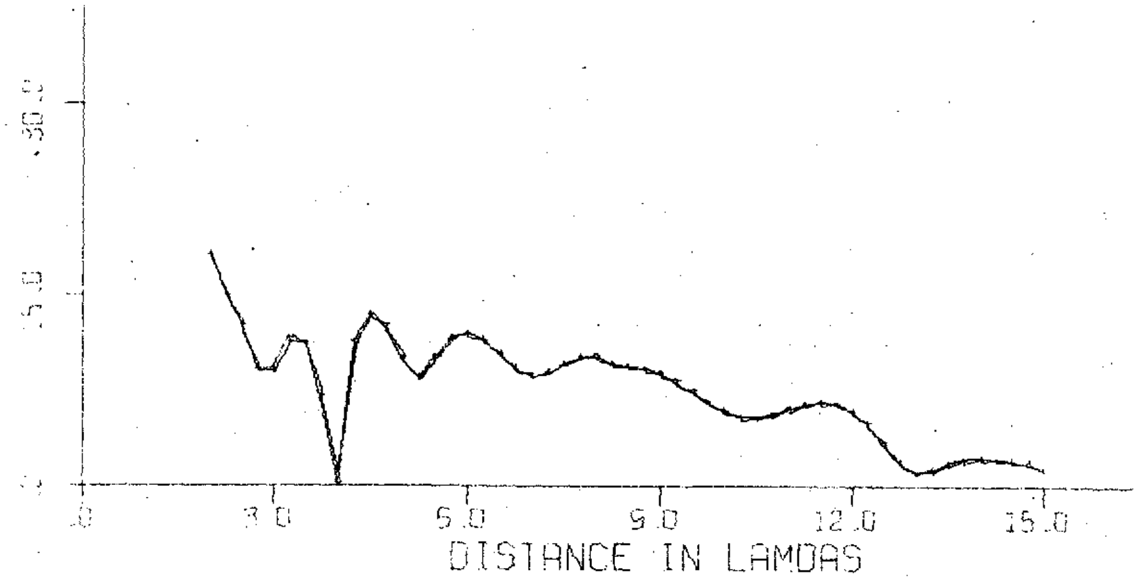
$\mu_2 = 1\ \mu_0$

$a = 1$

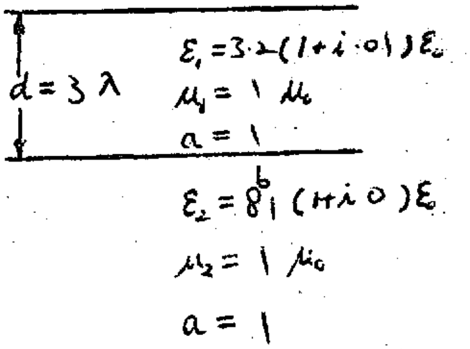


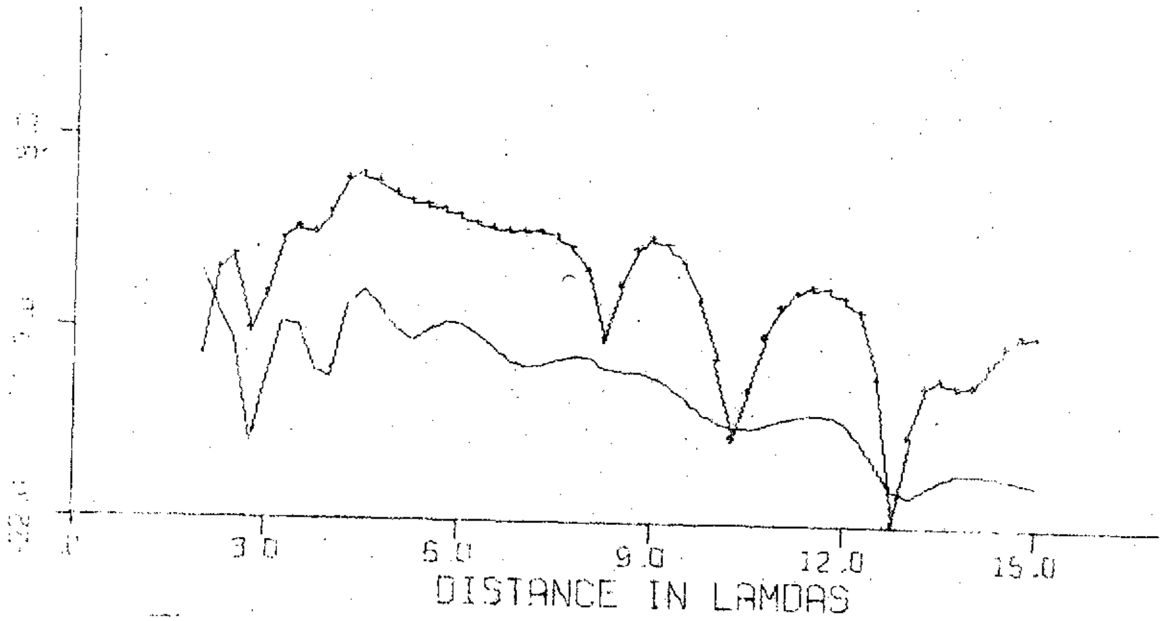
H_z (VMD)


d = 3λ
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
a = 1
$\varepsilon_2 = 6\,(1+i\,0.1)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
a = 1

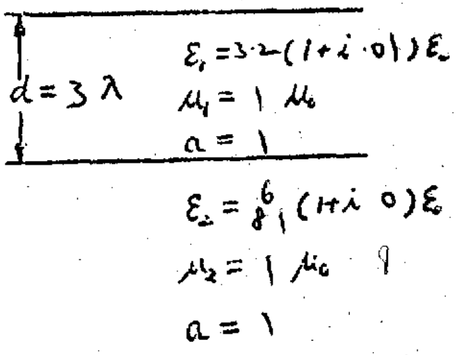

.30.0
15.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

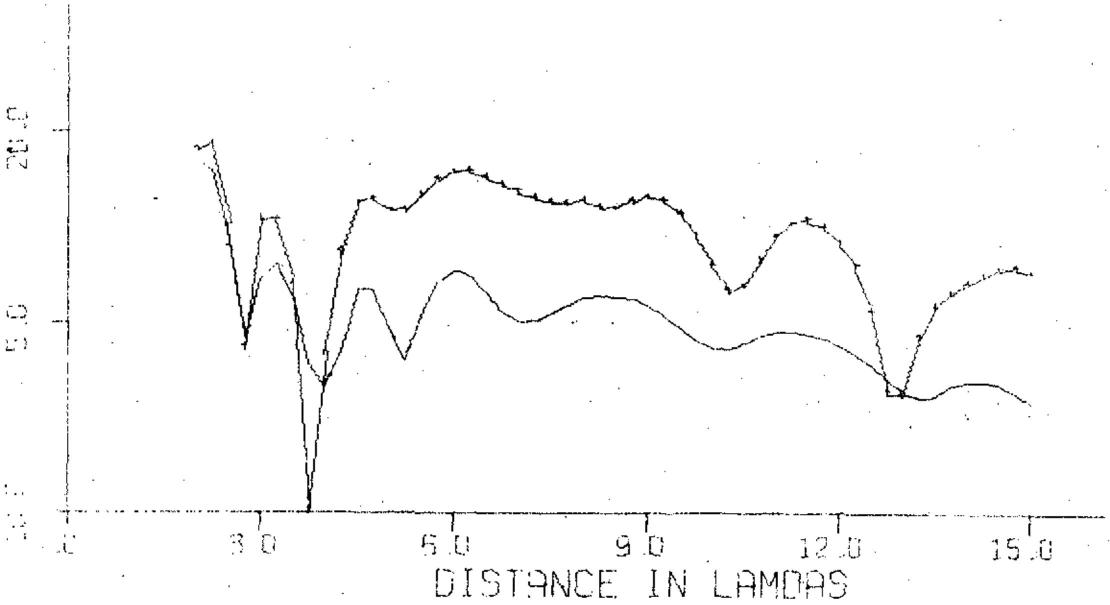
Eφ (VMD)


d = 3 λ
ε₁ = 3.2 (1 + i .01) ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 81 (1 + i 0) ε₀
b
μ₂ = 1 μ₀
a = 1

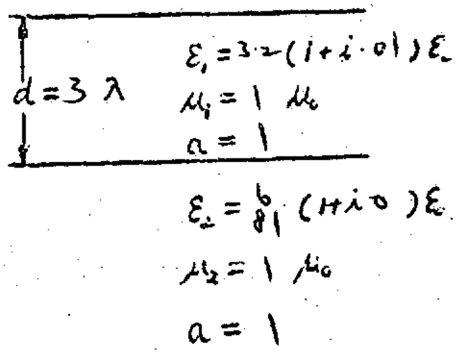

0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)

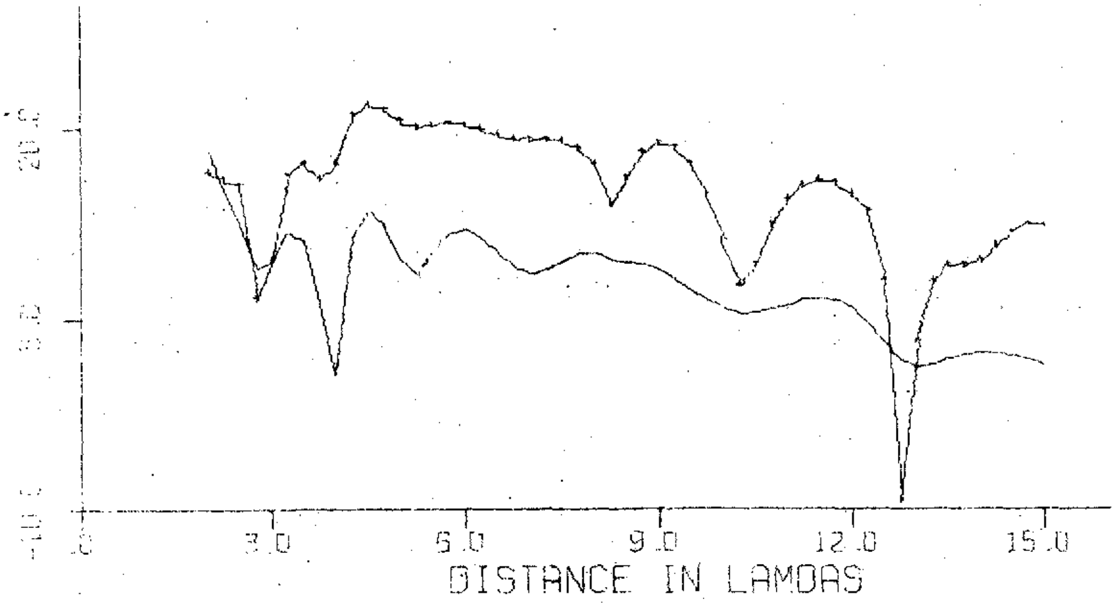

$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{81}(1+i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$ 9
$a = 1$


20.0
5.0
.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)

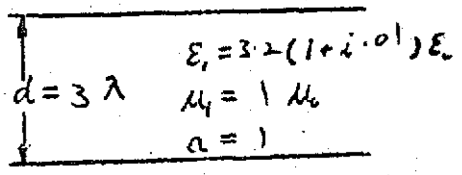


d = 3 λ
ε₁ = 3.2 (1 + i·01) ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 6/81 (1 + i 0) ε₀
μ₂ = 1 μ₀
a = 1



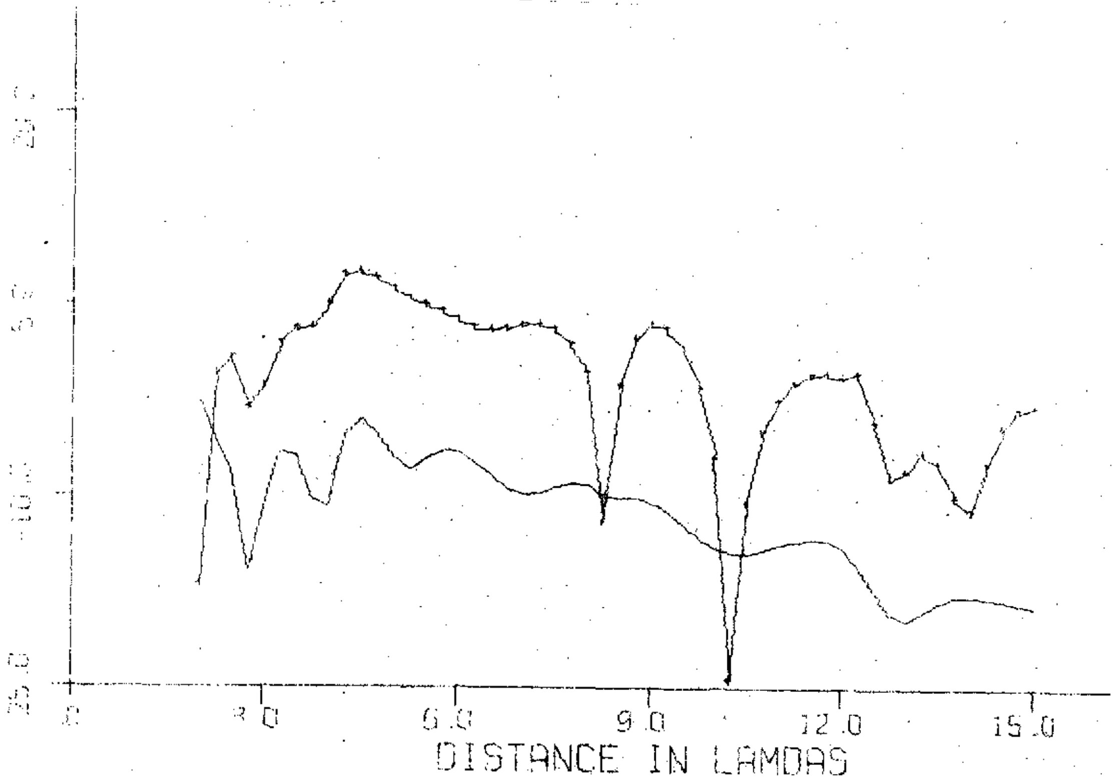
20.0
0.0
-10.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)

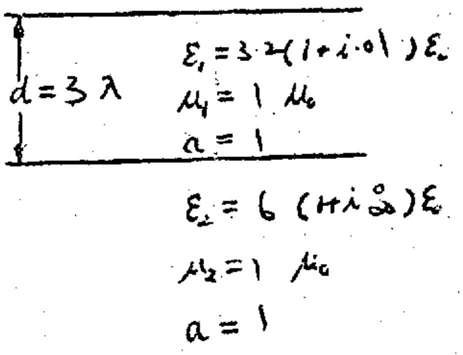


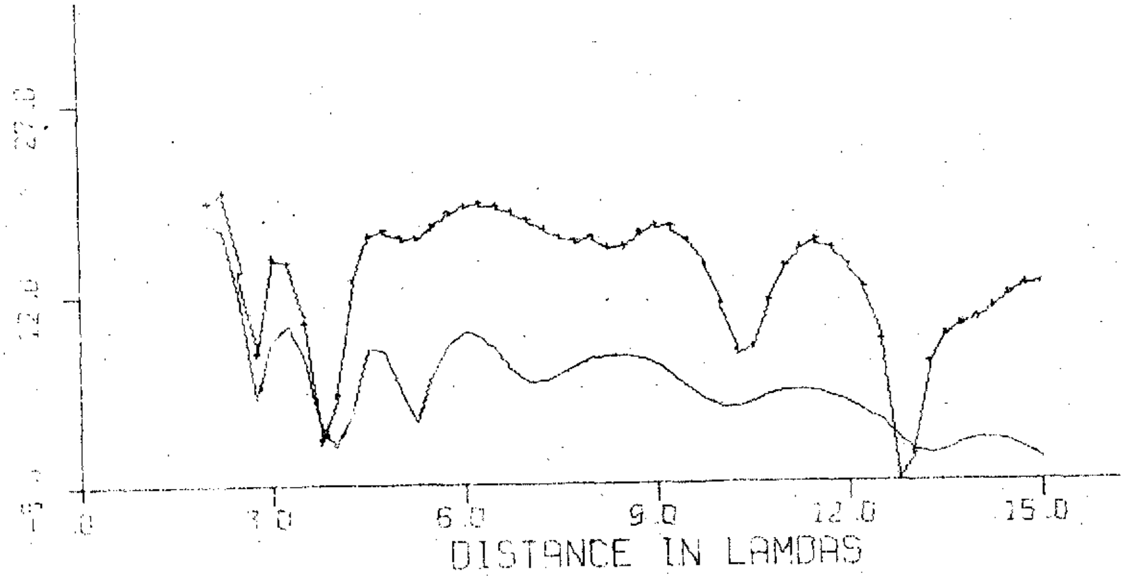
$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

$\varepsilon_2 = 6\,(1+i\,.0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

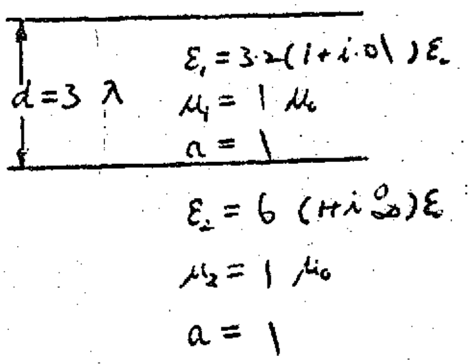


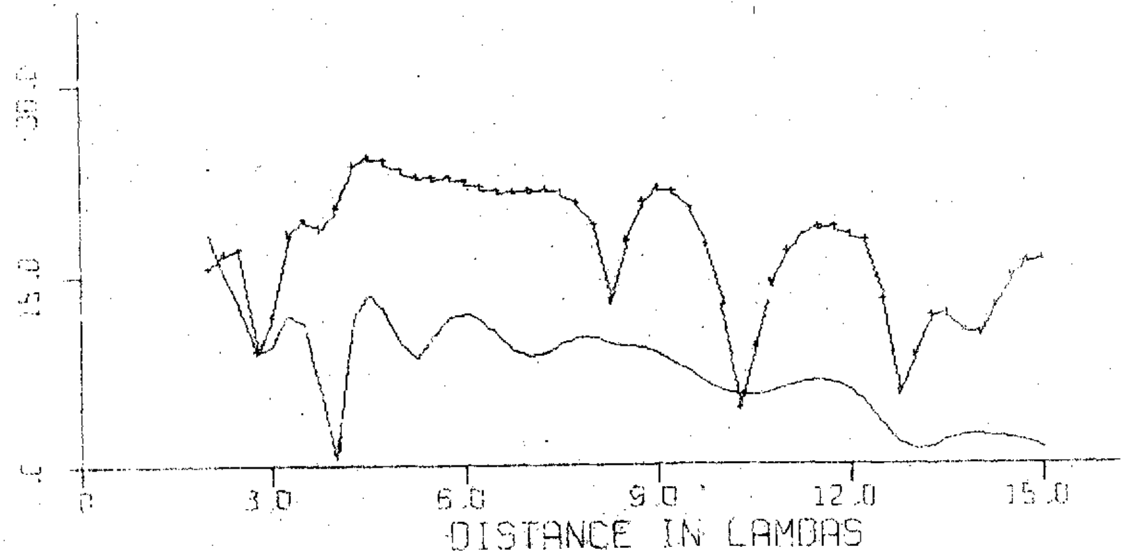
H_z (VMD)


d = 3 λ
ε1 = 3.2(1+i.01)ε0
μ1 = 1 μ0
a = 1
ε2 = 6 (1+i [illegible])ε0
μ2 = 1 μ0
a = 1

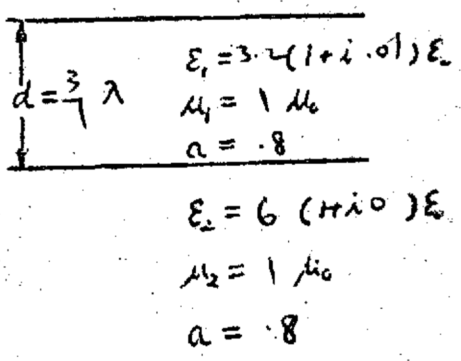

27.0
12.0
-3.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

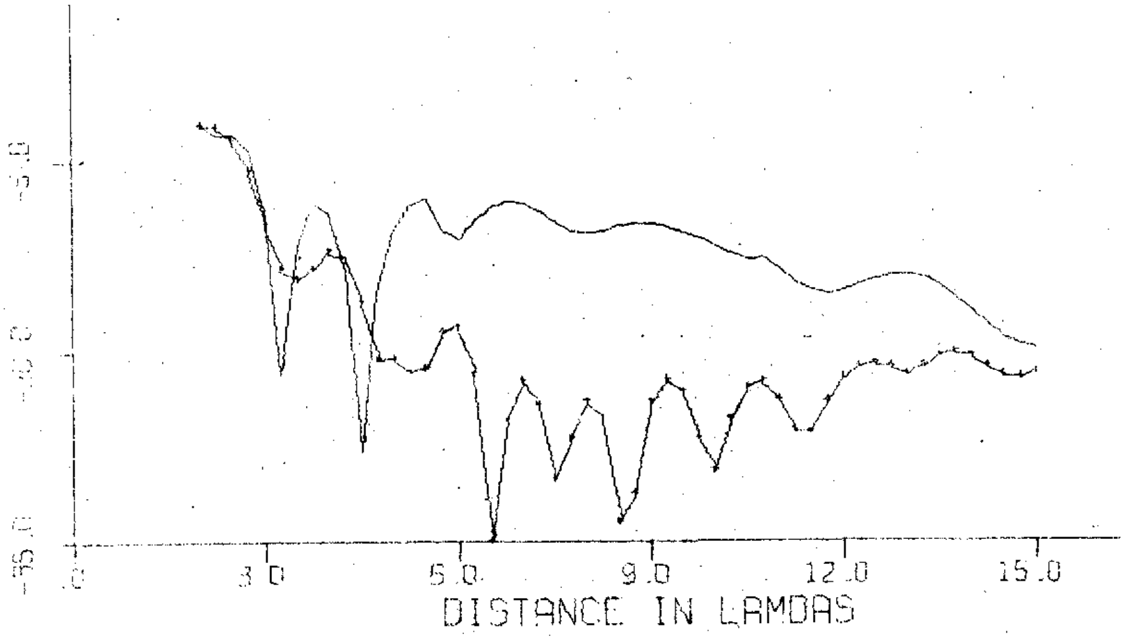
H_z (VMD)


$d = 3\ \lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\,\frac{0}{20})\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

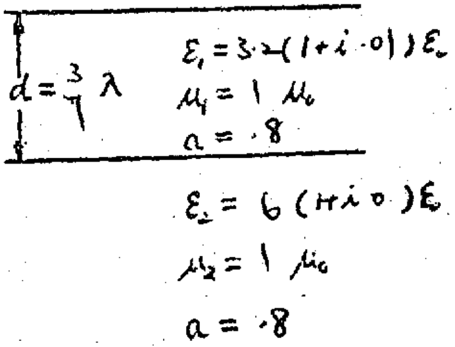

30.0
15.0
0.
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

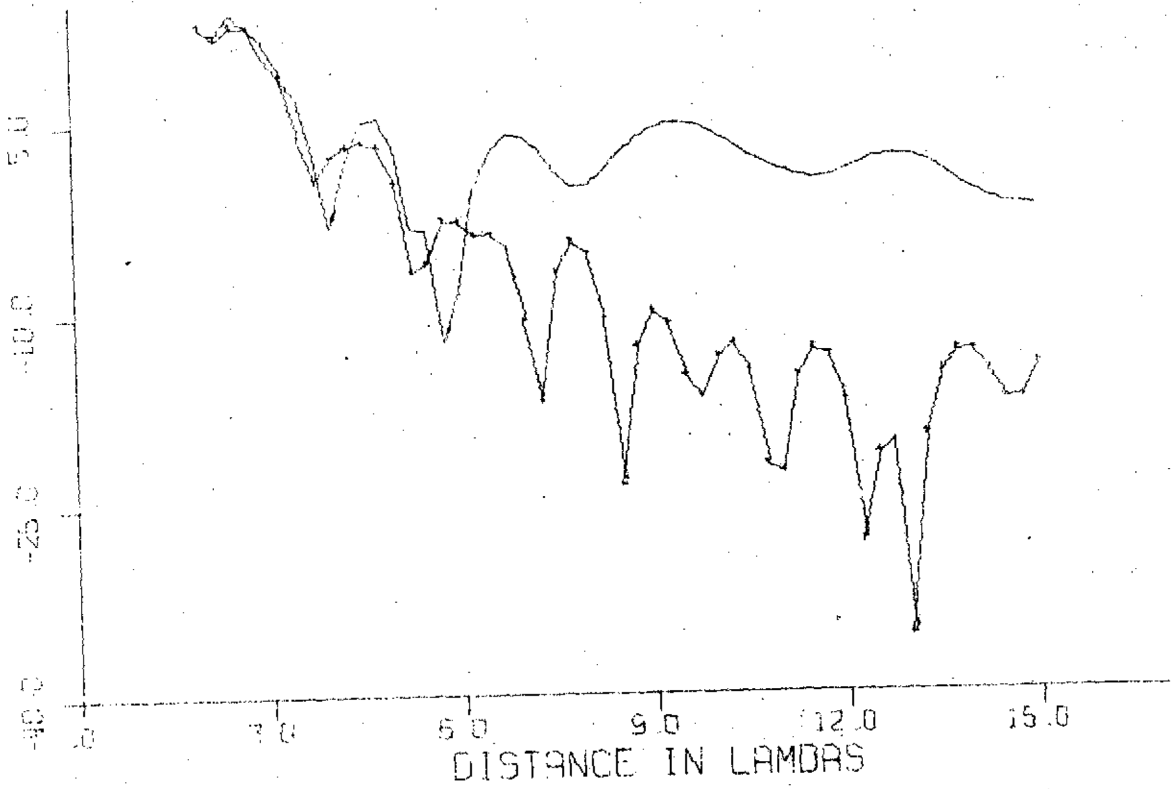
E_φ (VMD)


$d=\frac{3}{7}\lambda$
$\varepsilon_1=3.4(1+i\,.01)\varepsilon_0$
$\mu_1=1\,\mu_0$
$a=.8$
$\varepsilon_2=6\,(1+i\,0)\varepsilon_0$
$\mu_2=1\,\mu_0$
$a=.8$

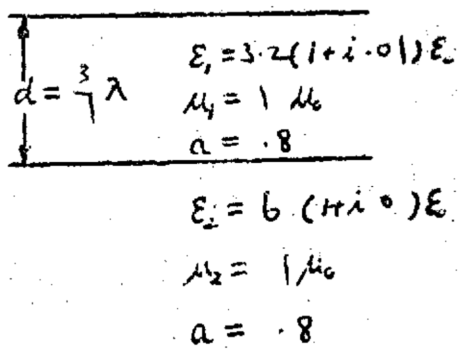

-5.0
-20.0
-35.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

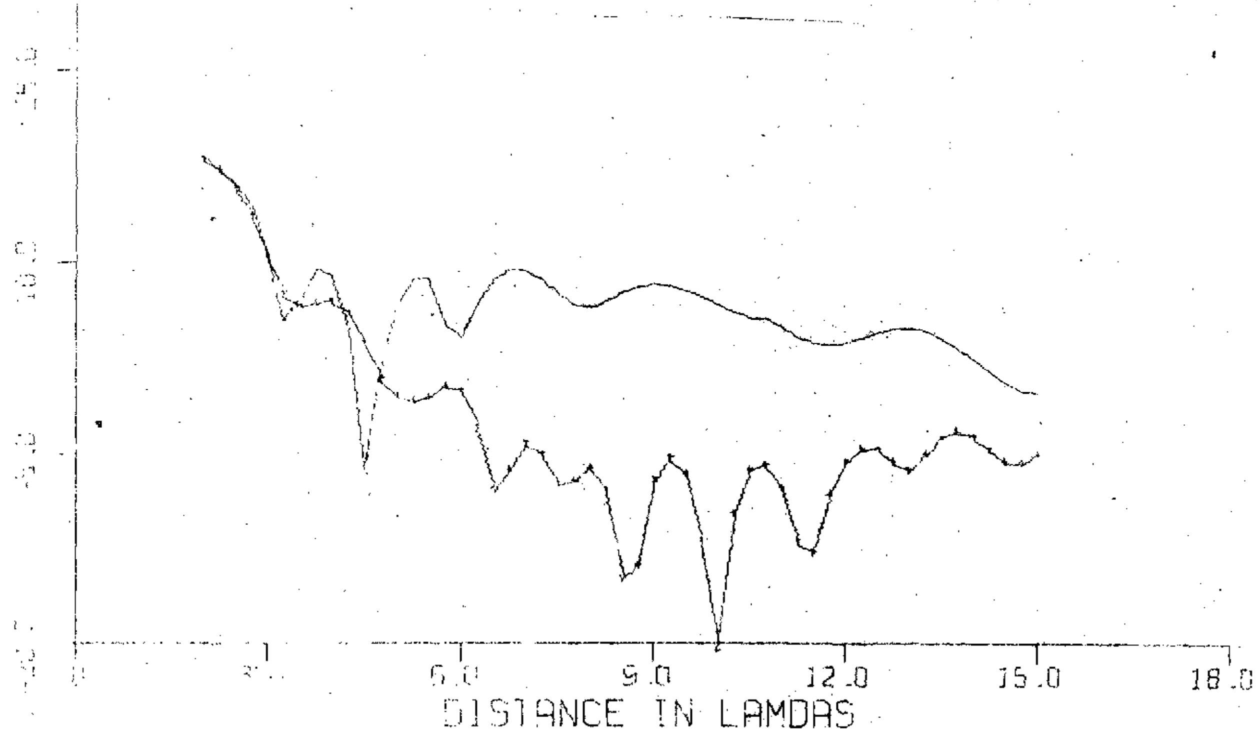
H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 6\,(1+i\,0\,)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$

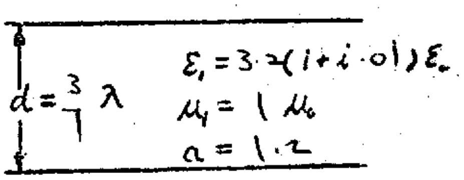

5.0
-10.0
-20.0
-30.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$


-10.0
0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

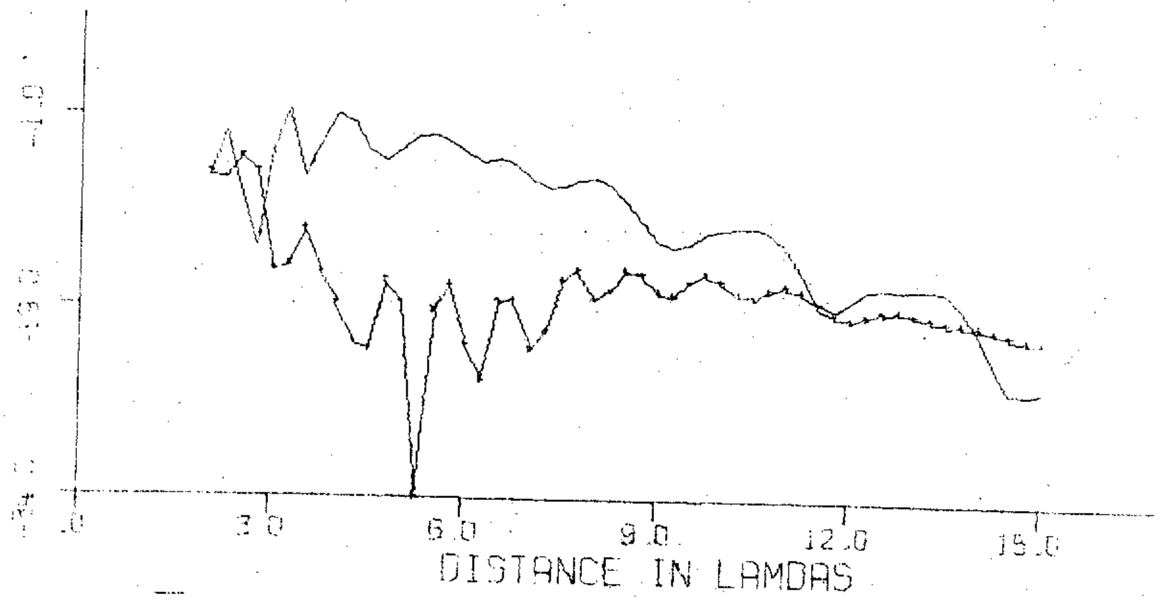
E_φ (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$

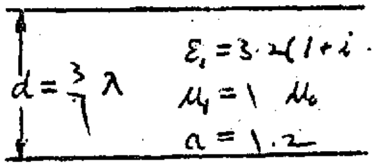
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$

$\mu_2 = 1\,\mu_0$

$a = 1.2$



H_ϱ (VMD)


$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.2(1 + i\ .0))\varepsilon_0$

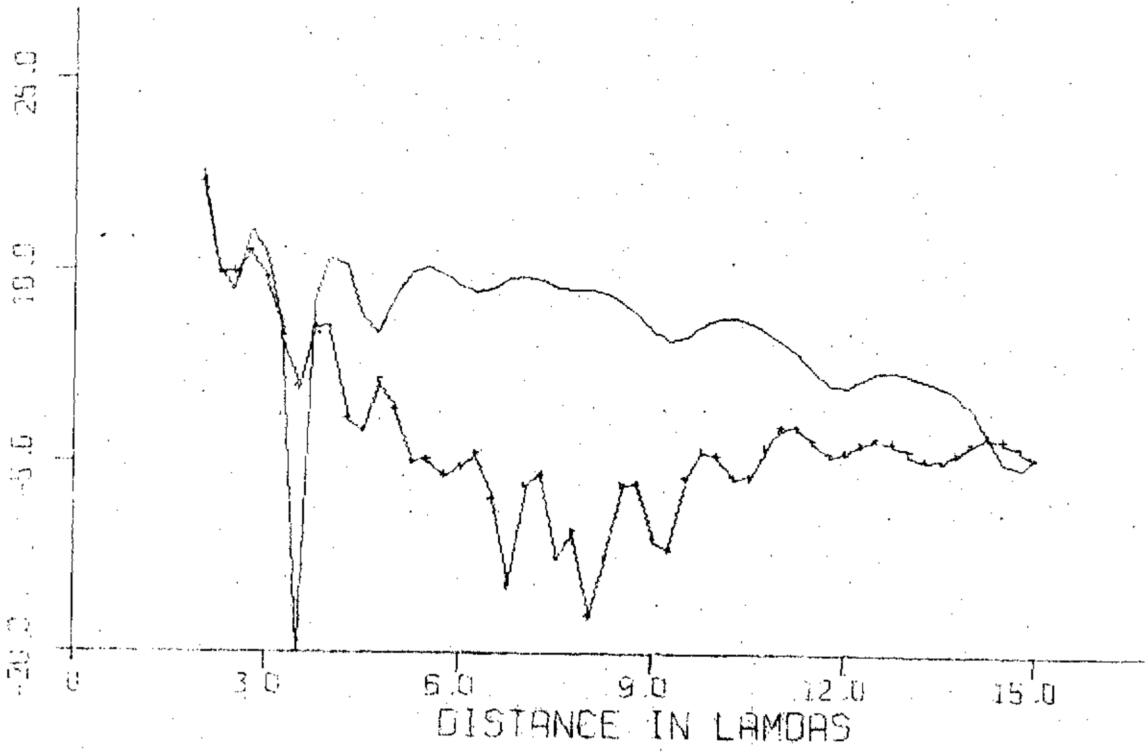
$\mu_1 = 1\ \mu_0$

$a = 1.2$

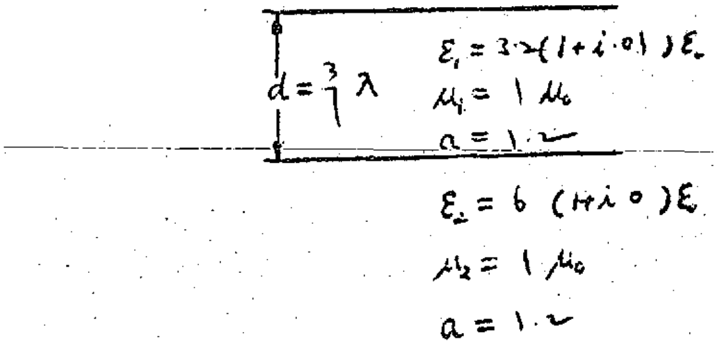
$\varepsilon_2 = 6\ (1 + i\ 0)\varepsilon$

$\mu_2 = 1\ \mu_0$

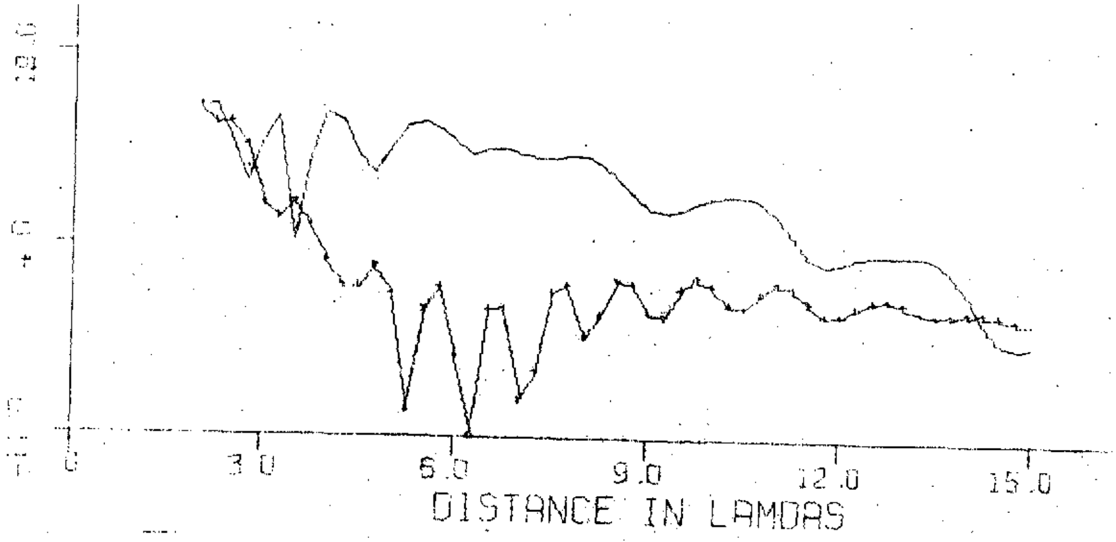
$a = 1.2$



H_z (VMD)

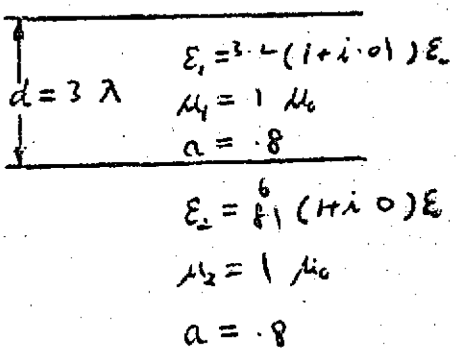


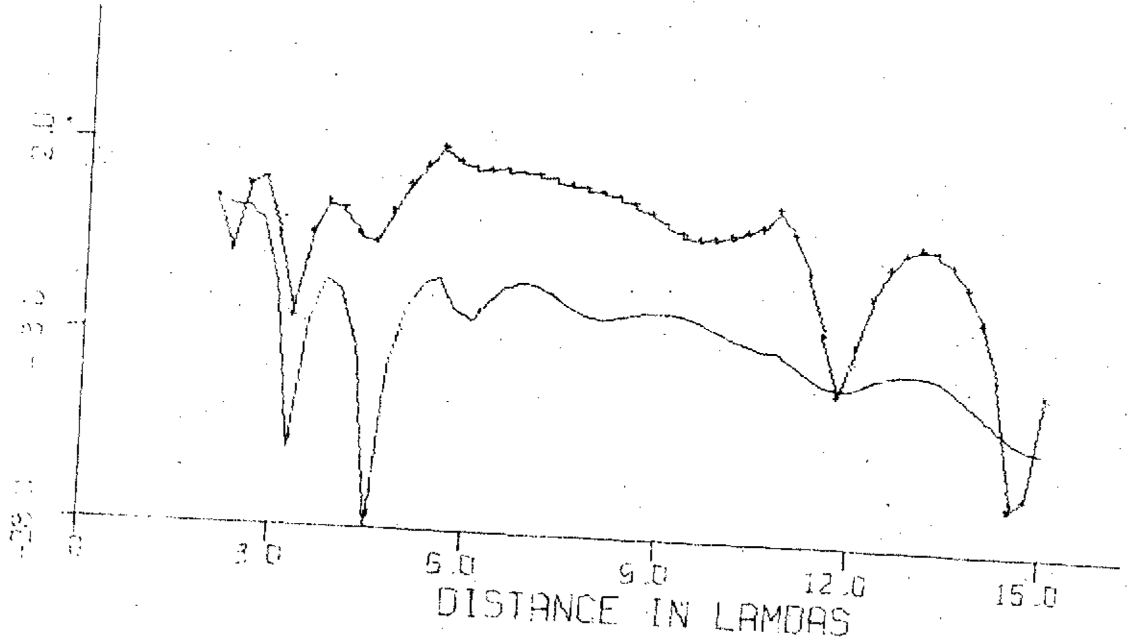
$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$



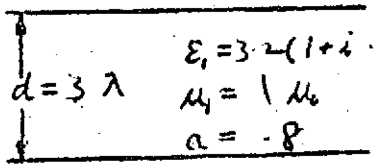
8.0
4.0
0.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Eφ (VMD)


d = 3 λ
ε₁ = 3.2 (1 + i ·01) ε₀
μ₁ = 1 μ₀
a = ·8
ε₂ = 81 (1+ i 0) ε
μ₂ = 1 μ₀
a = ·8


2.0
-18.0
-38.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_S(VMD)



$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$

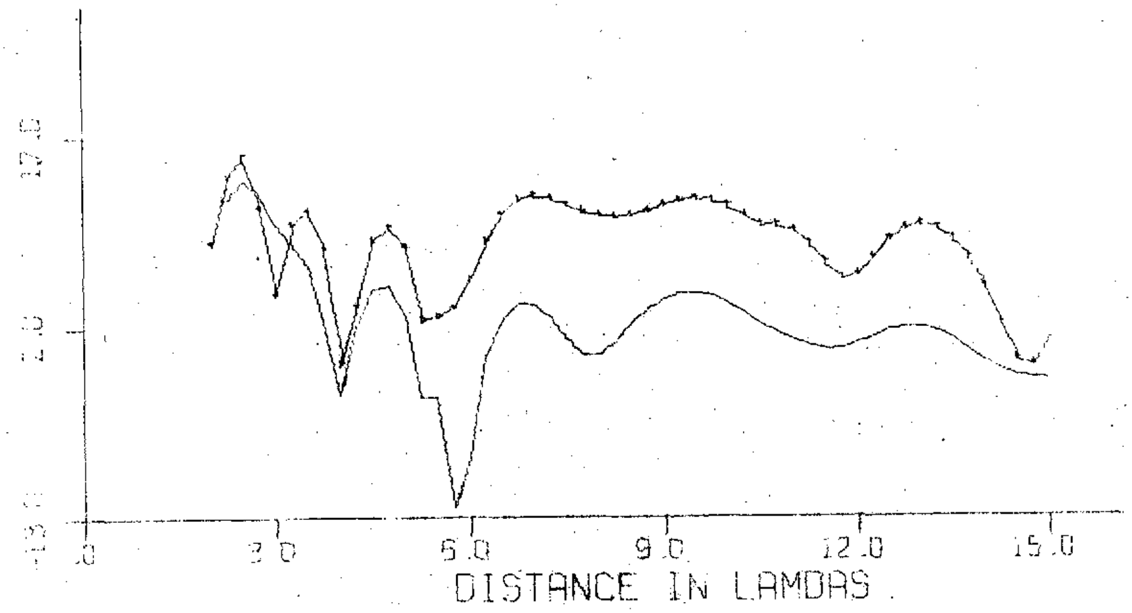
$\mu_1 = 1\ \mu_0$

$a = .8$

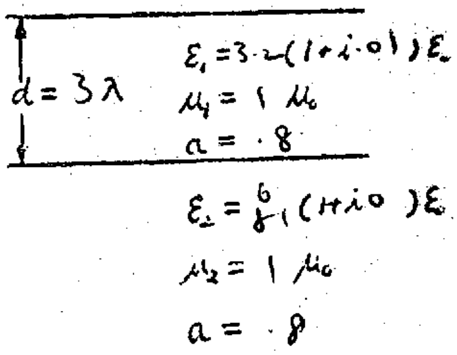
$\varepsilon_2 = \overset{6}{8}.1(1+i0\ )\varepsilon_0$

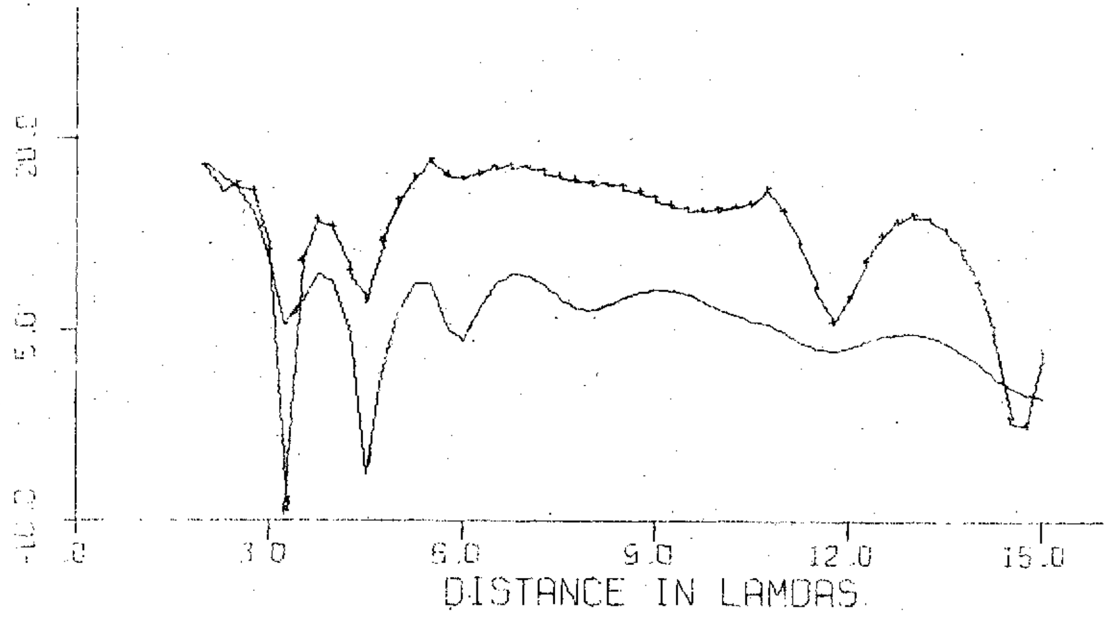
$\mu_2 = 1\ \mu_0$

$a = .8$

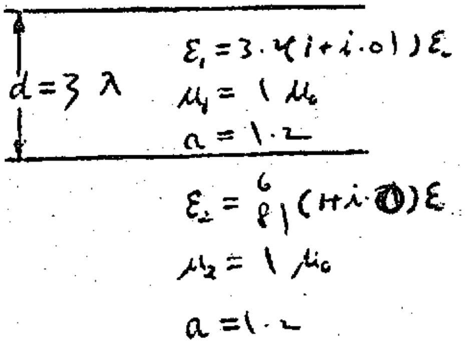


H_z (VMD)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$


20.0
5.0
-10.0
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)



$\varepsilon_1 = 3.4(1+i\cdot 0.1)\varepsilon_0$

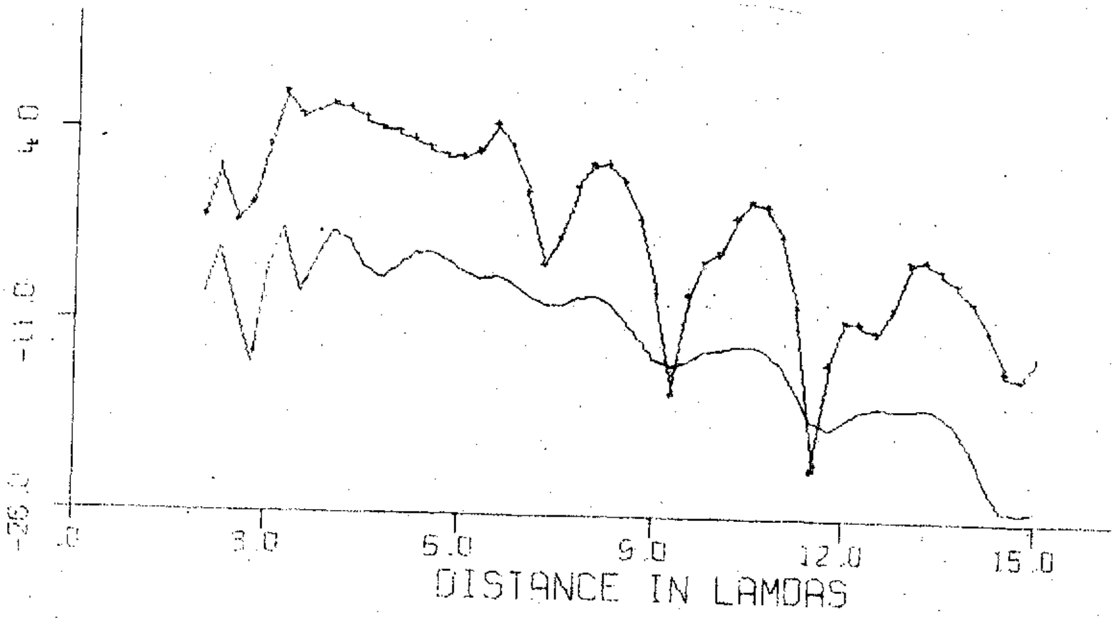
$\mu_1 = 1\,\mu_0$

$a = 1.2$

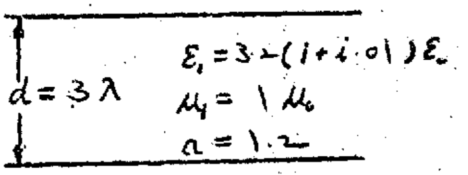
$\varepsilon_2 = \overset{6}{81}(1+i\cdot 0)\varepsilon$

$\mu_2 = 1\,\mu_0$

$a = 1.2$

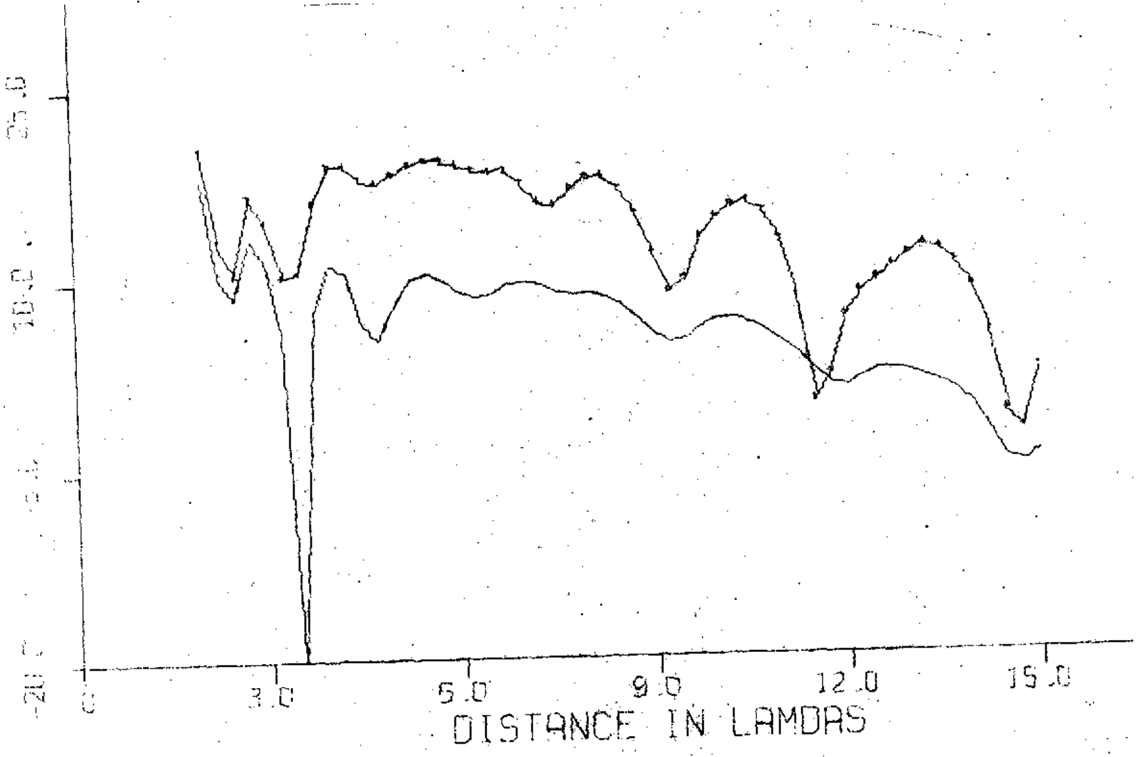


H_ρ (VMD)

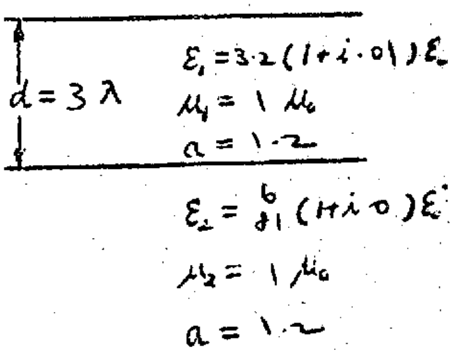


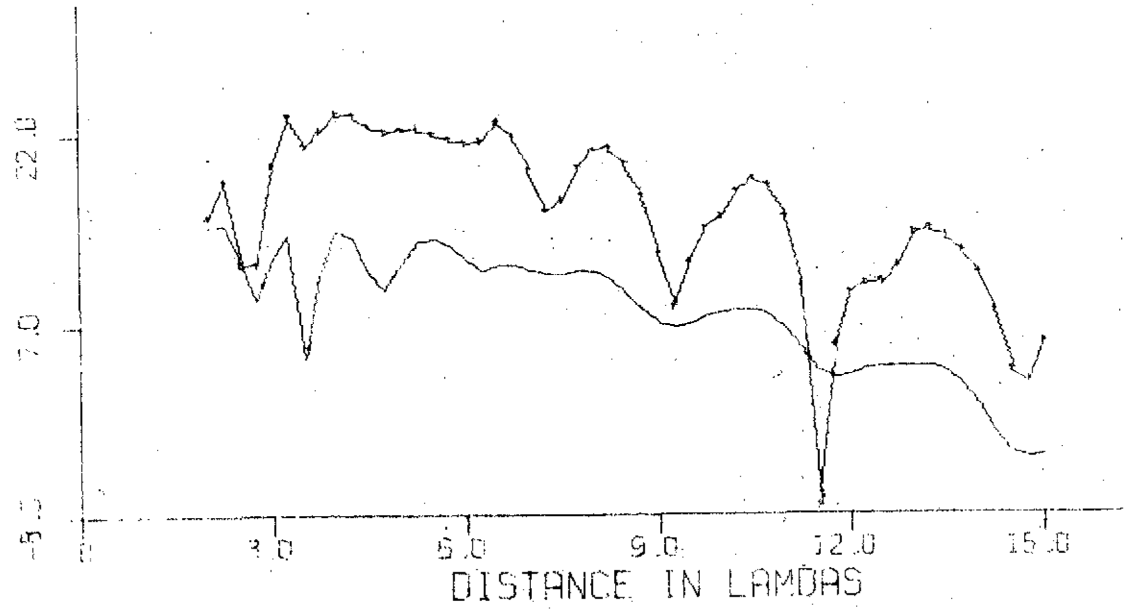
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$

$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1.2$

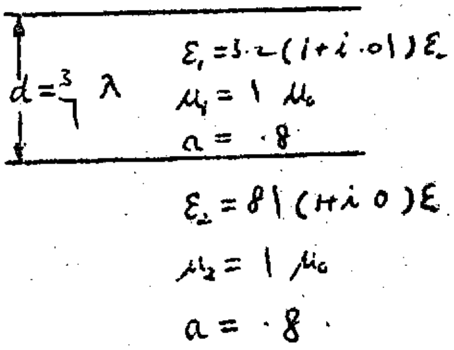


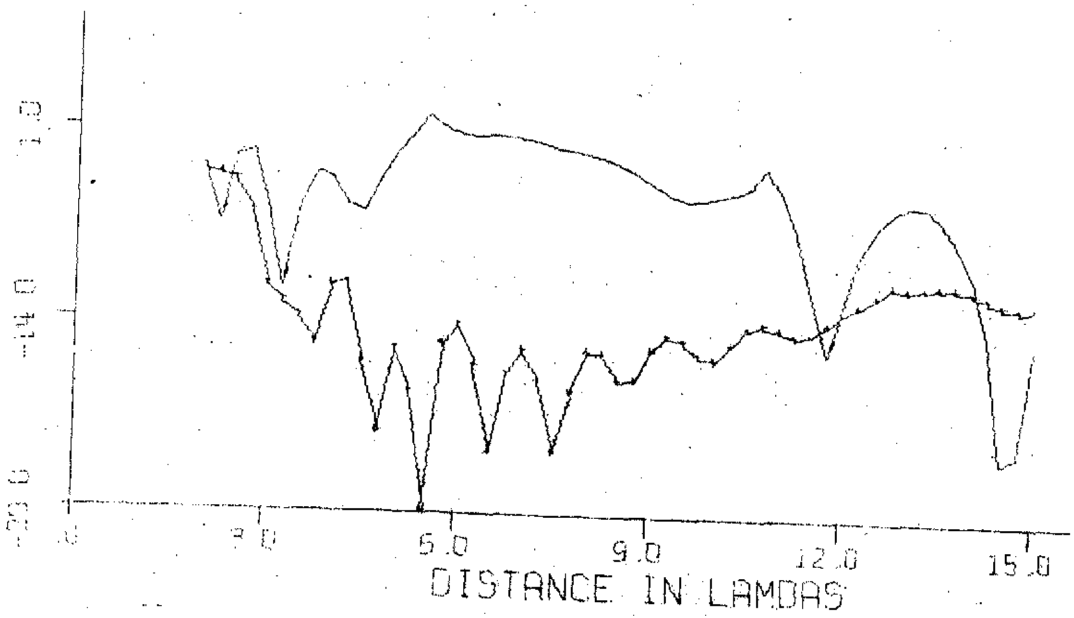
H_z (VMD)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$


22.0
7.0
-8.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = .8$
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = .8$


1.0
-14.0
-29.0
.0
3.0
5.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)

$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$

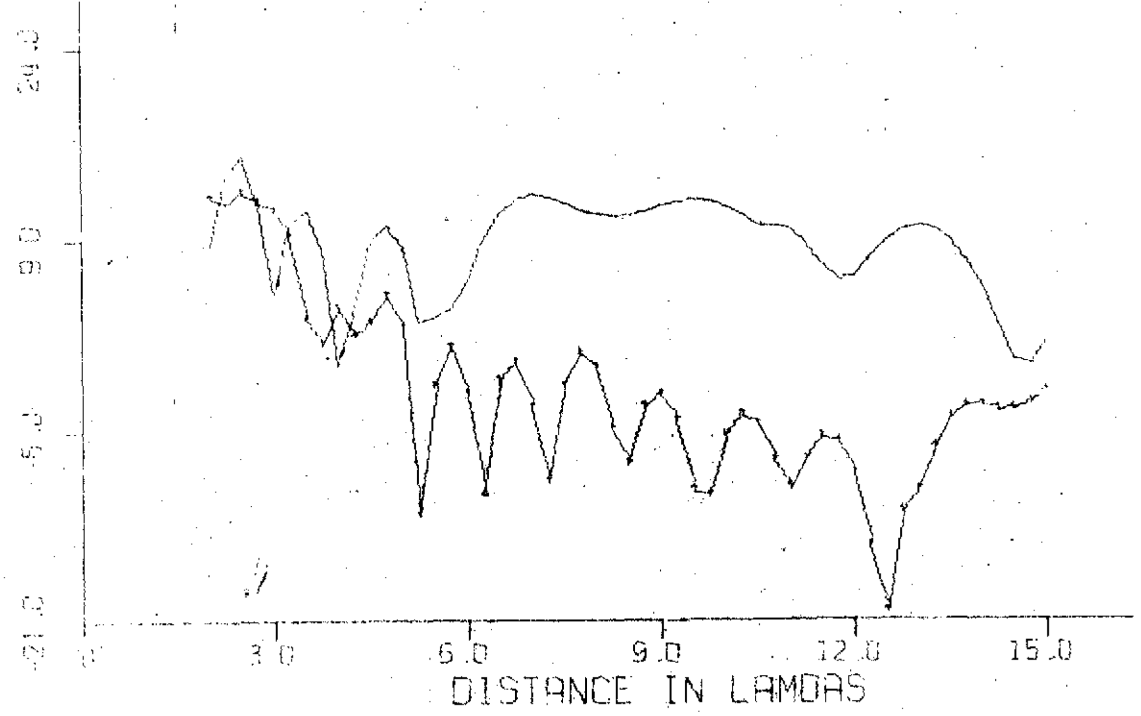
$\mu_1 = 1\ \mu_0$

$a = .8$

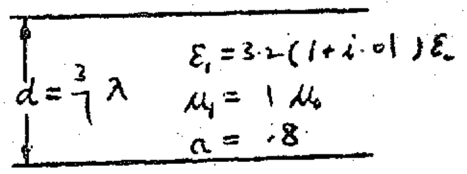
$\varepsilon_2 = 81(1+i\ 0)\varepsilon_0$

$\mu_2 = 1\ \mu_0$

$a = .8$



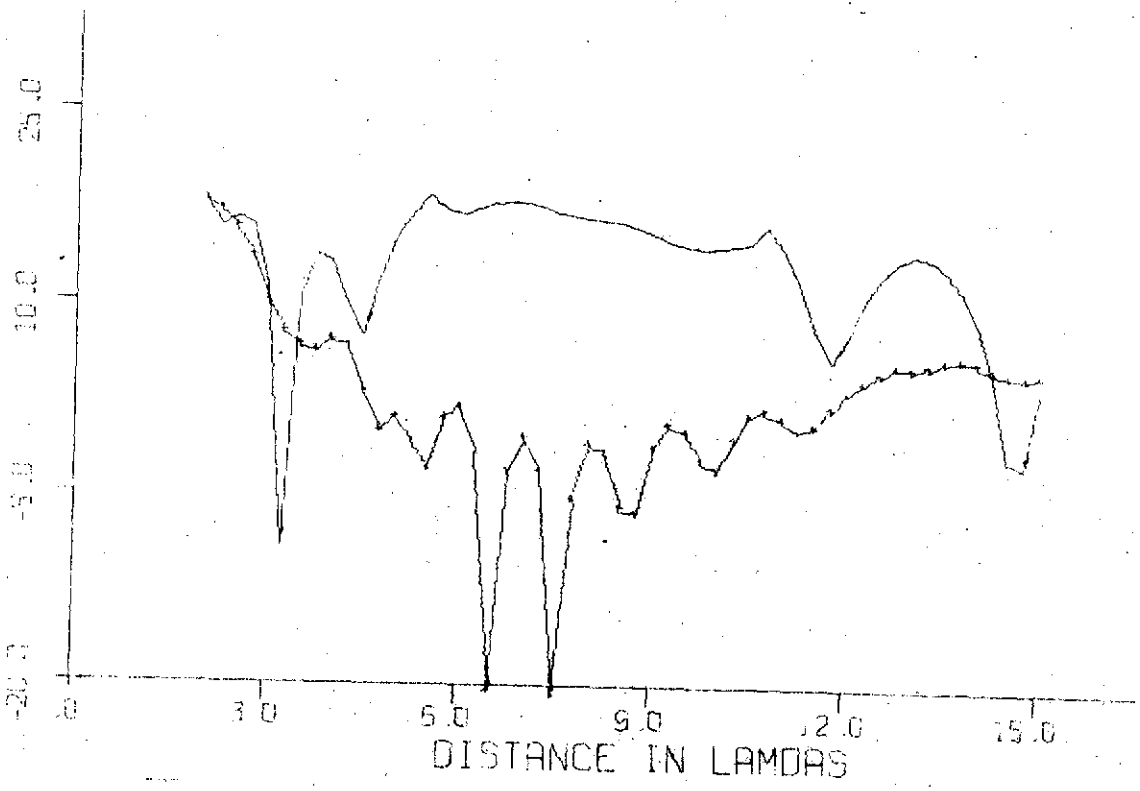
H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$

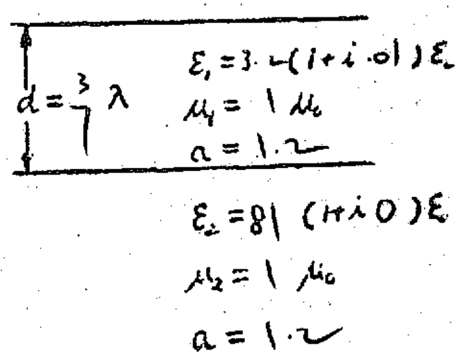
$\varepsilon_2 = 81(1+i\,0)\varepsilon_0$

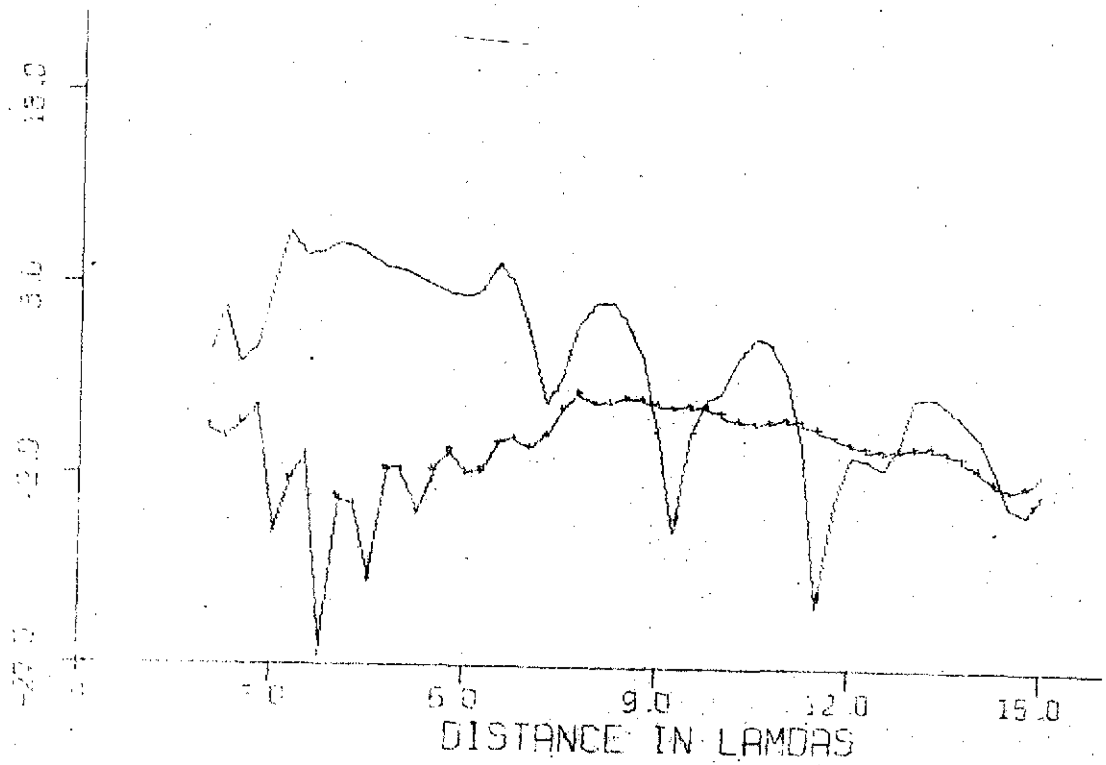
$\mu_2 = 1\,\mu_0$

$a = .8$

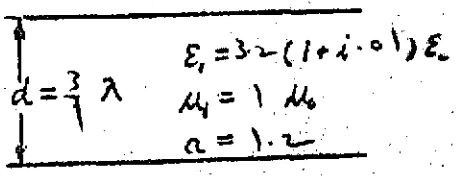


E_φ (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.4(1+i\,.01)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = 81\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$


18.0
3.0
-12.0
-27.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)

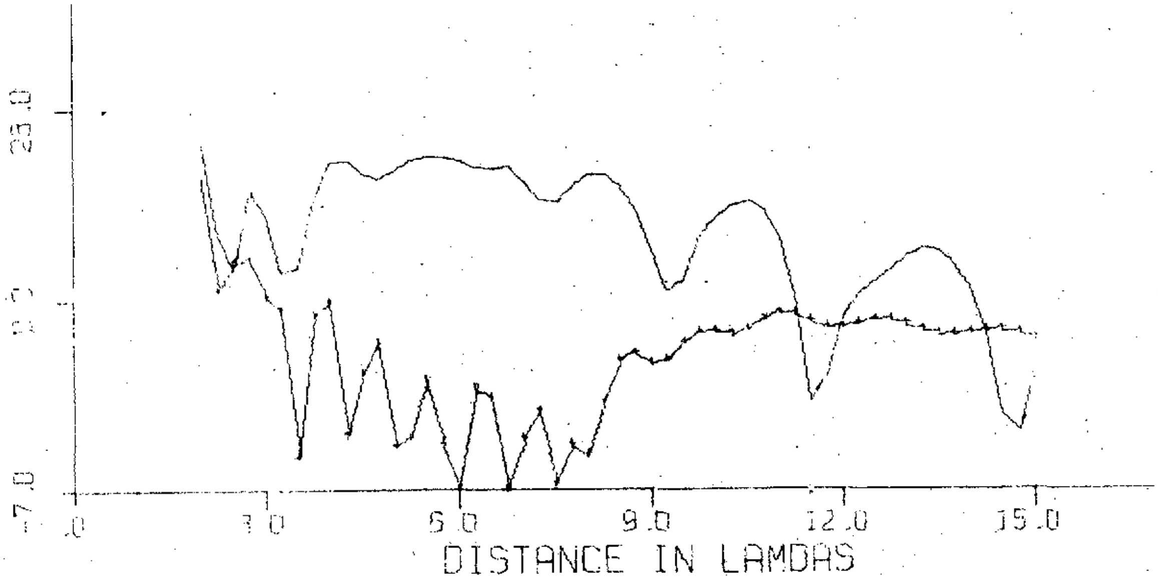


$d = \frac{3}{7} \lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.2$

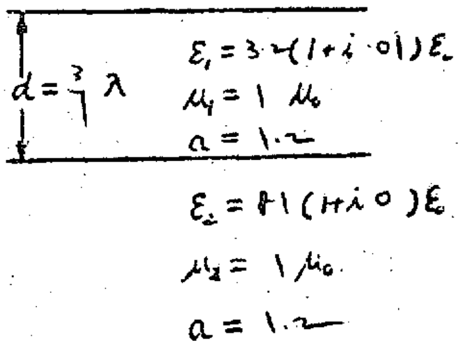
$\varepsilon_2 = 81(1+i0)\varepsilon_0$

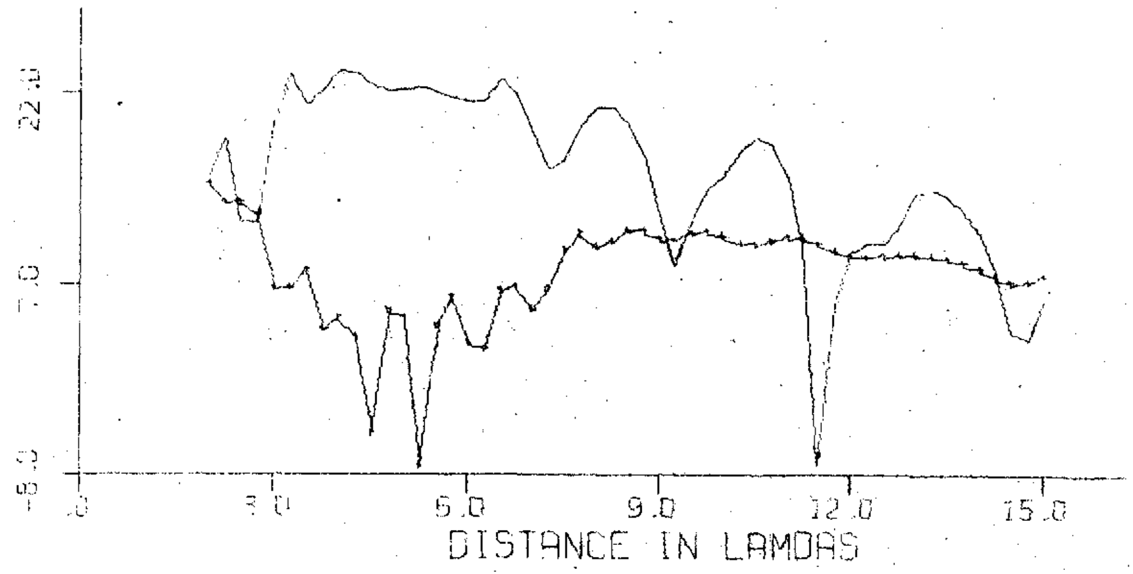
$\mu_2 = 1\ \mu_0$

$a = 1.2$

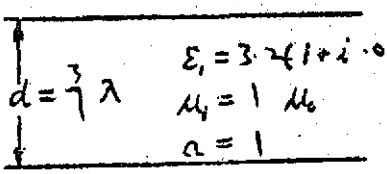


H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.2$
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1.2$


22.0
7.0
-8.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)


$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$

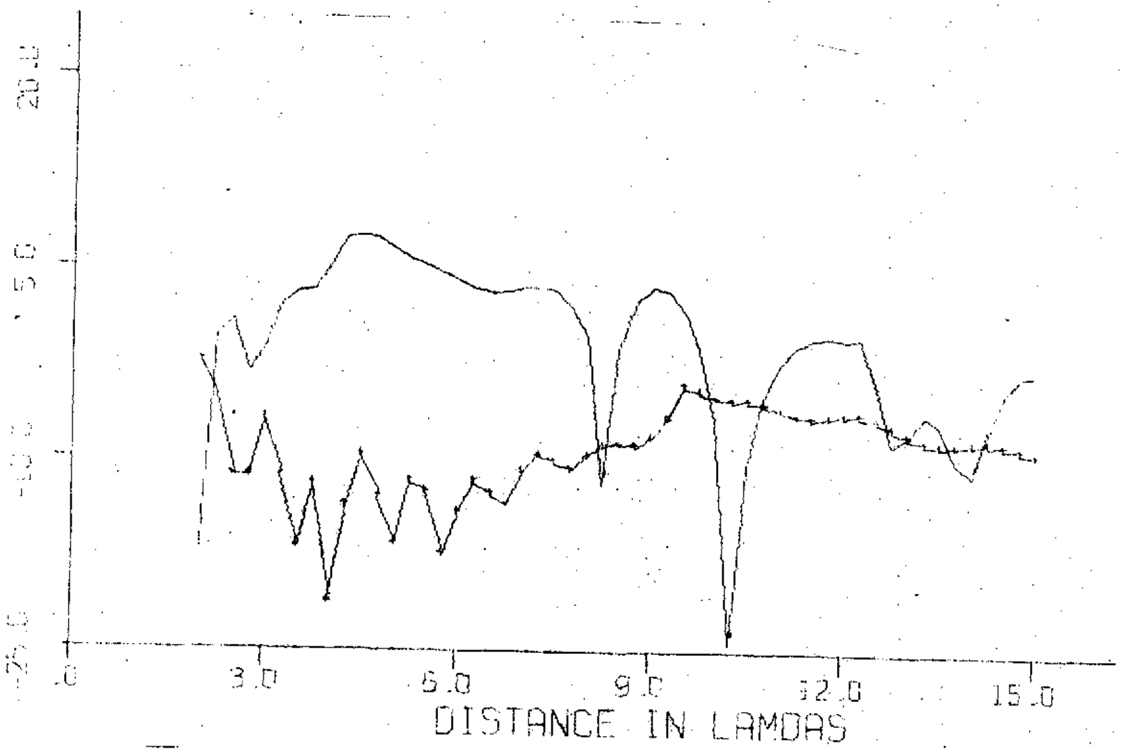
$\mu_1 = 1\ \mu_0$

$a = 1$

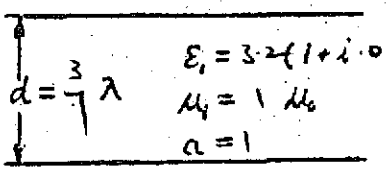
$\varepsilon_2 = 6\ (1+i\infty)\varepsilon$

$\mu_2 = 1\ \mu_0$

$a = 1$

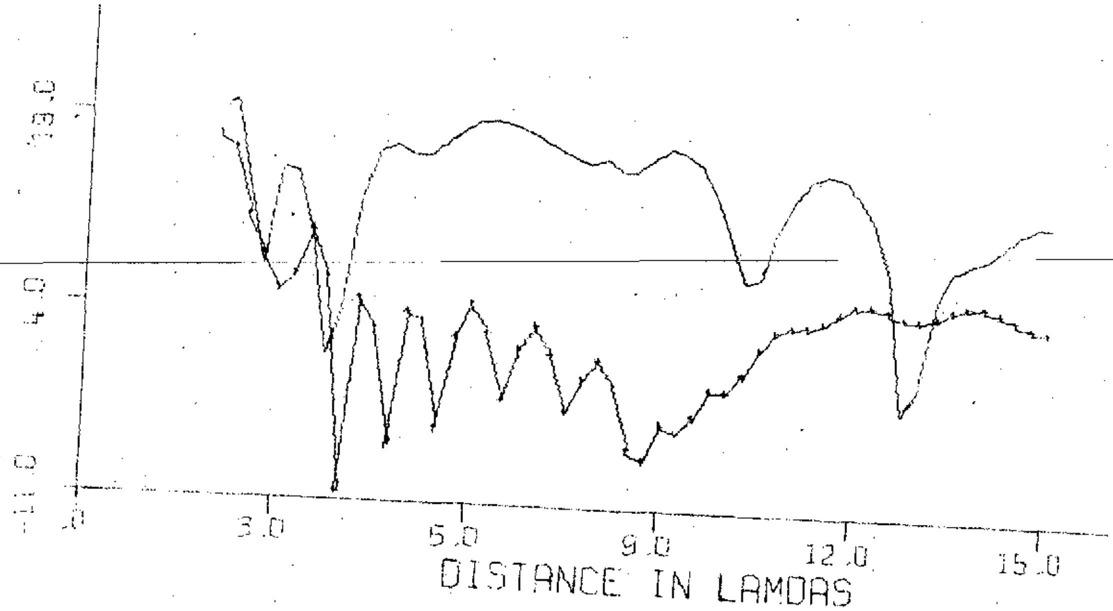


H_z (VMD)

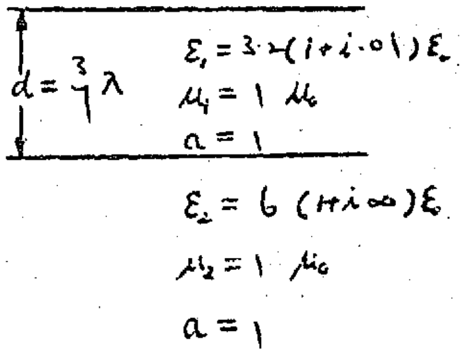

$d = \frac{3}{7}\lambda$

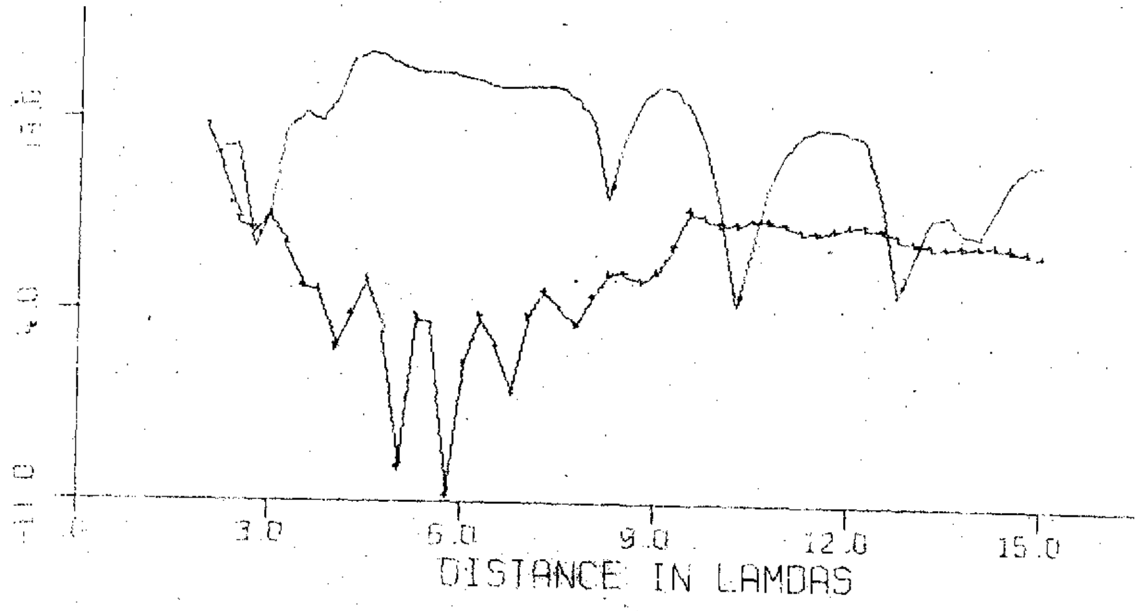
$\varepsilon_1 = 3.2(1 + i\,.01)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$

$\varepsilon_2 = 6\ (1 + i\,\infty)\,\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

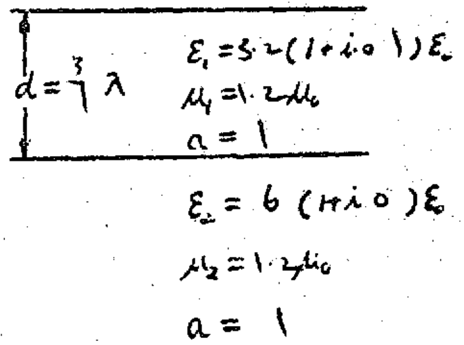


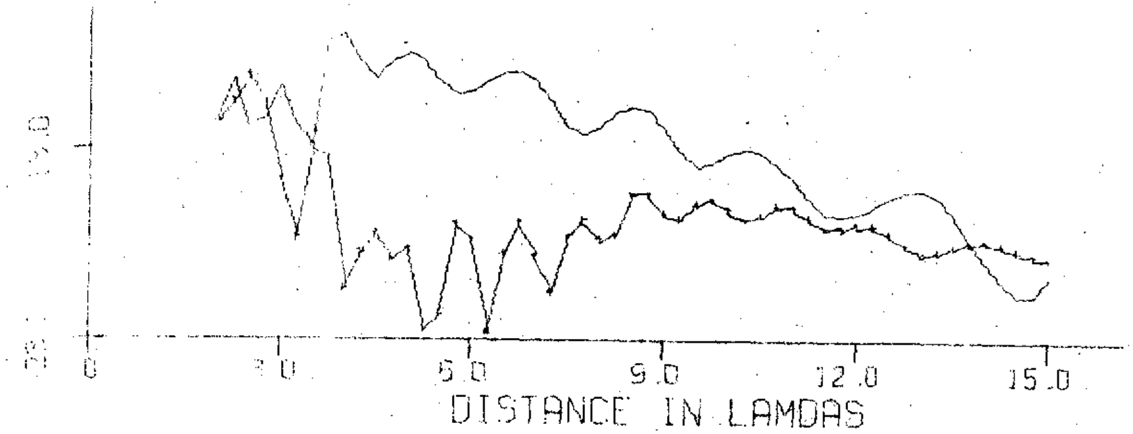
H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\infty)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

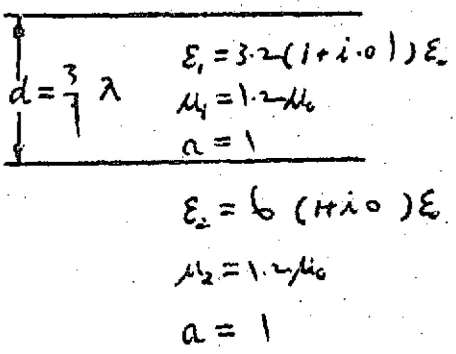

0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

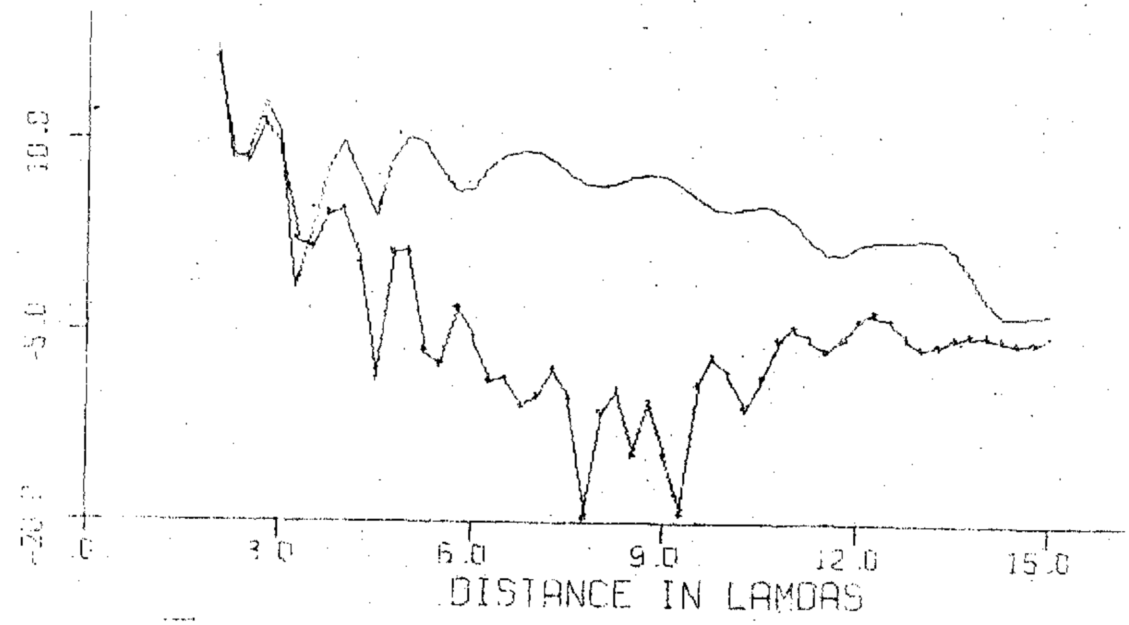
Eφ (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.0)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$

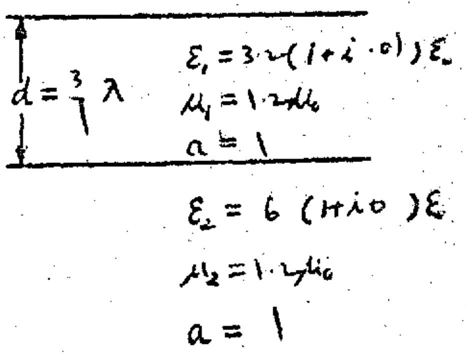

0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

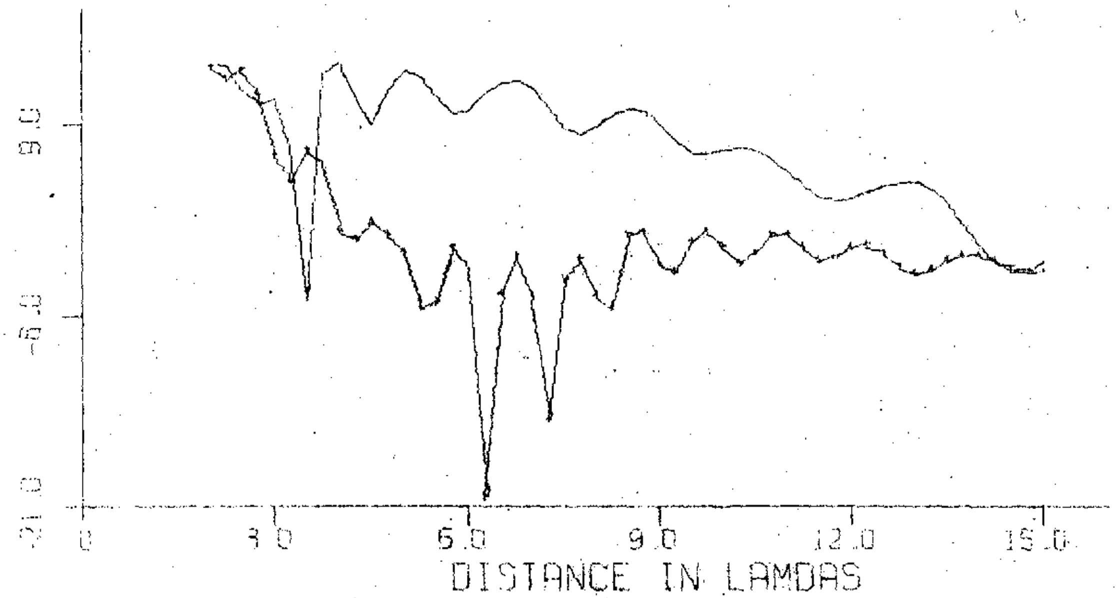
H_z (VMD)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$

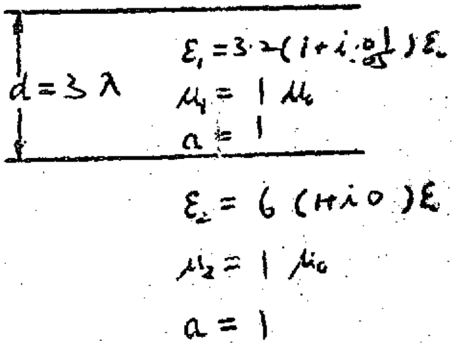

10.0
-5.0
-20.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

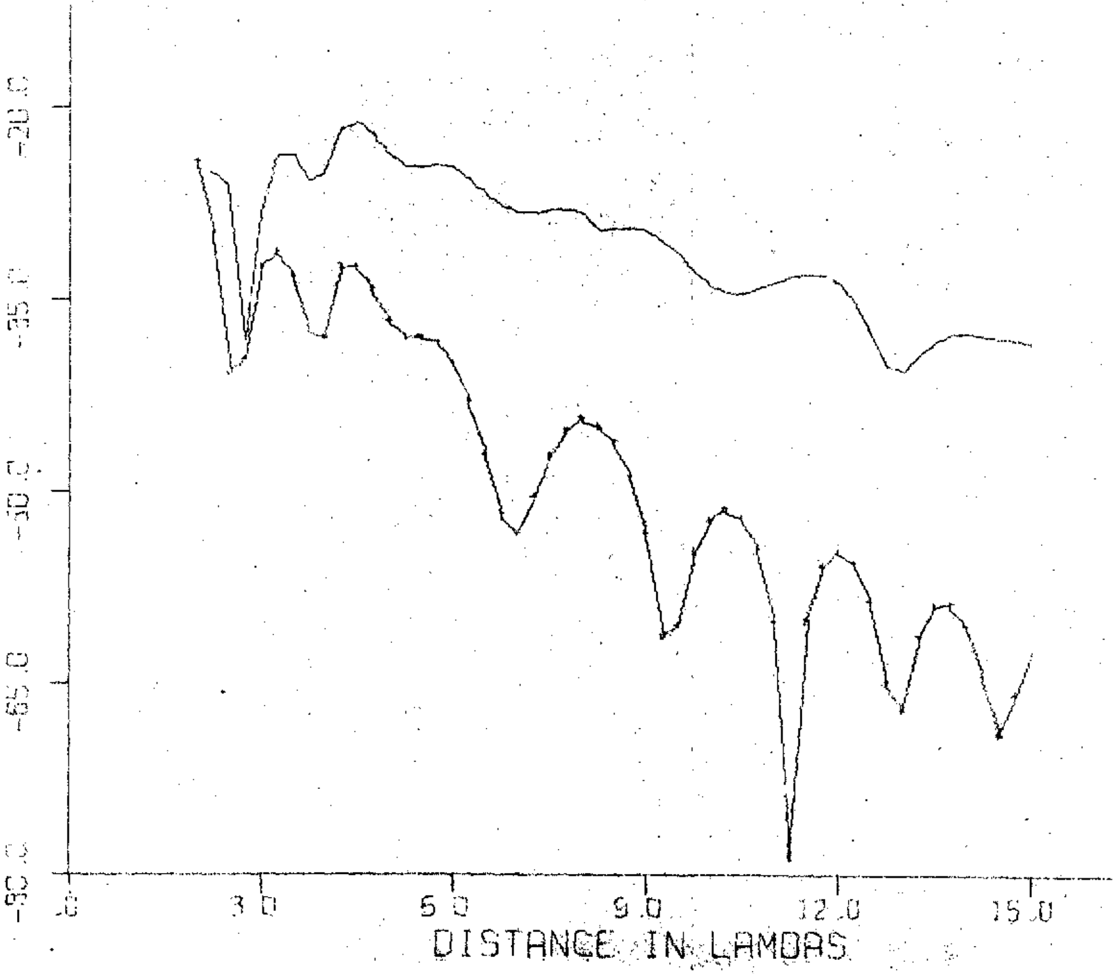
H_z (VMD)


d = 3/1 λ
ε₁ = 3.2(1+i·0)ε₀
μ₁ = 1.2μ₀
a = 1
ε₂ = 6 (1+i0)ε
μ₂ = 1.2μ₀
a = 1

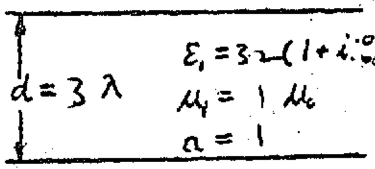

9.0
-6.0
-21.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.05)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

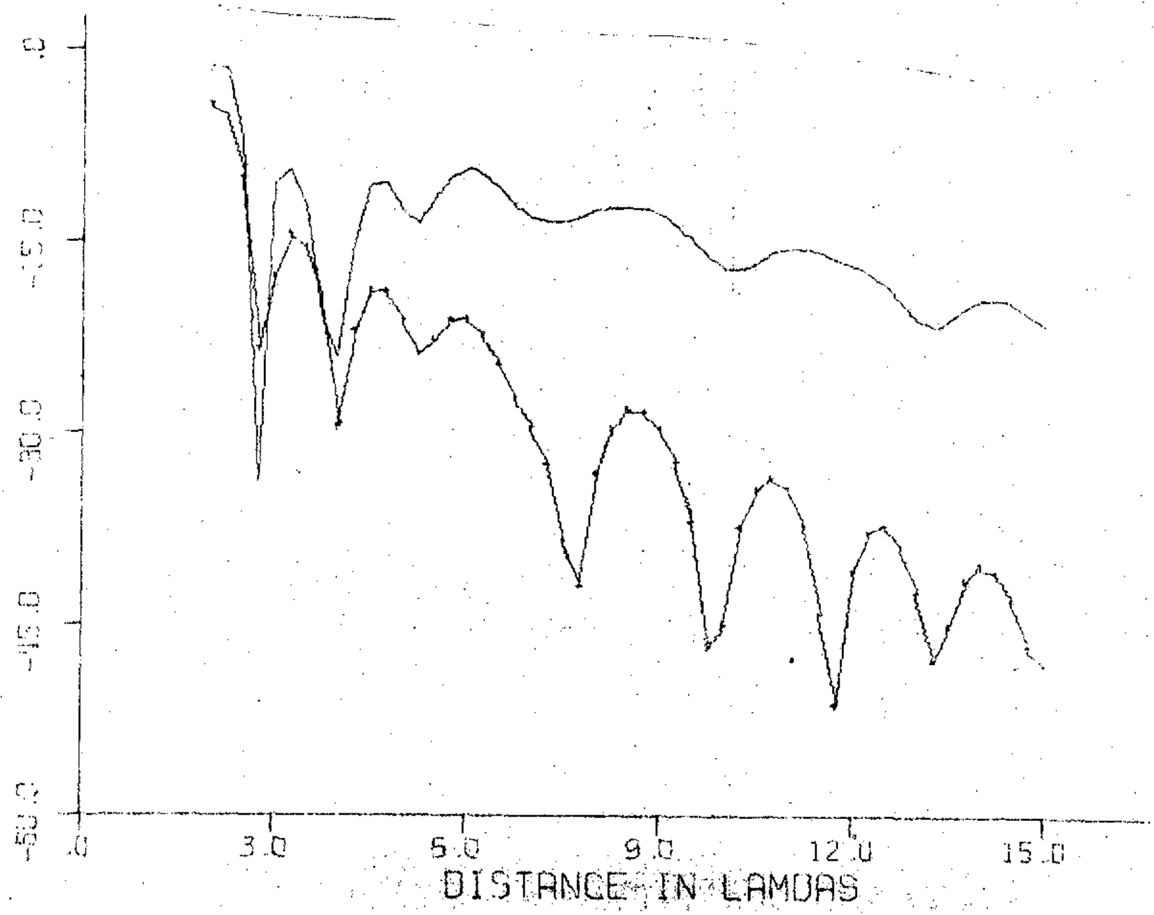

-20.0
-35.0
-50.0
-65.0
-80.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

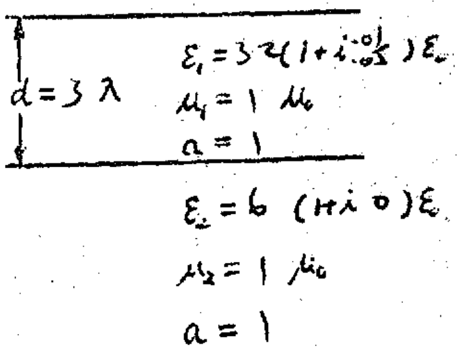


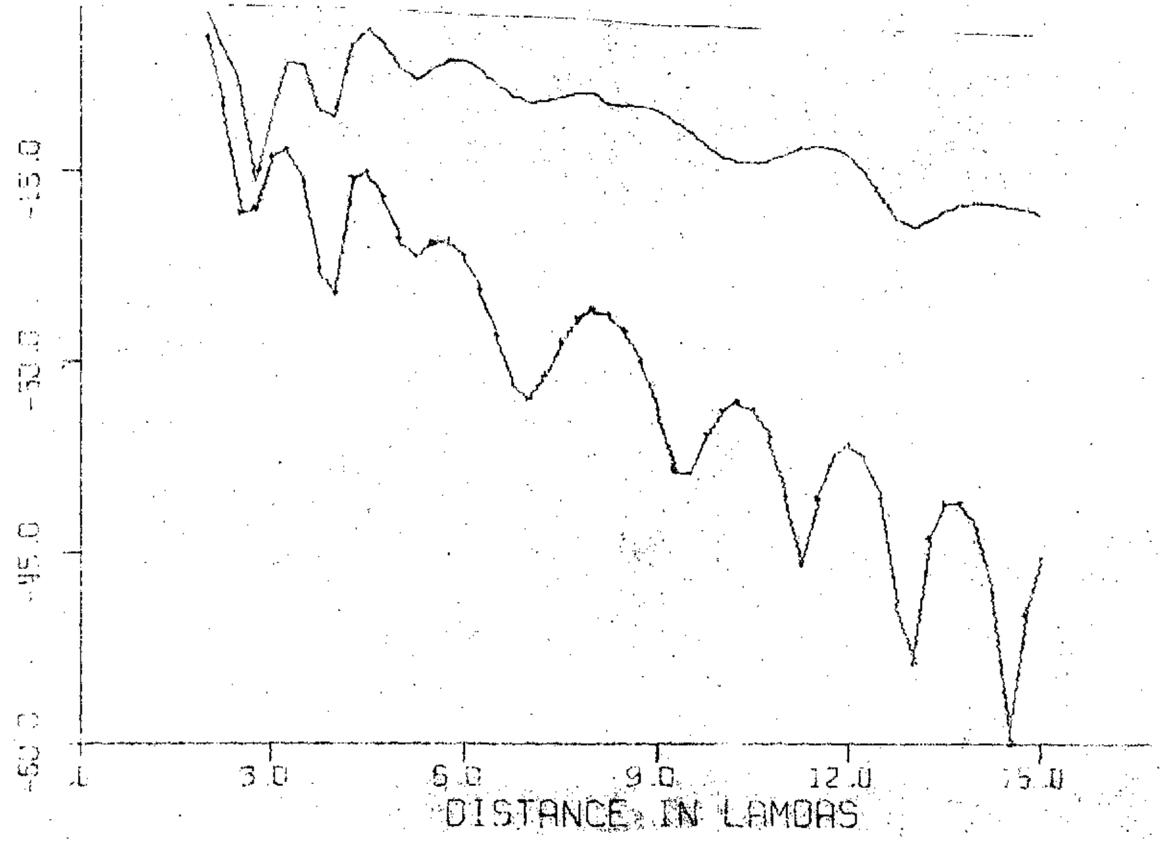
$\varepsilon_1 = 3.2(1+i\,.005)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

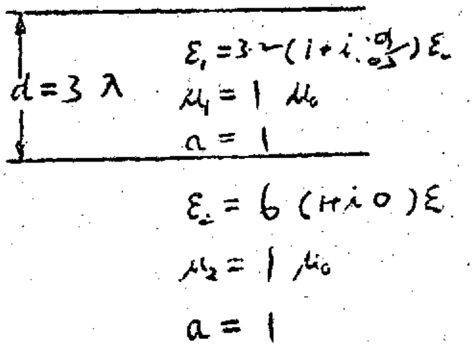


H_z(HED)

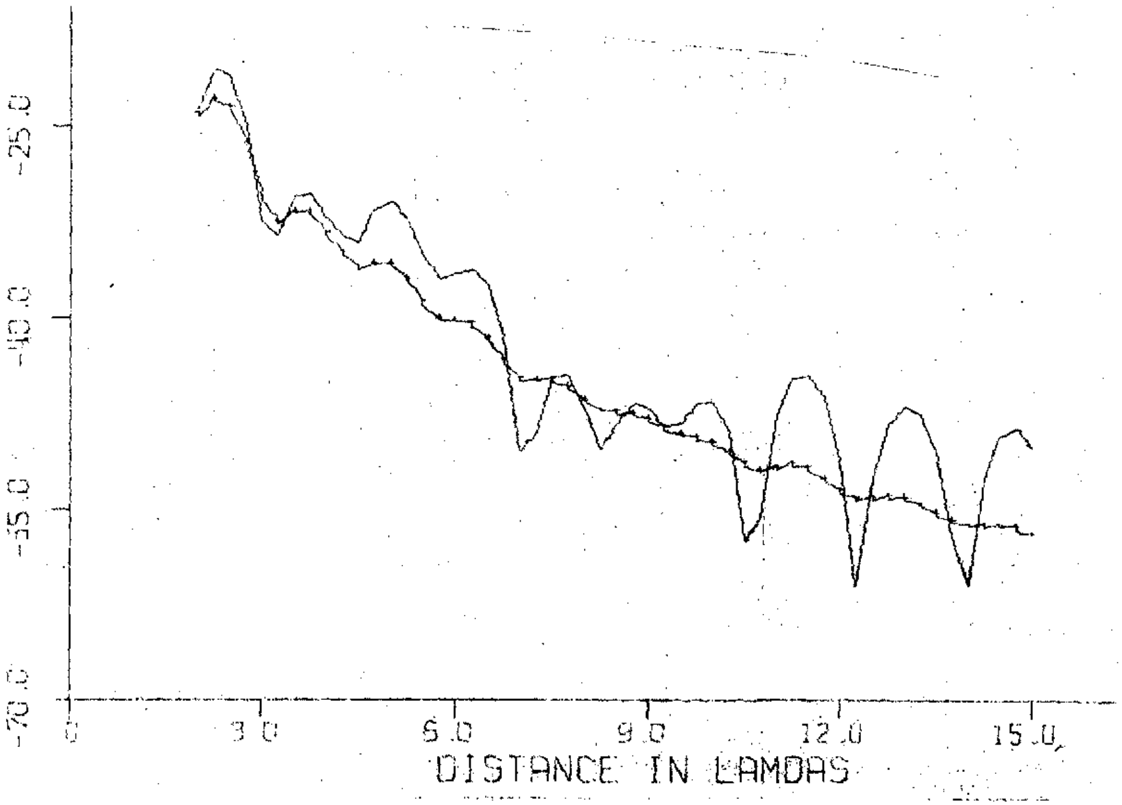

$d = 3\lambda$
$\varepsilon_1 = 32(1 + i\,.01/.05)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1 + i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_g (HED)

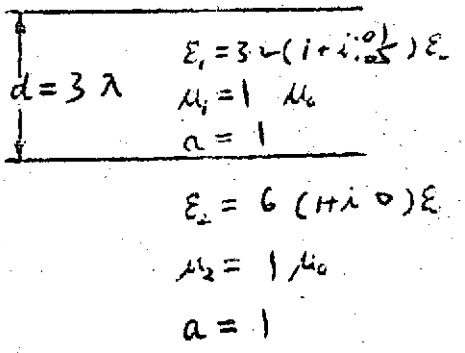


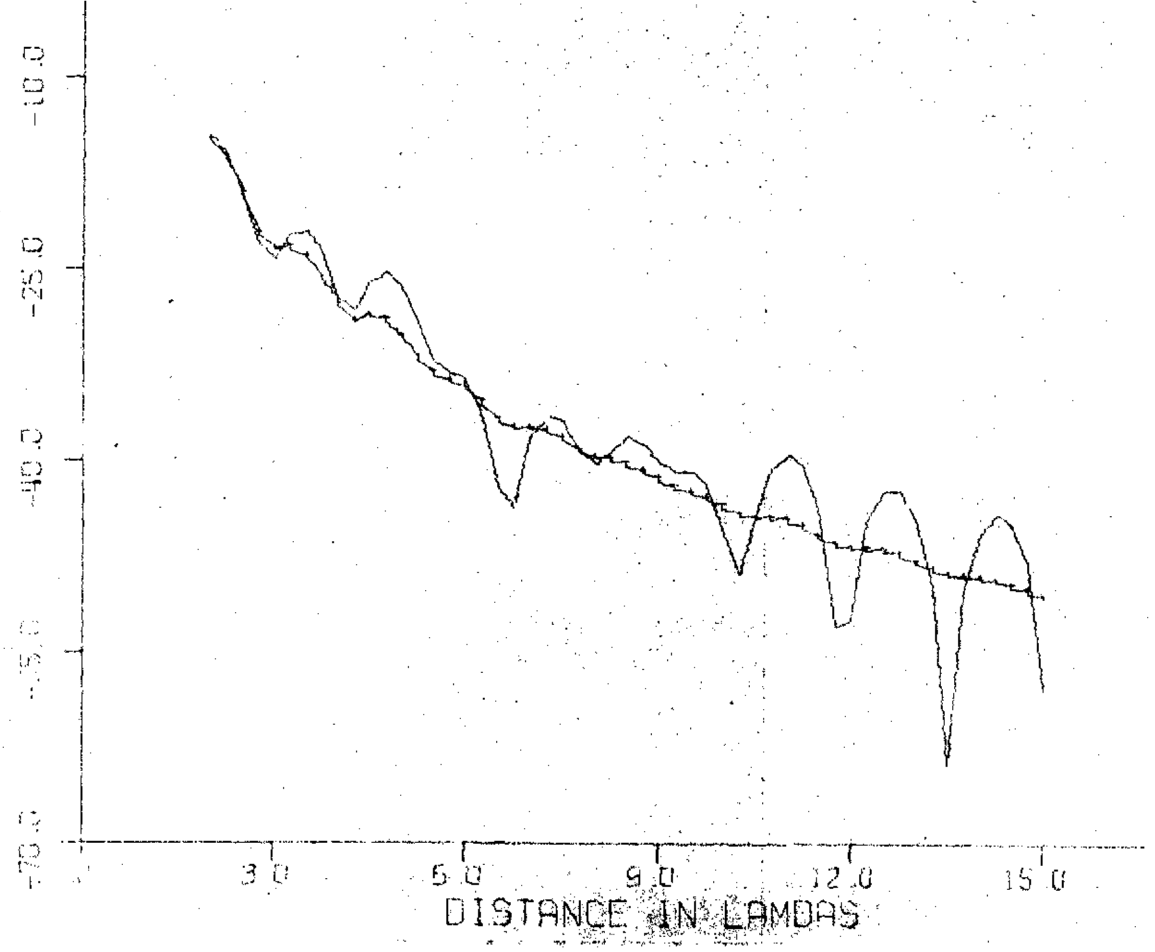
d = 3 λ
$\varepsilon_1 = 3.2(1+i\,\frac{.01}{.03})\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i0)\,\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$



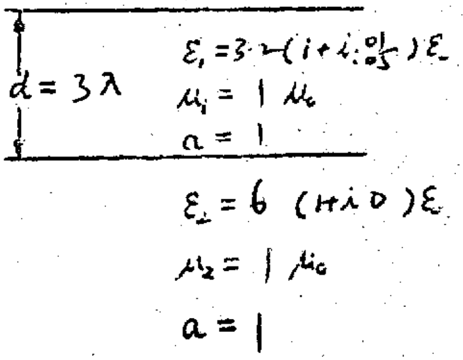
-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

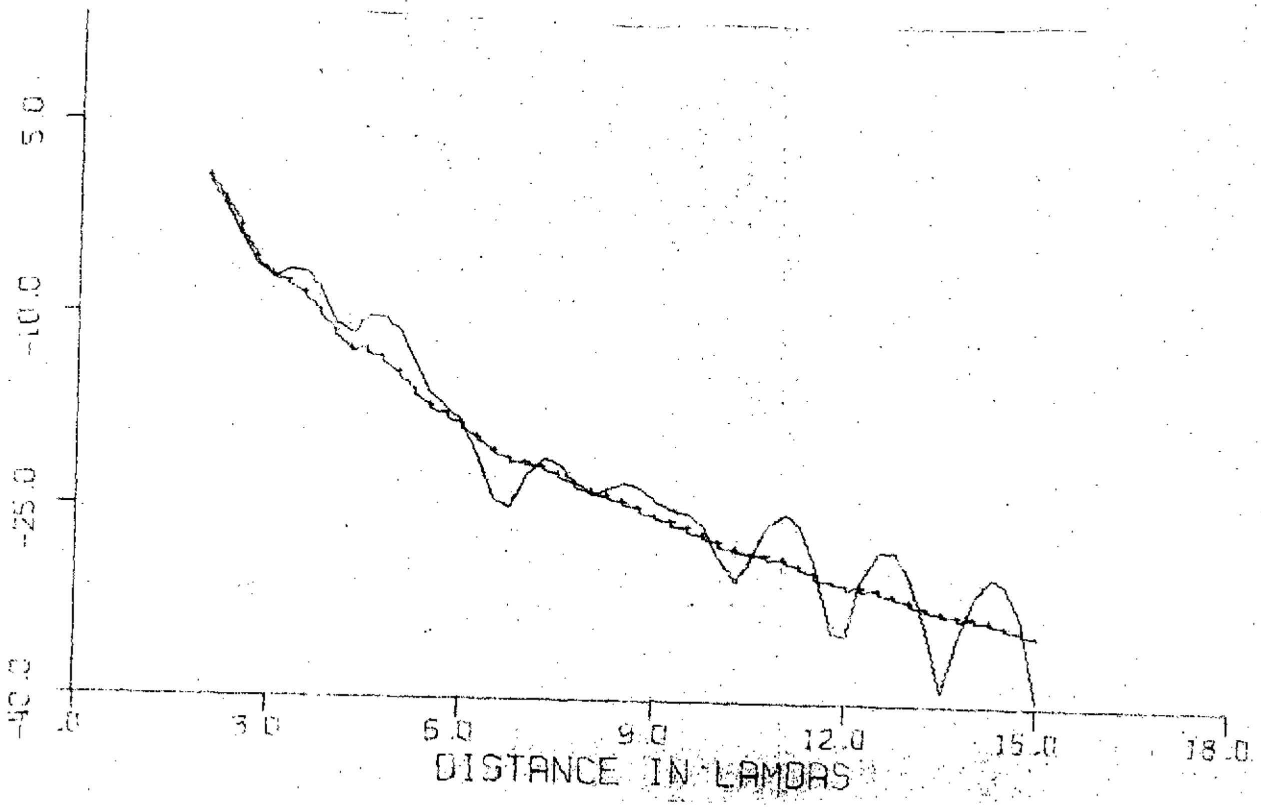
E_z (HED)


d = 3 λ
$\varepsilon_1 = 3(1+i\overset{.01}{.05})\varepsilon_0$
$\mu_1 = 1\ \mu_0$
a = 1
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
a = 1

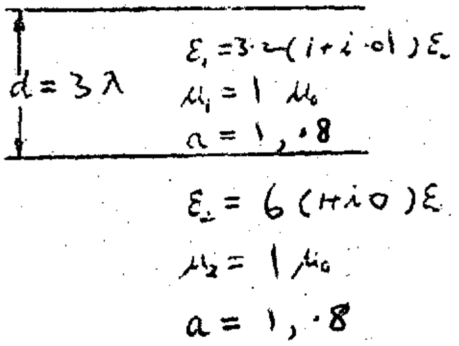

-10.0
-25.0
-40.0
-55.0
-70.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

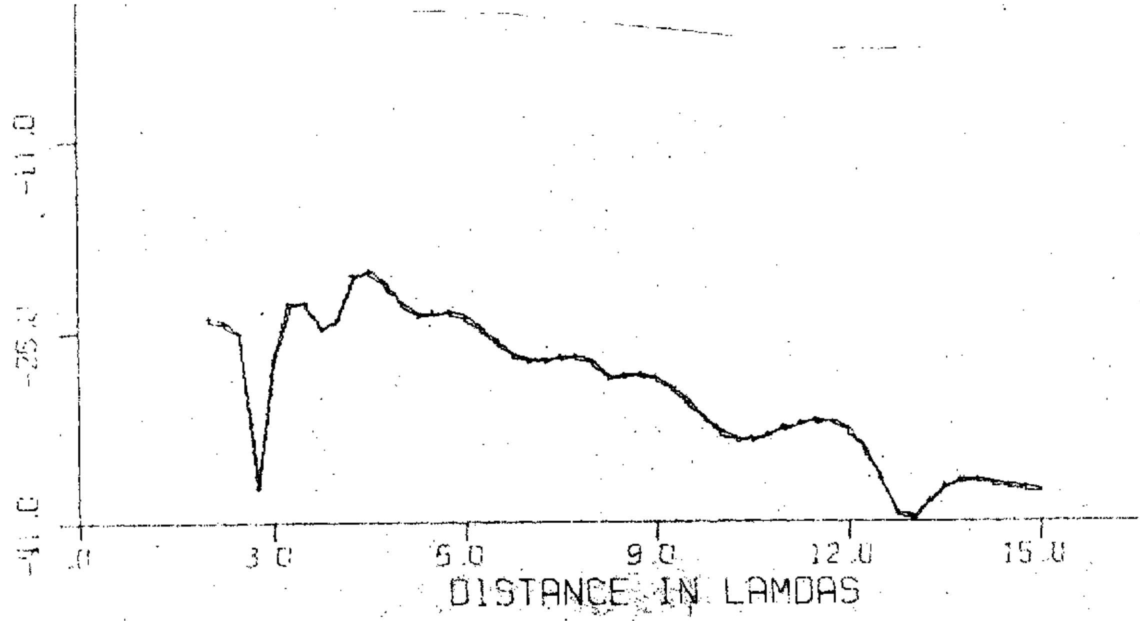
H_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\,0.05)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

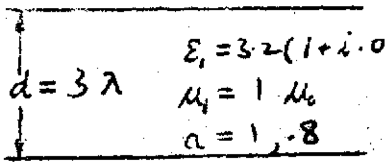

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

Eφ (HED)


d = 3λ
$\varepsilon_1 = 3.2(1 + i\,.01)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$
a = 1, .8
$\varepsilon_2 = 6(1 + i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
a = 1, .8


-11.0
-26.0
-41.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z(HED)



$d = 3\lambda$

$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$

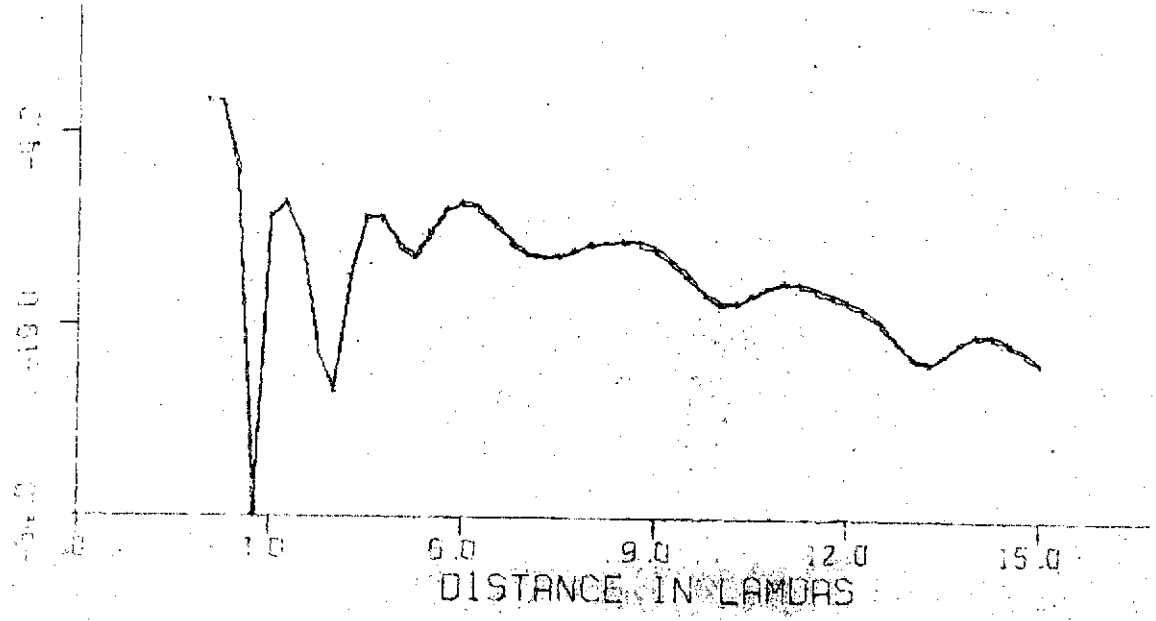
$\mu_1 = 1\ \mu_0$

$a = 1, .8$

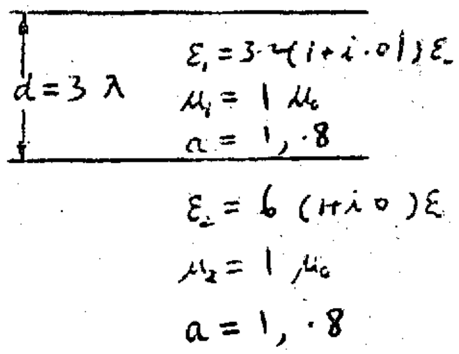
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon$

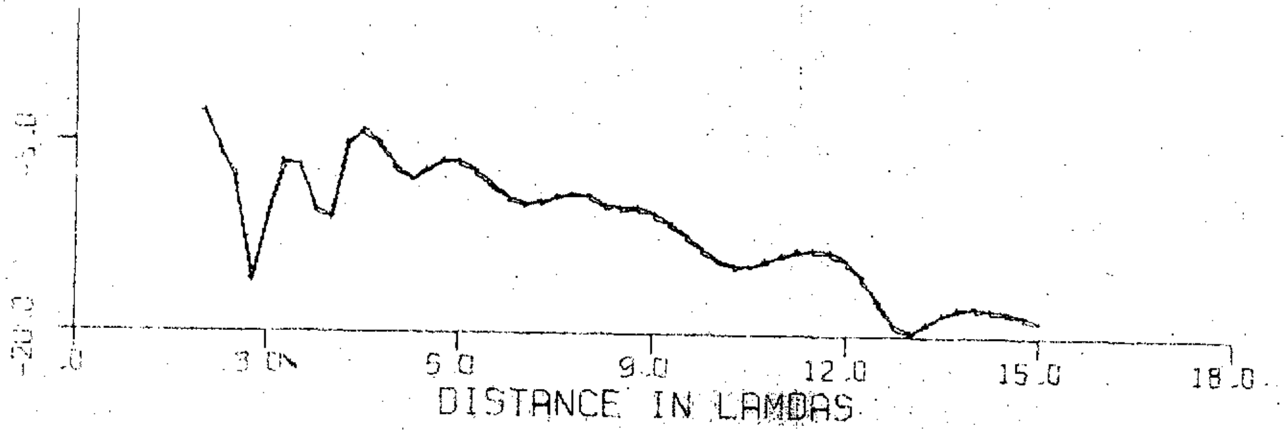
$\mu_2 = 1\ \mu_0$

$a = 1, .8$

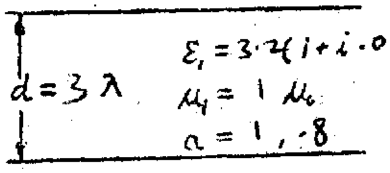


H_z (HED)


d = 3 λ
$\varepsilon_1 = 3.4(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
a = 1, ·8
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
a = 1, ·8

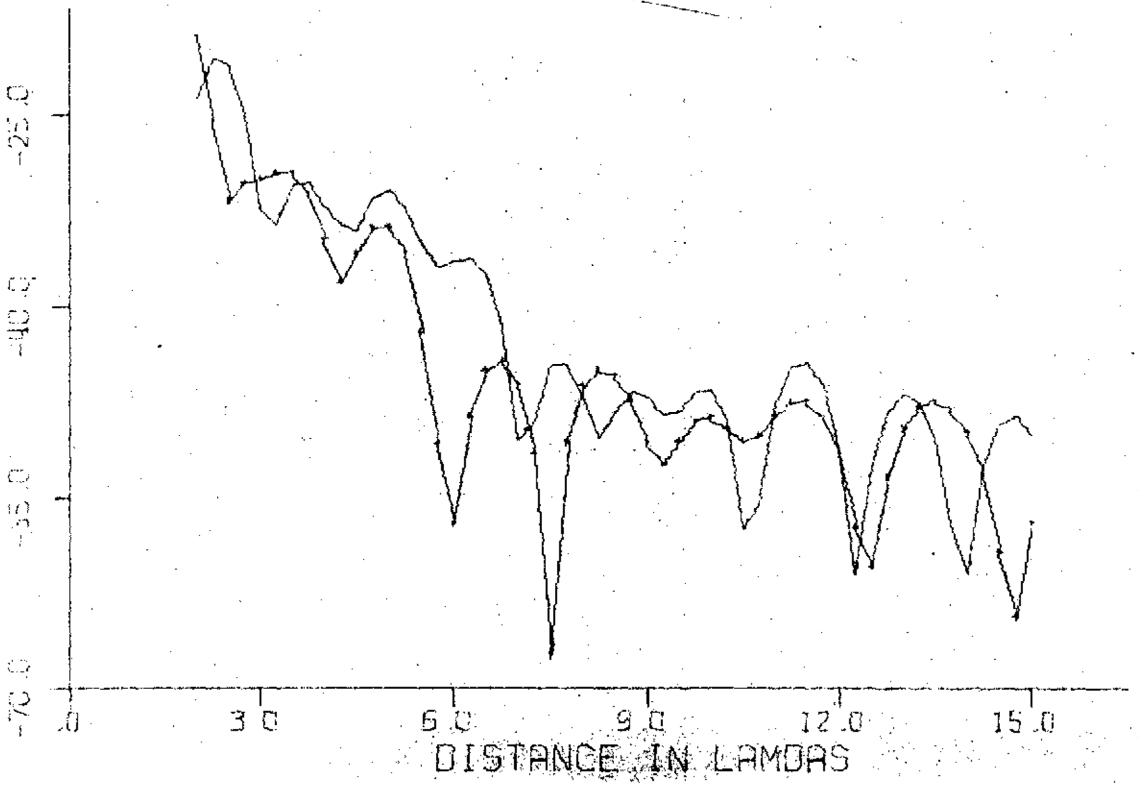

-5.0
-20.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

E_z (HED)



$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, .8$

$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, .8$



E_z (HED)

$d = 3\lambda$

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

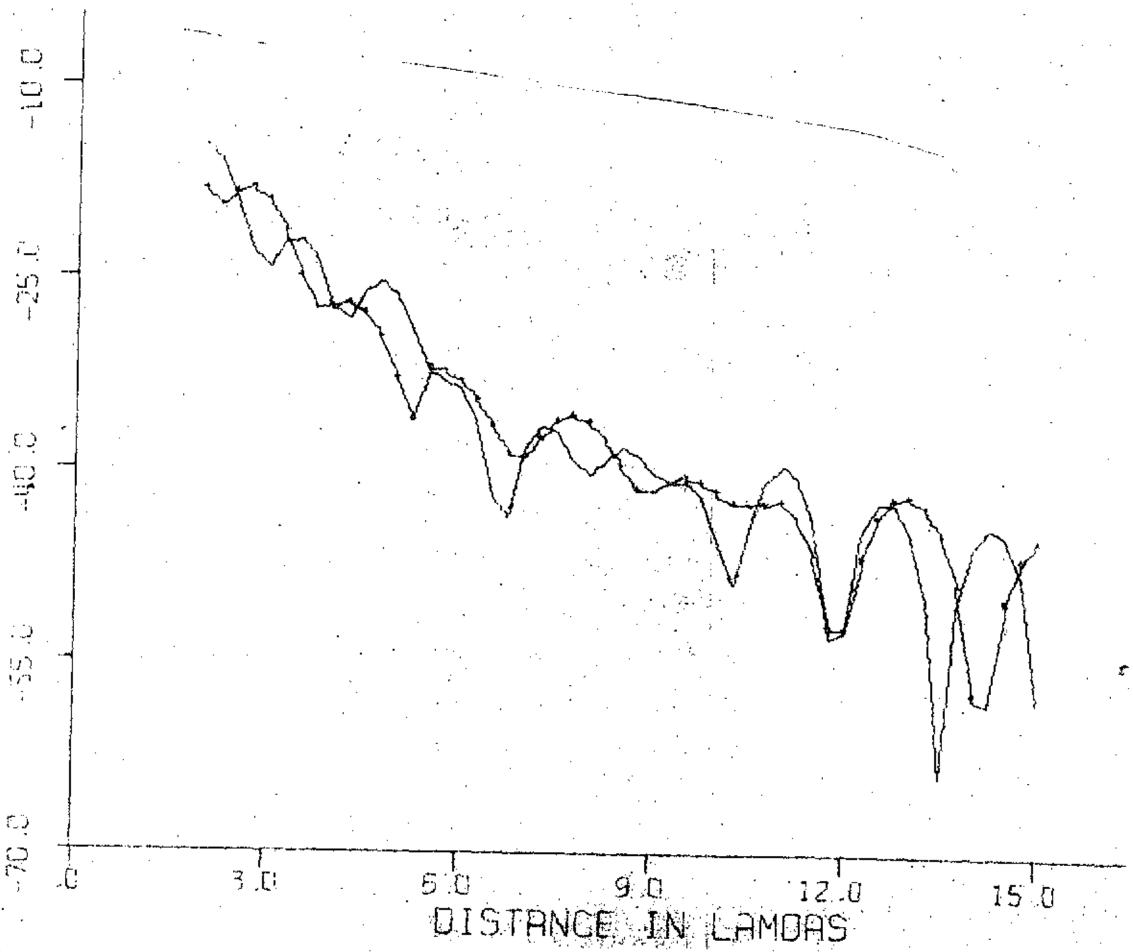
$\mu_1 = 1\,\mu_0$

$a = 1, .8$

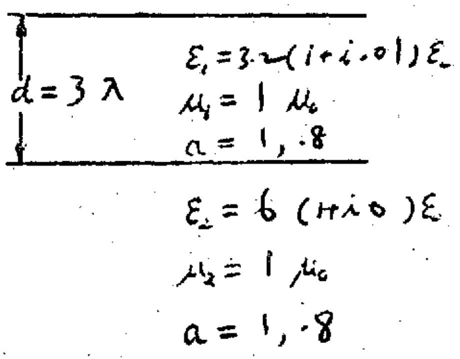
$\varepsilon_2 = 6\,(1+i0)\,\varepsilon_0$

$\mu_2 = 1\,\mu_0$

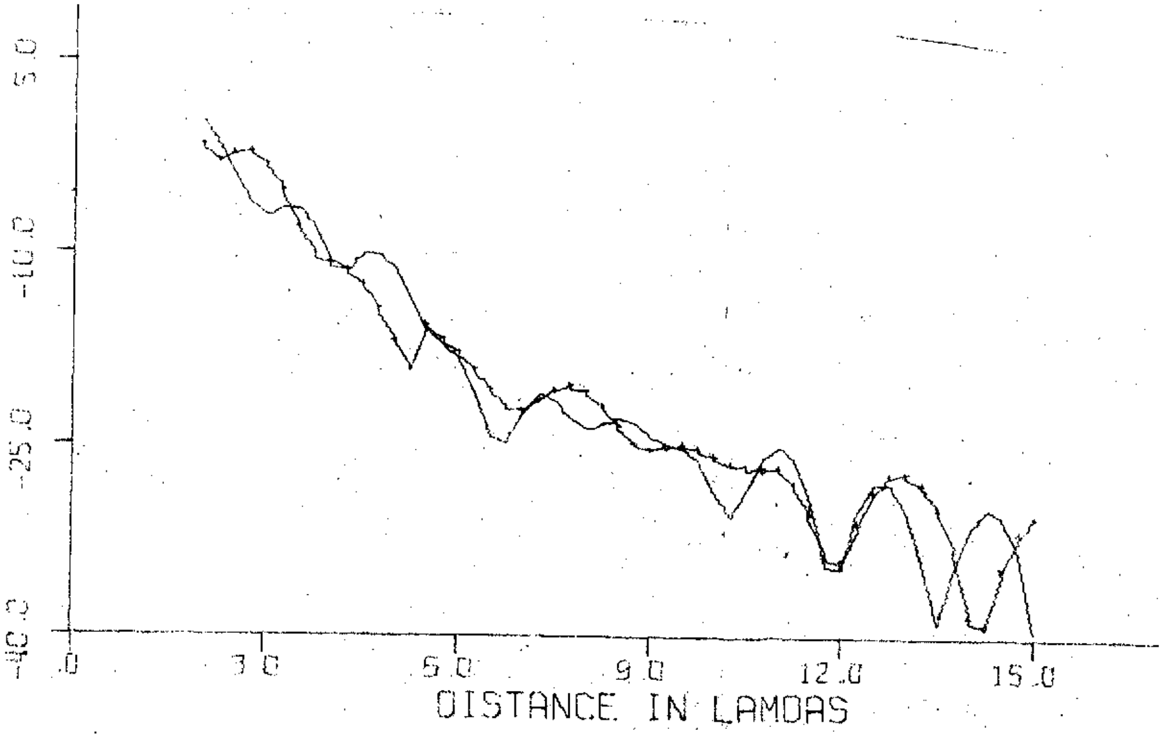
$a = 1, .8$



H_φ (HED)

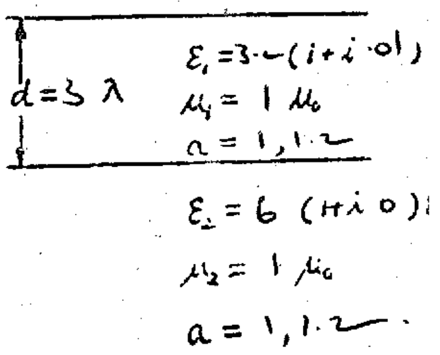


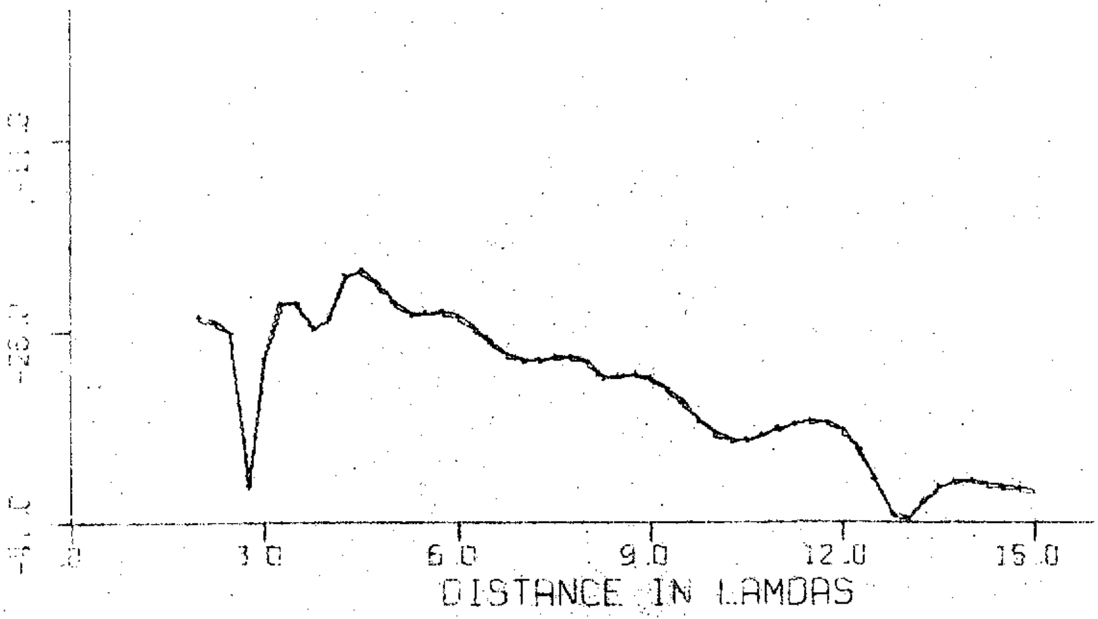
d = 3 λ
ε₁ = 3.2(1+i.01)ε₀
μ₁ = 1 μ₀
a = 1, .8
ε₂ = 6 (1+i0) ε₀
μ₂ = 1 μ₀
a = 1, .8



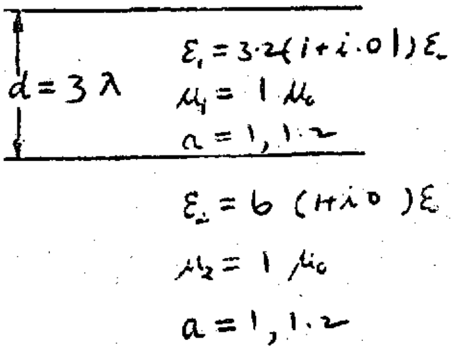
5.0
-10.0
-25.0
-40.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Eφ (HED)

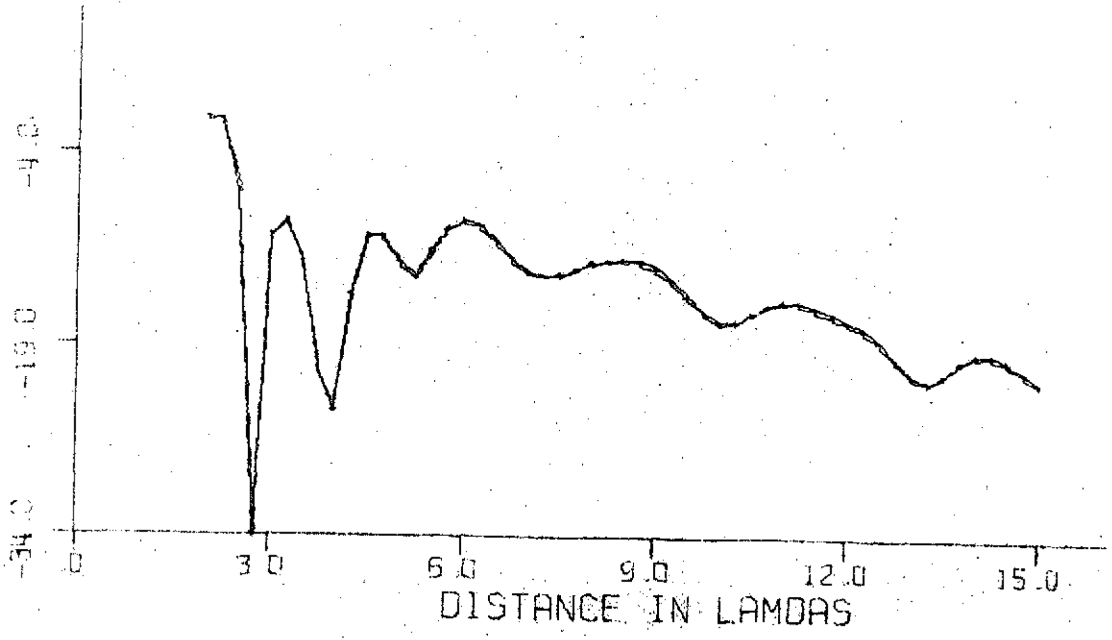

d = 3 λ
ε₁ = 3.0 (1 + i .01)
μ₁ = 1 μ₀
a = 1, 1.2
ε₂ = 6 (1 + i 0)
μ₂ = 1 μ₀
a = 1, 1.2


-20.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ρ (HED)

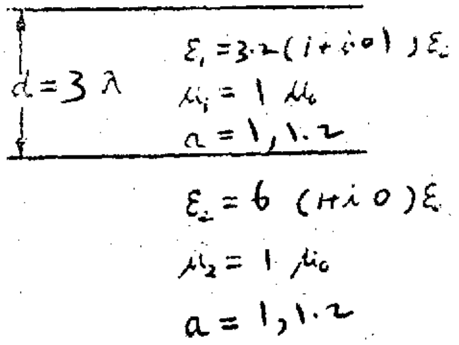


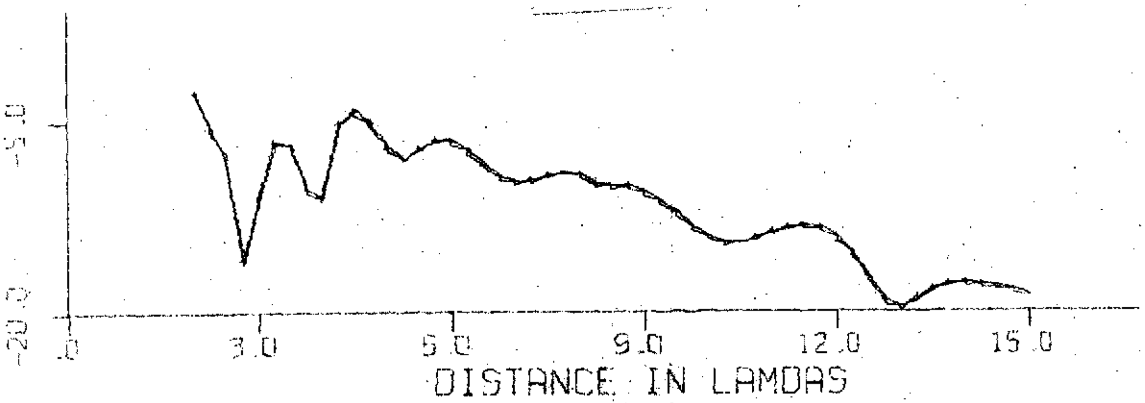
$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6\,(1+i0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$



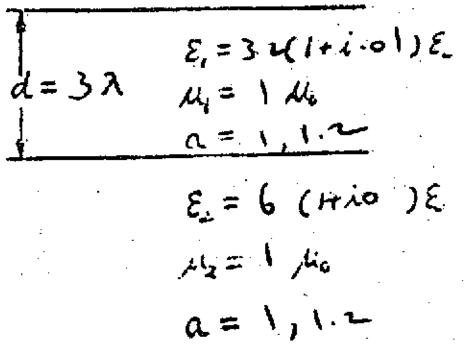
-4.0
-19.0
-34.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

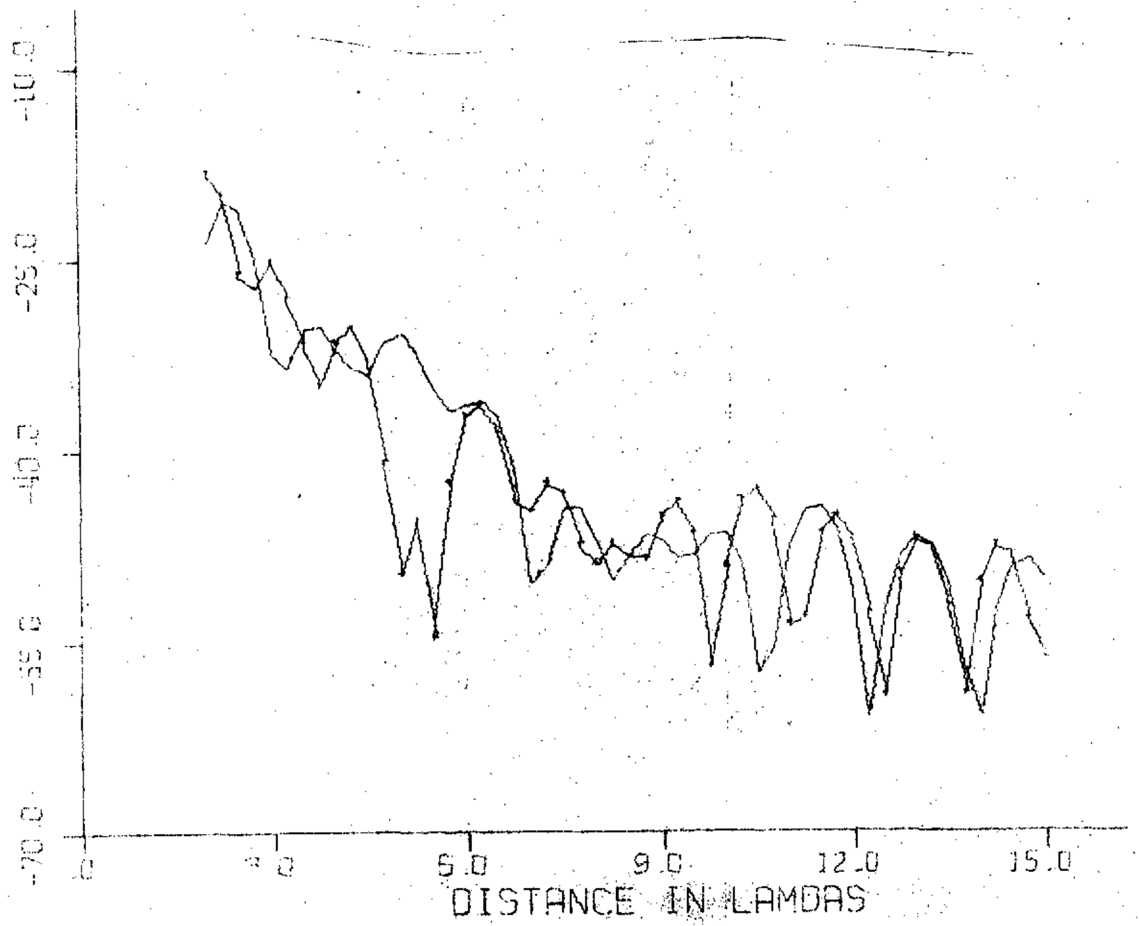
H_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6\,(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$


-5.0
-20.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6\,(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$


-10.0
-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

$d = 3\lambda$

$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$

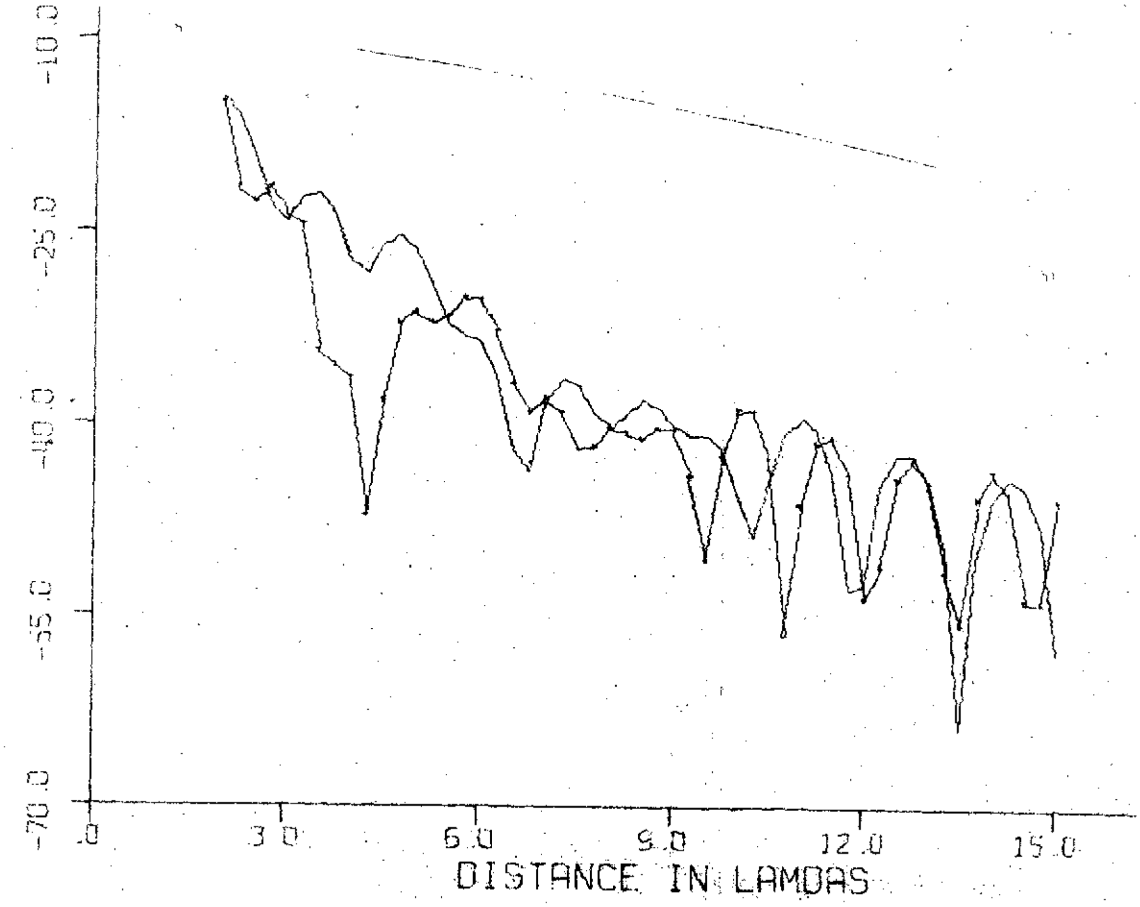
$\mu_1 = 1\ \mu_0$

$a = 1, 1.2$

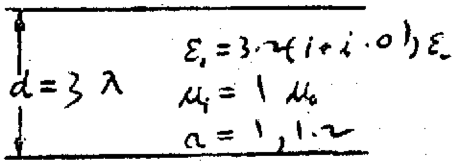
$\varepsilon_2 = 6\ (1+i\cdot 0)\varepsilon_0$

$\mu_2 = 1\ \mu_0$

$a = 1, 1.2$



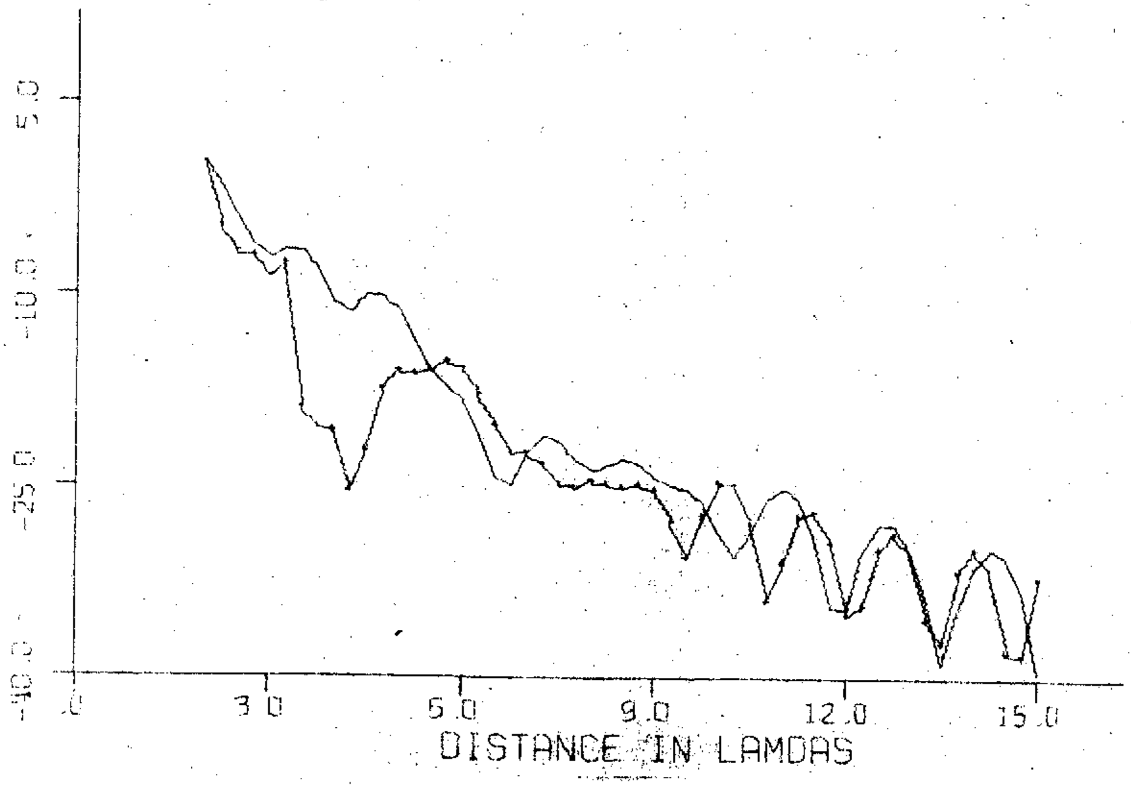
H_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, 1.2$

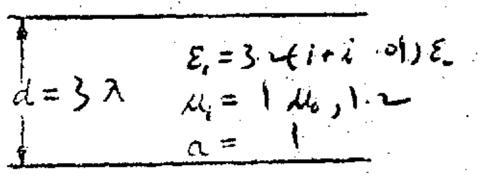
$\varepsilon_2 = 6\ (1+i\,0)\,\varepsilon_0$

$\mu_2 = 1\ \mu_0$

$a = 1, 1.2$



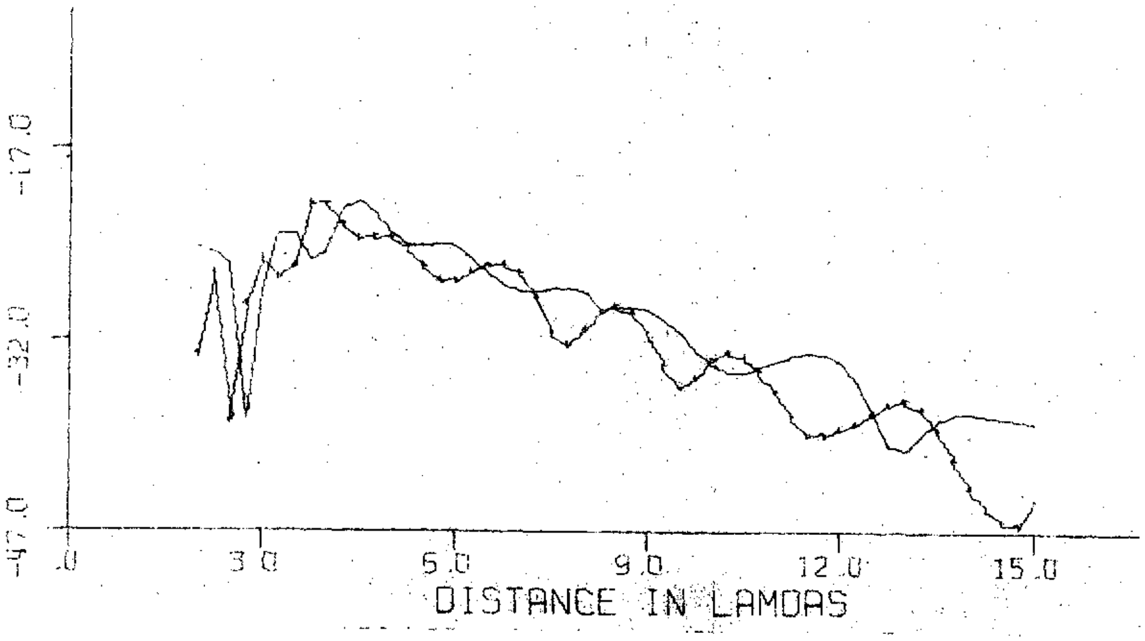
E_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i\ .01)\varepsilon_0$
$\mu_1 = 1\ \mu_0, 1.2$
$a = 1$

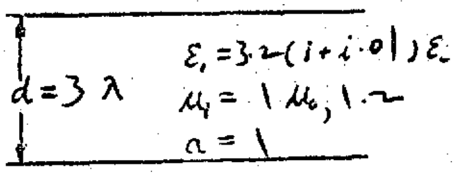
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon_0$

$\mu_2 = 1\ \mu_0\ , 1.2$

$a = 1$



H_z (HED)



$\varepsilon_1 = 3.2(1 + i\cdot 01)\varepsilon_0$

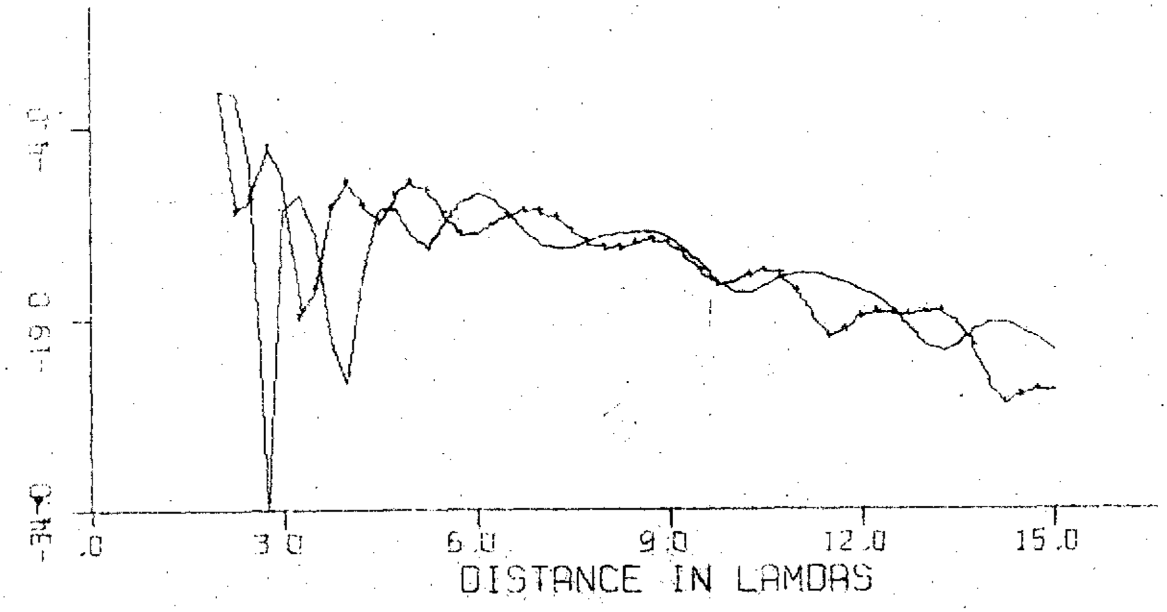
$\mu_1 = 1\,\mu_0,\ 1.2$

$a = 1$

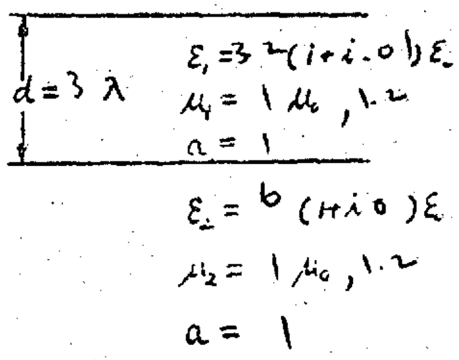
$\varepsilon_2 = 6\ (1 + i\,0)\varepsilon$

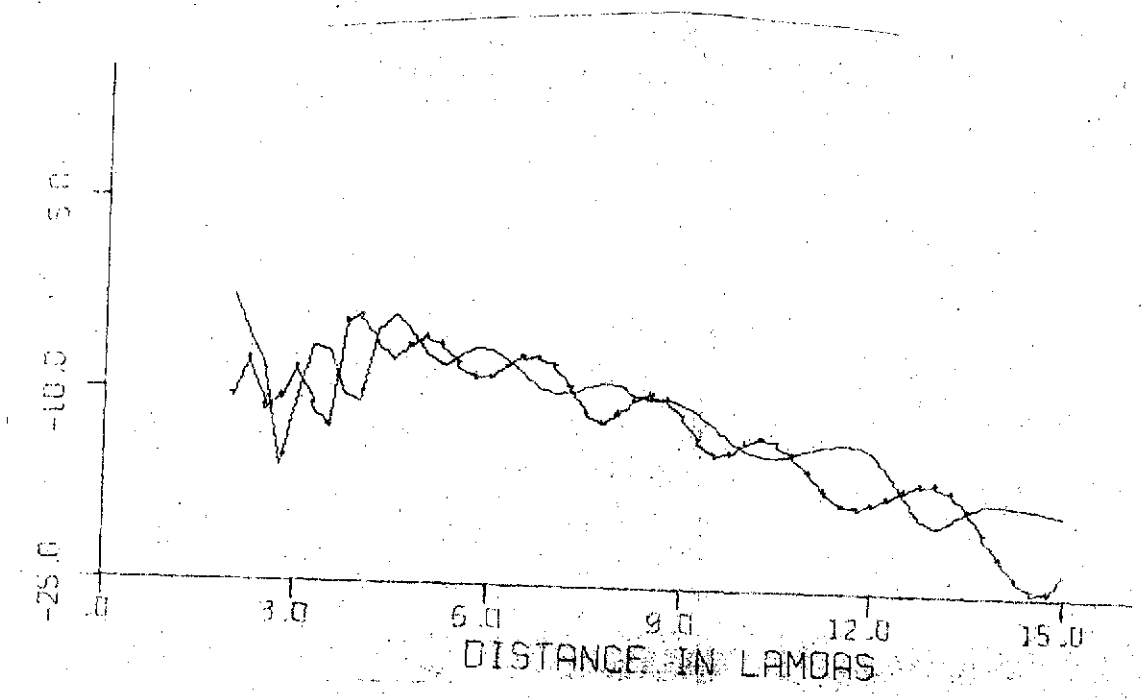
$\mu_2 = 1\,\mu_0,\ 1.2$

$a = 1$.



H_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3^2(1+i.0)\varepsilon_0$
$\mu_1 = 1\mu_0, 1.2$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\mu_0, 1.2$
$a = 1$


5.0
-10.0
-25.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z(HED)

$d = 3\lambda$

$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$

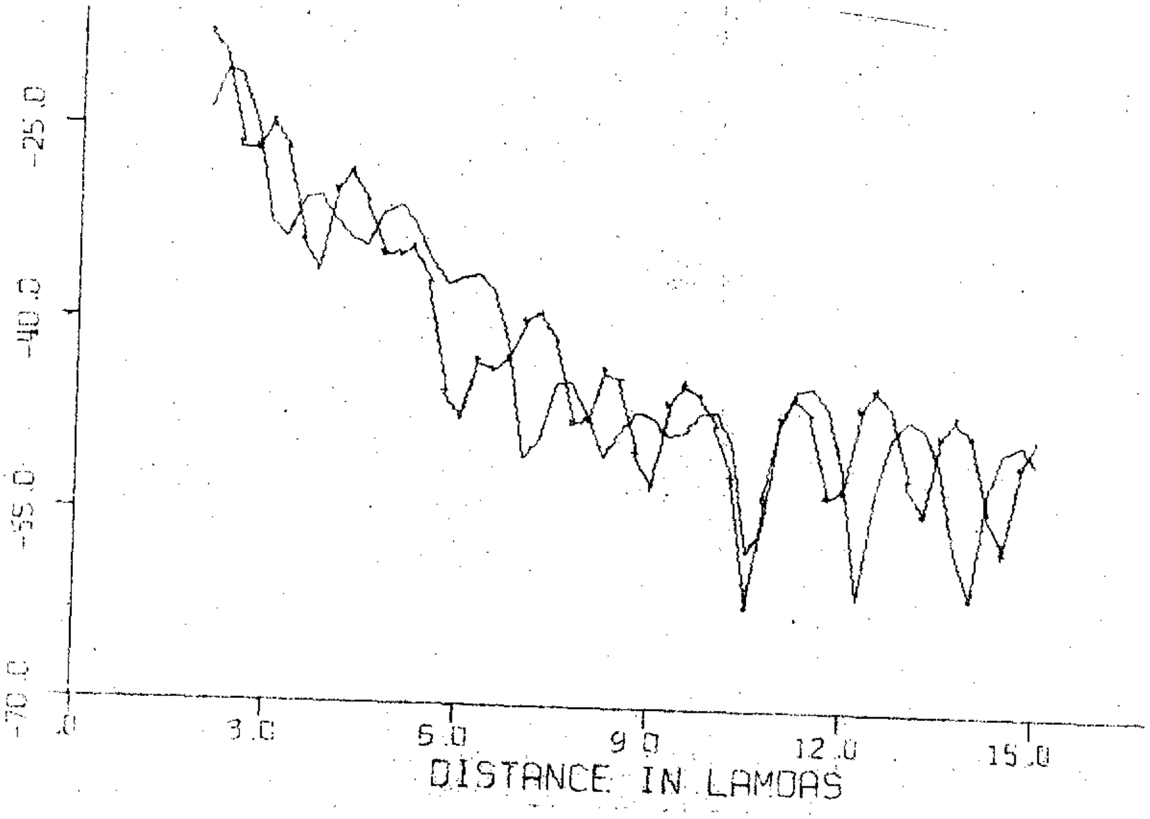
$\mu_1 = 1\,\mu_0\ ,\ 1.2$

$a = 1$

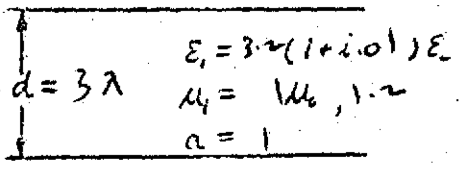
$\varepsilon_2 = 6\ (1+i0)\varepsilon_0$

$\mu_2 = 1\,\mu_0\ ,\ 1.2$

$a = 1$

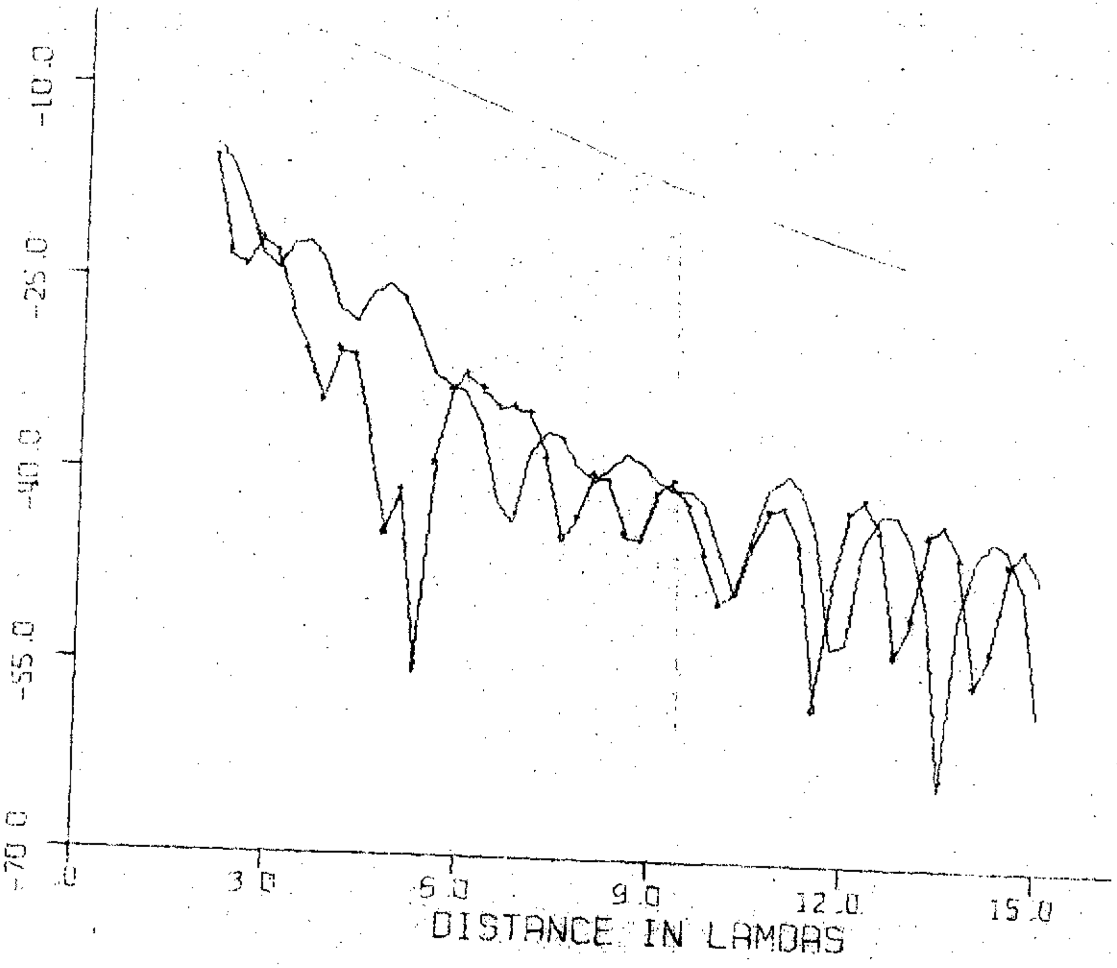


E_y (HED)

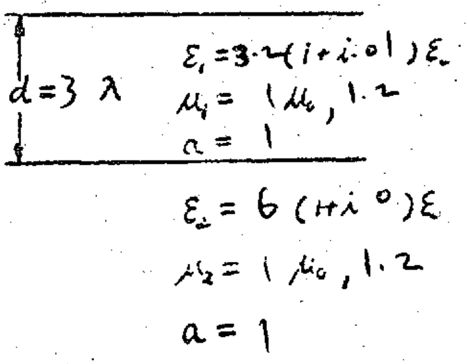


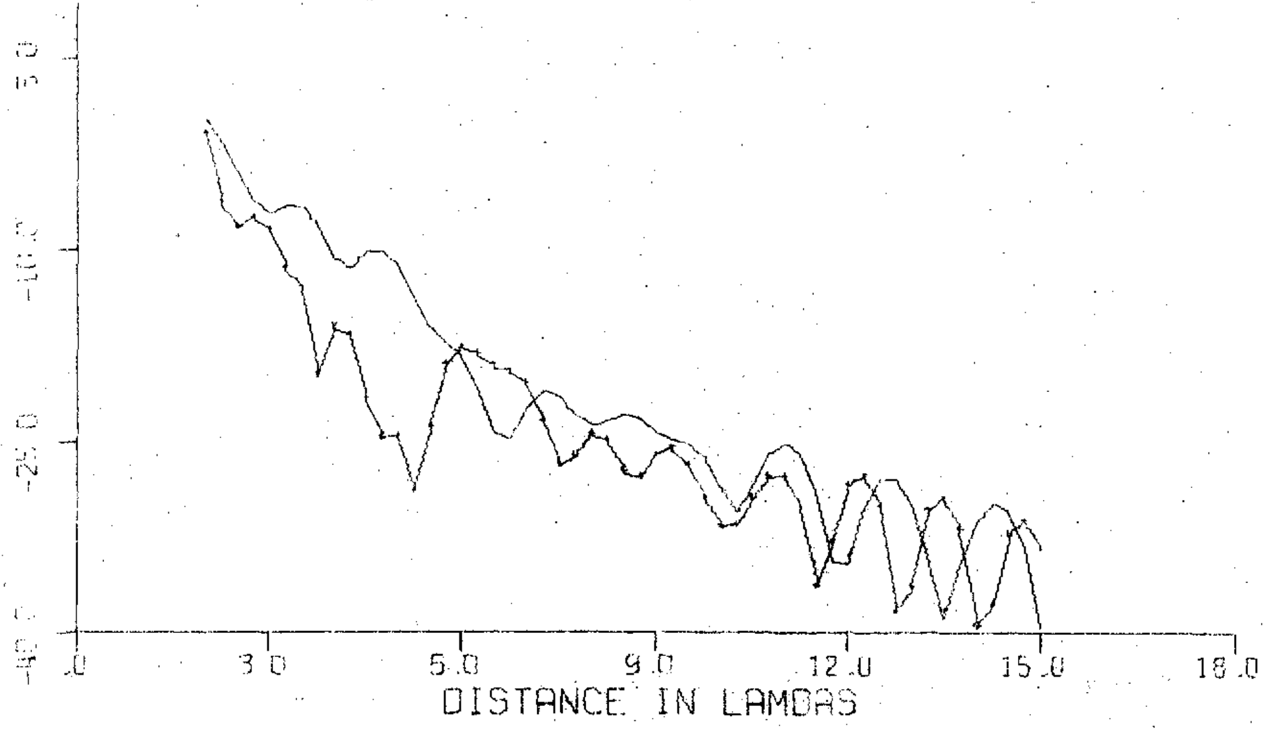
$\varepsilon_1 = 3.2(1+i.0)\varepsilon_0$
$\mu_1 = 1\mu_0, 1.2$
$a = 1$

$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\mu_0, 1.2$
$a = 1$

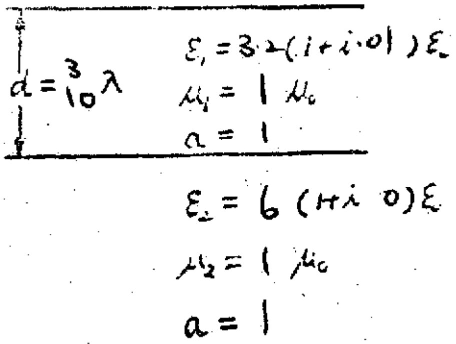


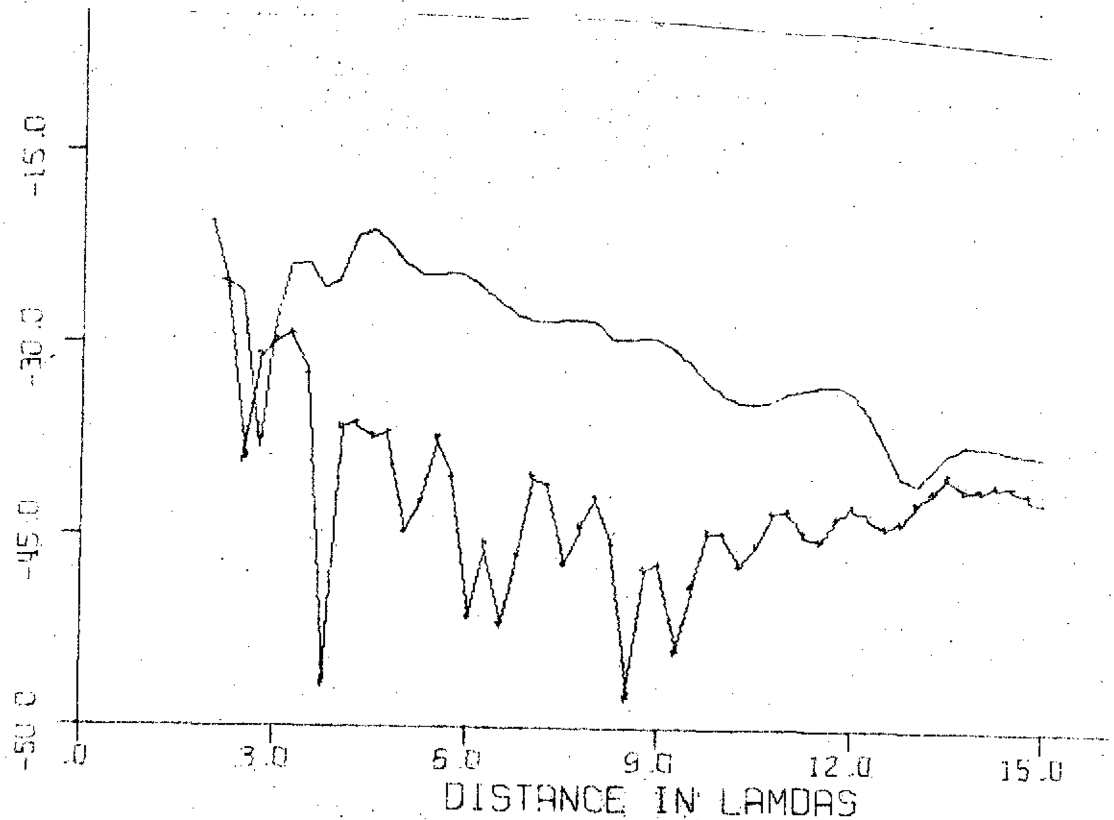
H_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\mu_0, 1.2$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon$
$\mu_2 = 1\mu_0, 1.2$
$a = 1$

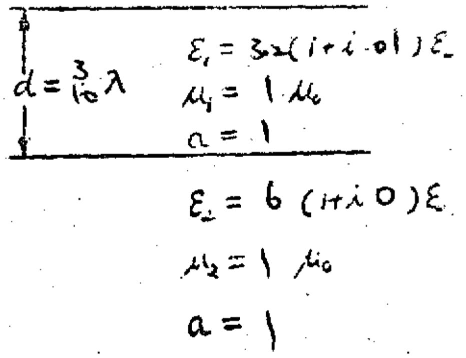

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

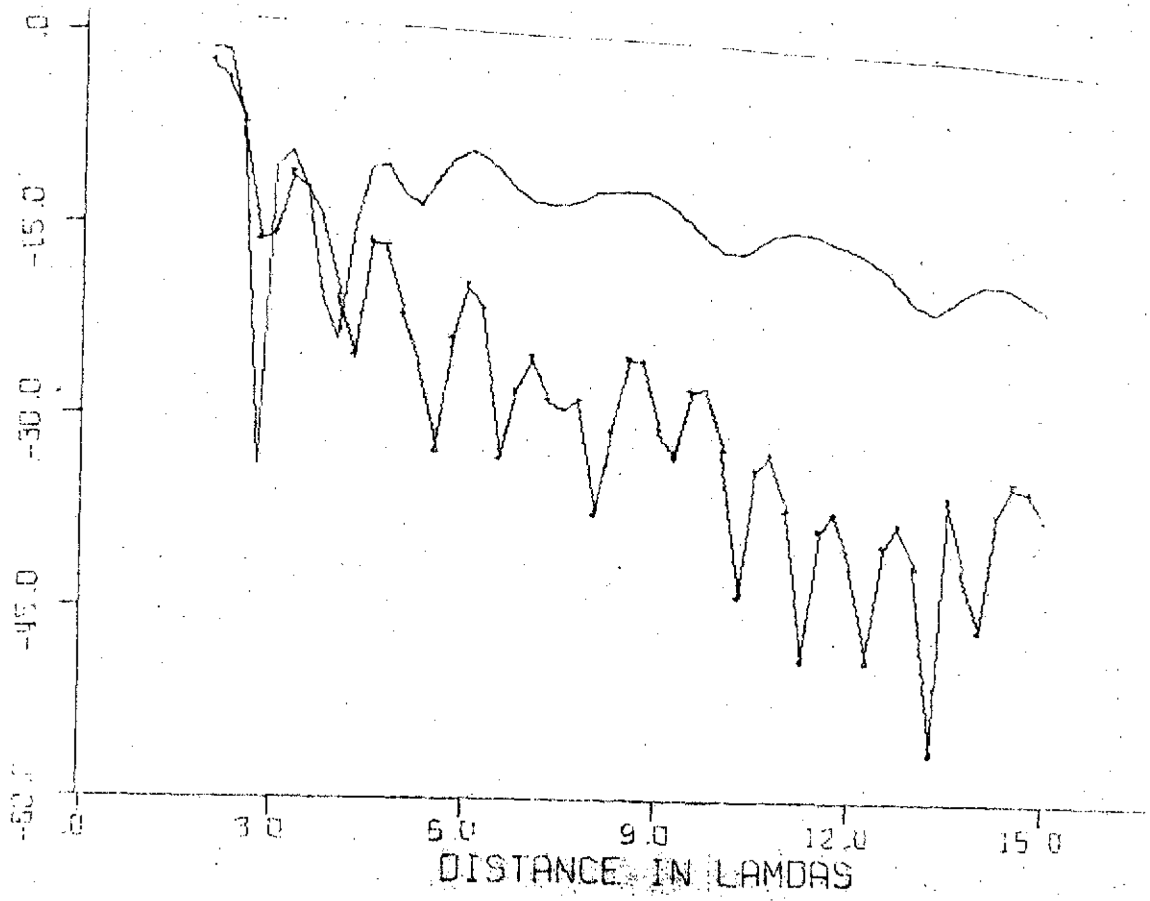
$\bar{E}_\varphi$ (HED)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

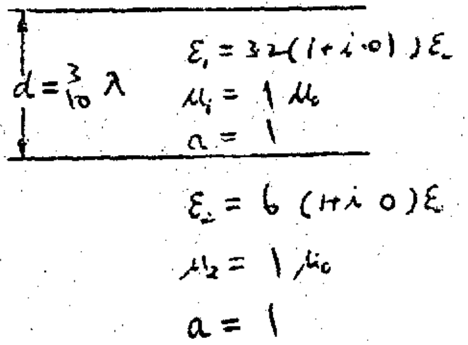


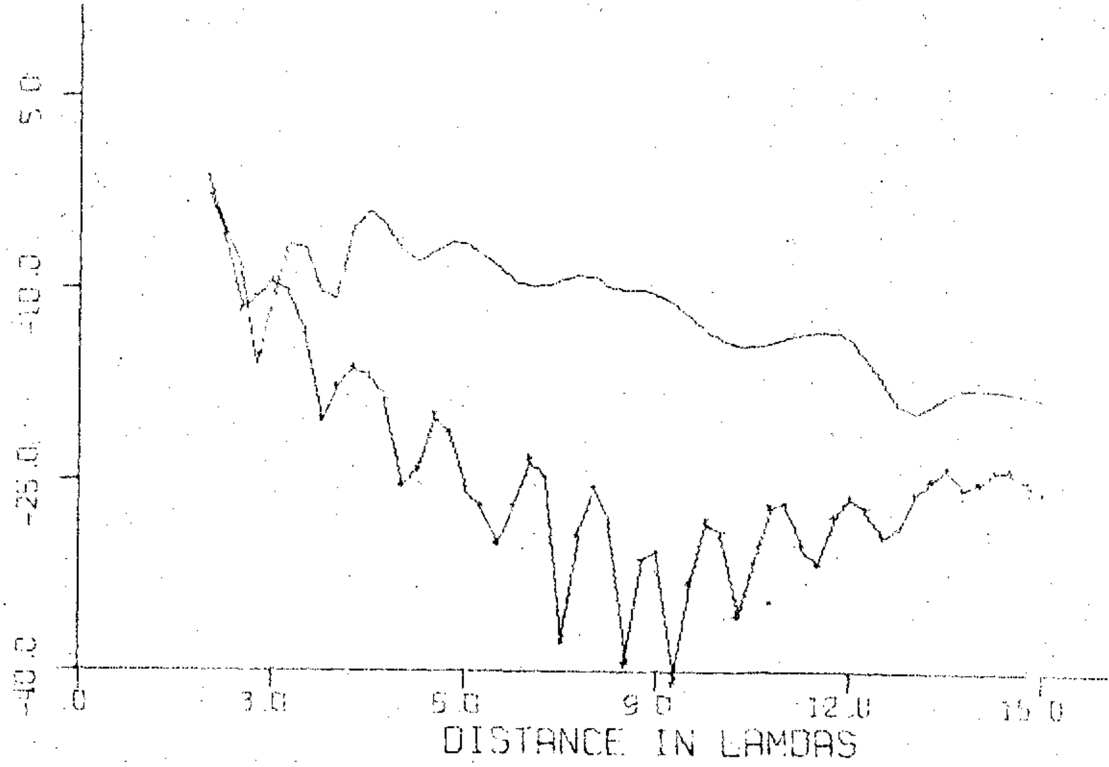
H_ρ (HED)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 32(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$

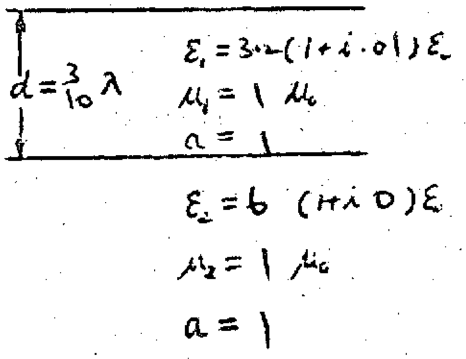

0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

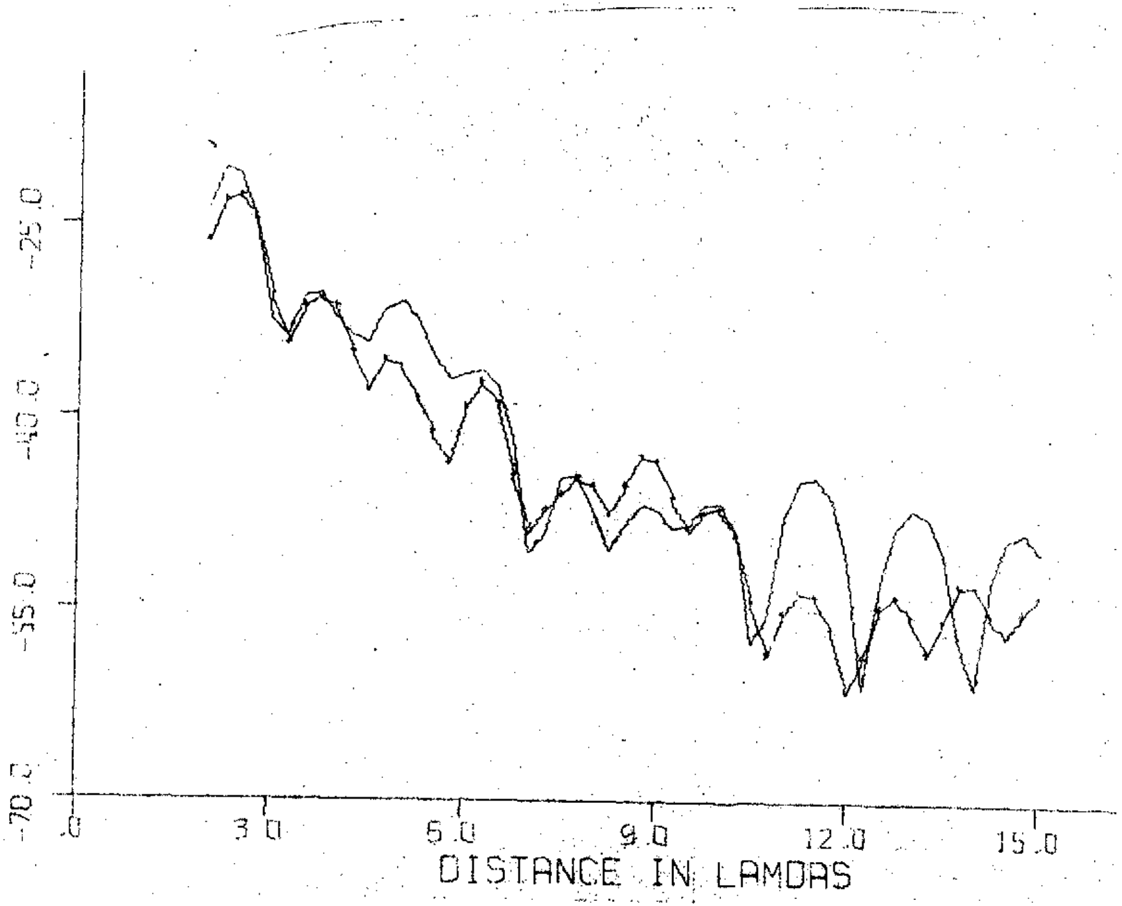
H_z (HED)


$d = \frac{3}{10} \lambda$
$\varepsilon_1 = 32(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$


5.0
-10.0
-25.0
-40.0
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_ρ (HED)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 3.2(1 + i\cdot.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1 + i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

$d = \frac{3}{10}\lambda$

$\varepsilon_1 = 3.4(1+i\cdot 01)\varepsilon_0$

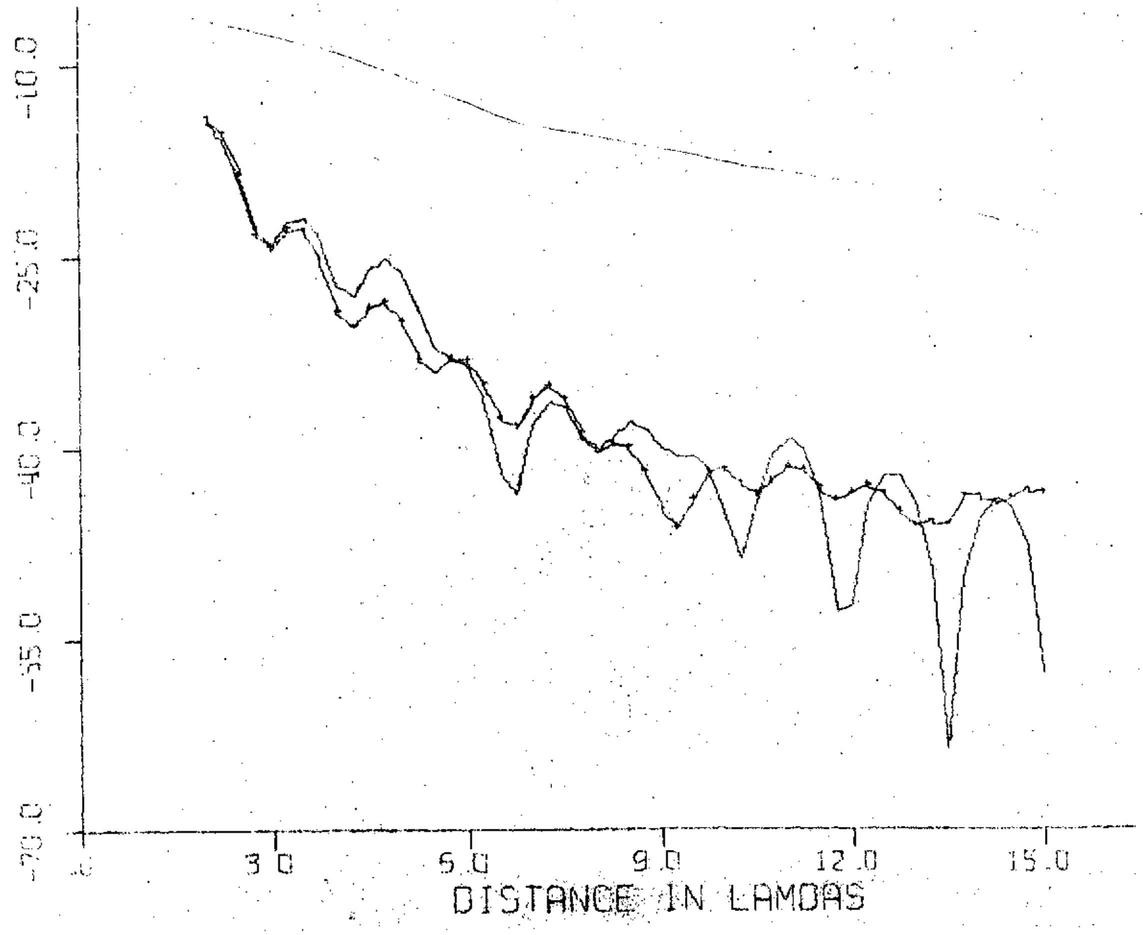
$\mu_1 = 1\ \mu_0$

$a = 1$

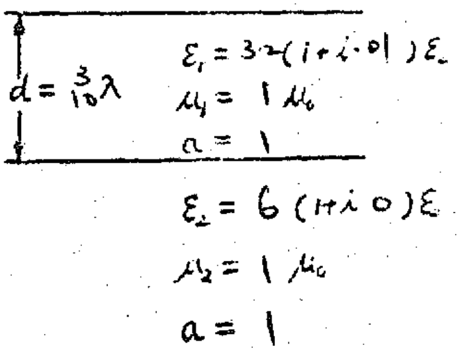
$\varepsilon_2 = 6\ (1+i0)\varepsilon_0$

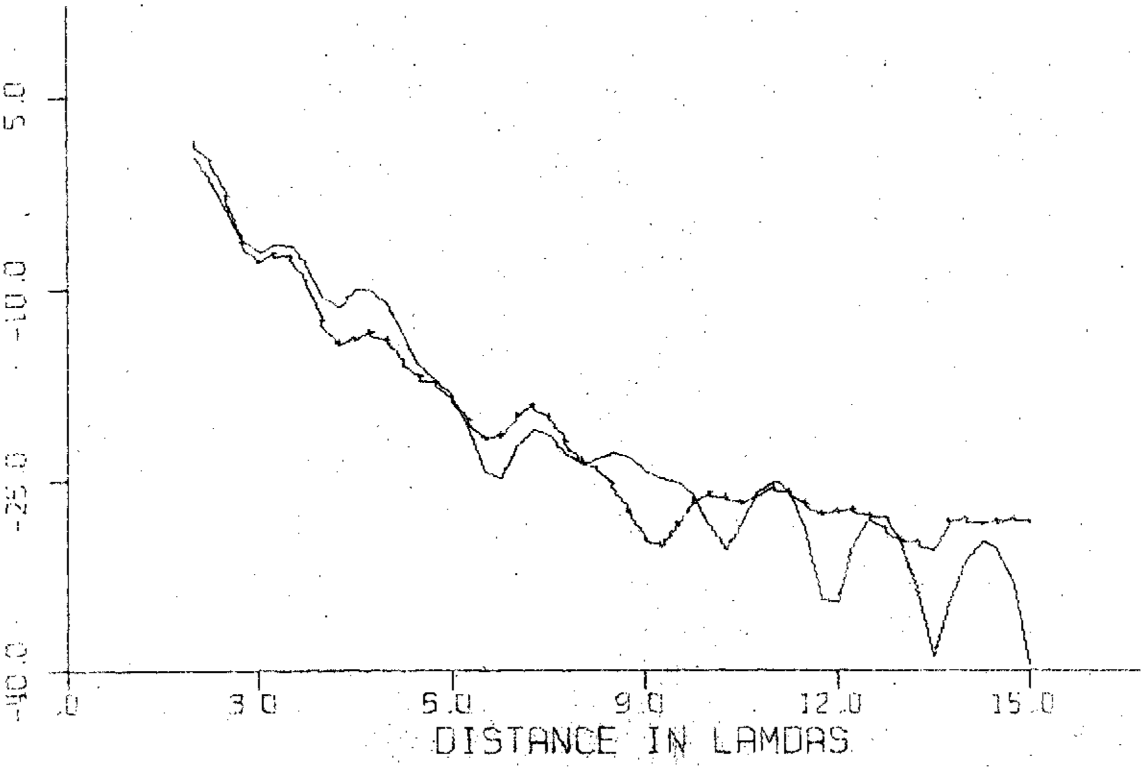
$\mu_2 = 1\ \mu_0$

$a = 1$

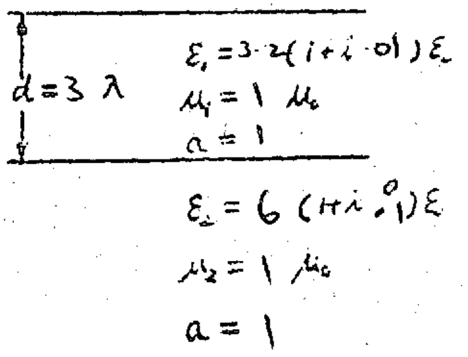


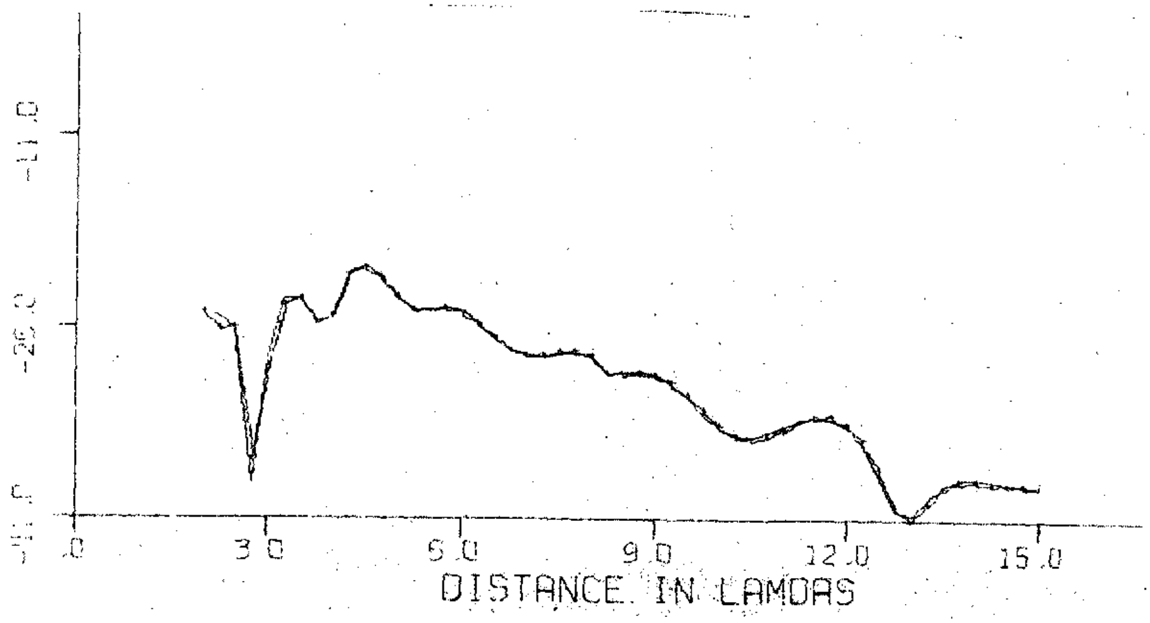
Hφ (HED)


$d = \frac{3}{10}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$

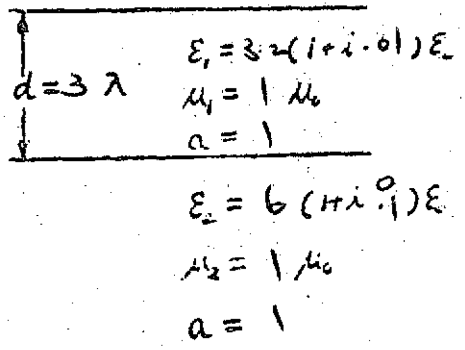

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

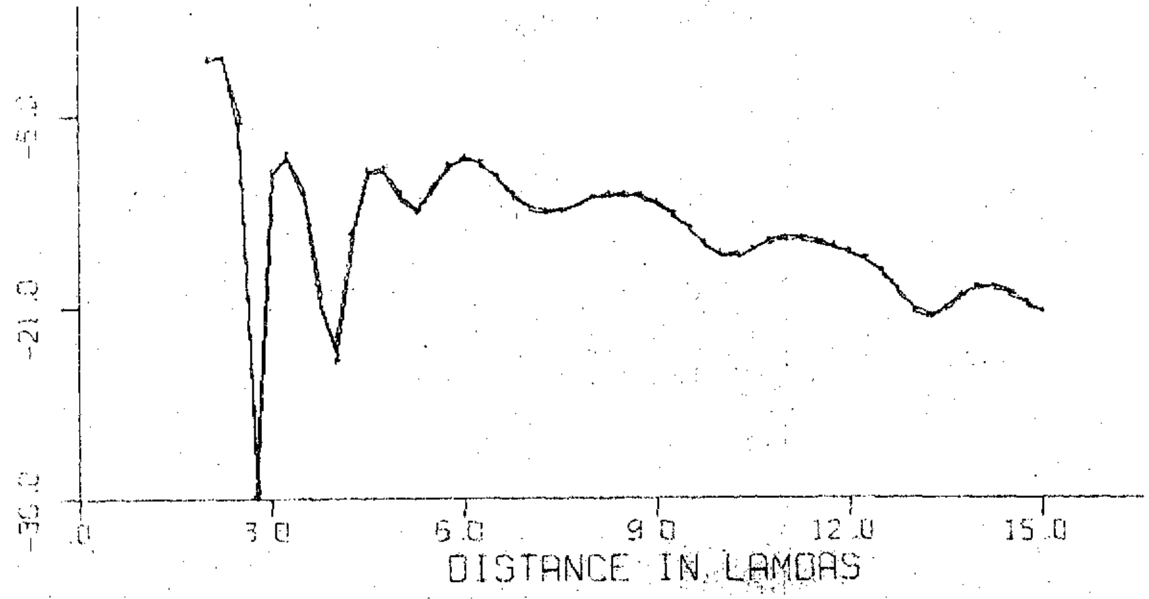
E_φ (HED)


$d = 3\ \lambda$
$\varepsilon_1 = 3.2(1 + i\ .01)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1 + i\ .1)\,\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$

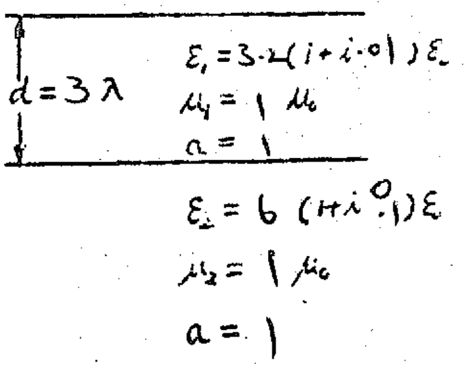

-11.0
-20.0
-31.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

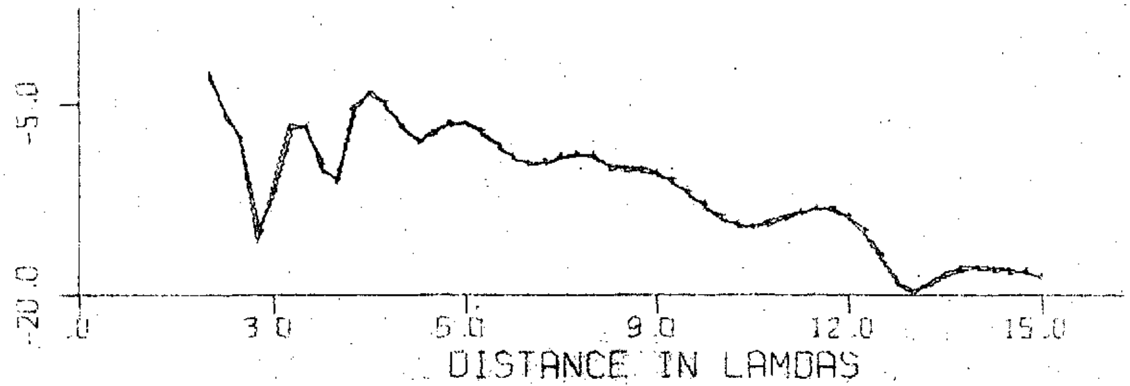
H_g (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i\,.1)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

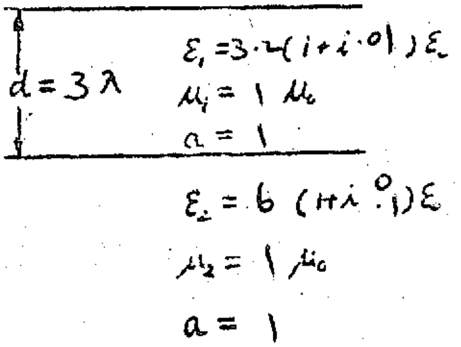

-5.0
-21.0
-30.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

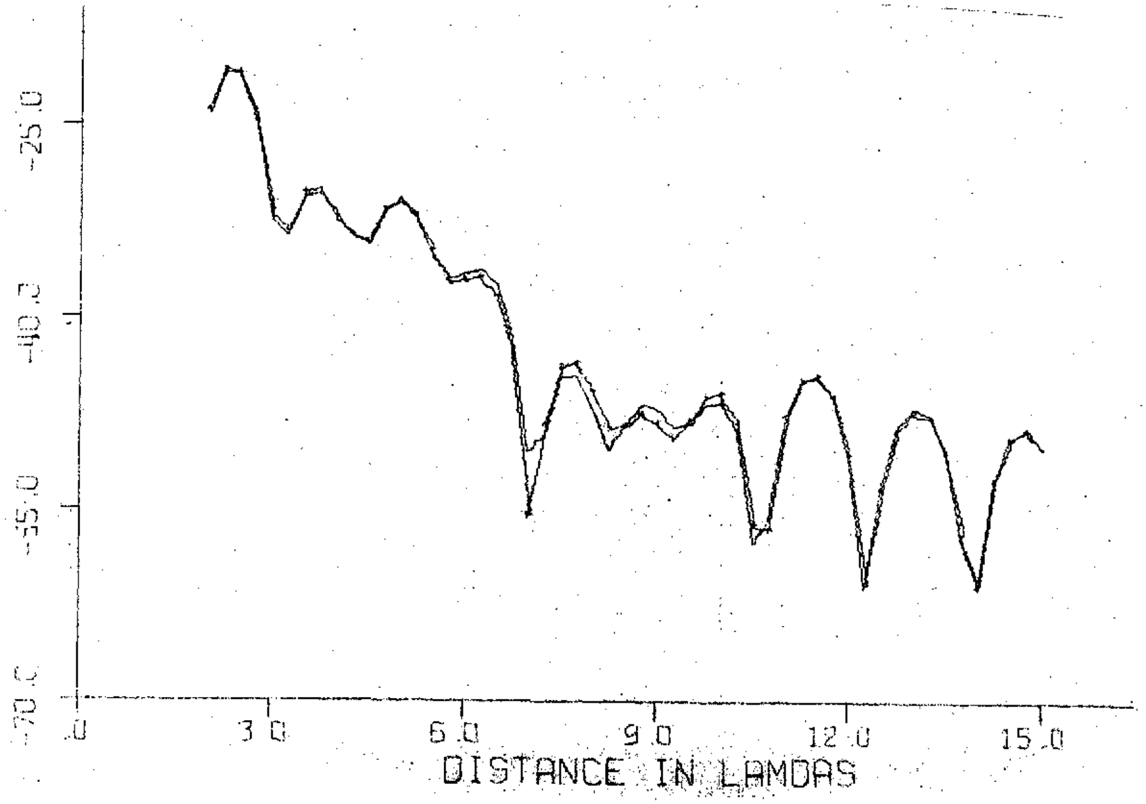
H_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,.01)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

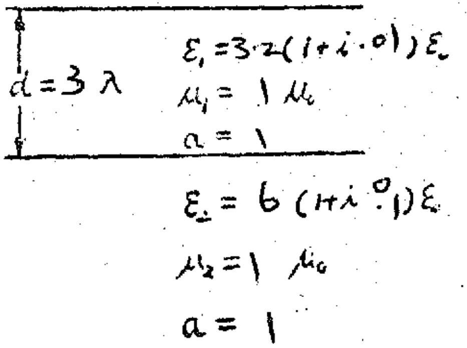

-5.0
-20.0
.0
3.0
5.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

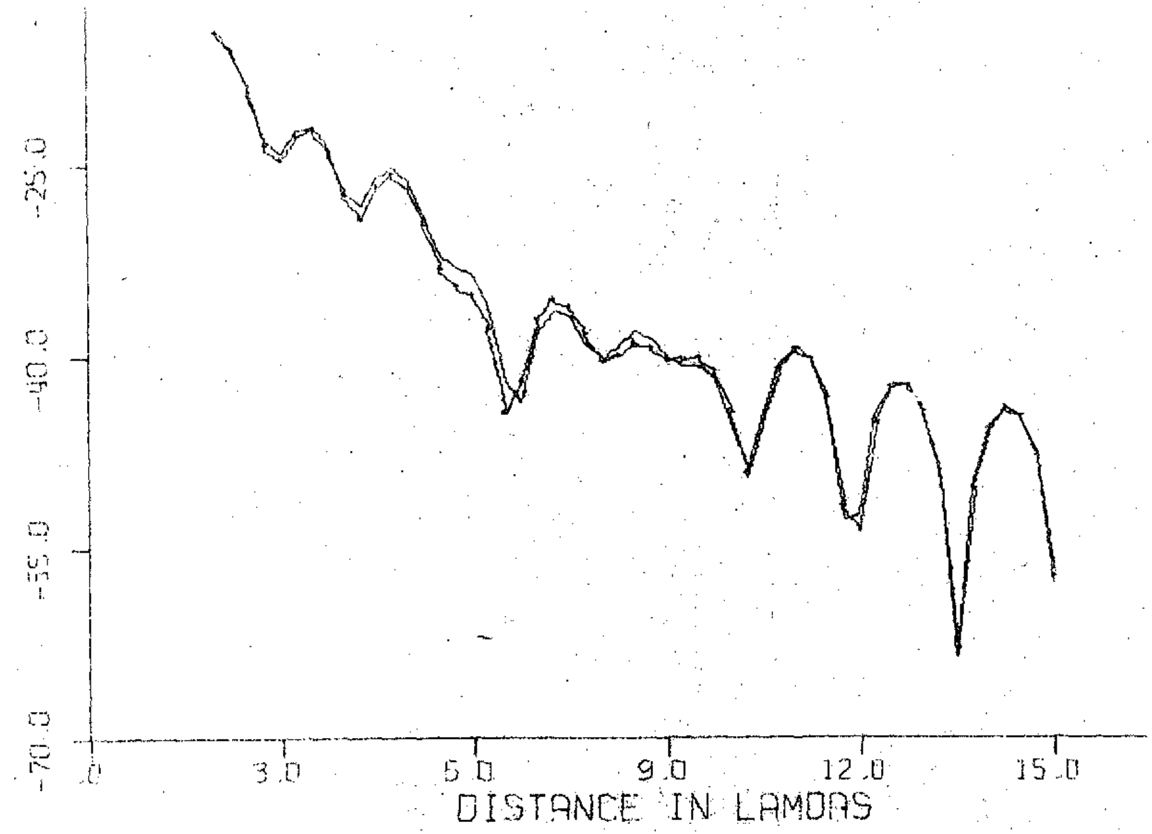
E_g (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i\cdot.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,.01)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

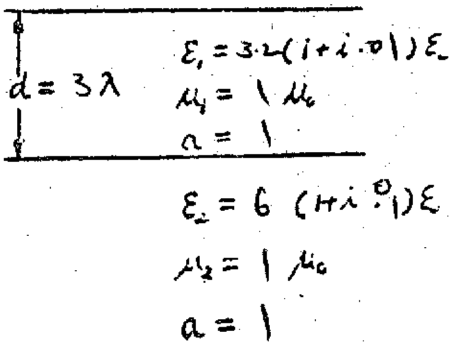

-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

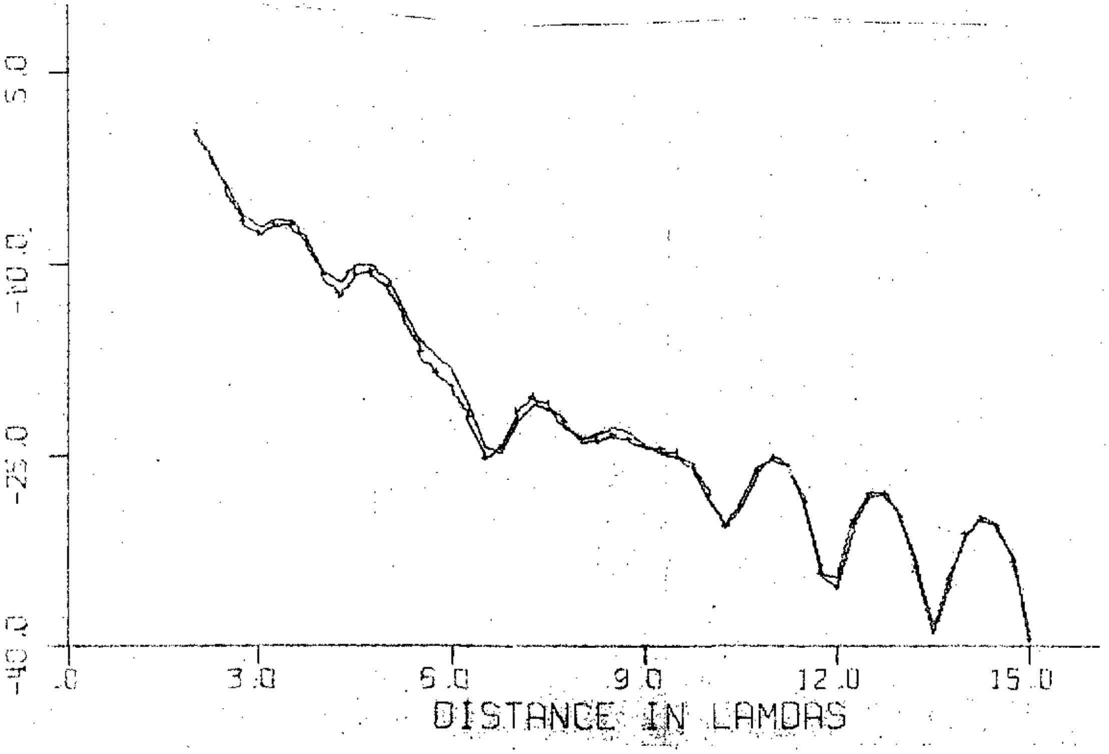
E_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i\,0.1)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

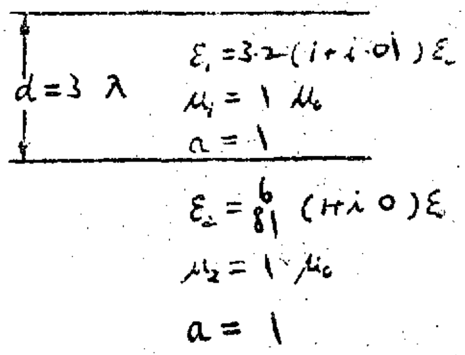

-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

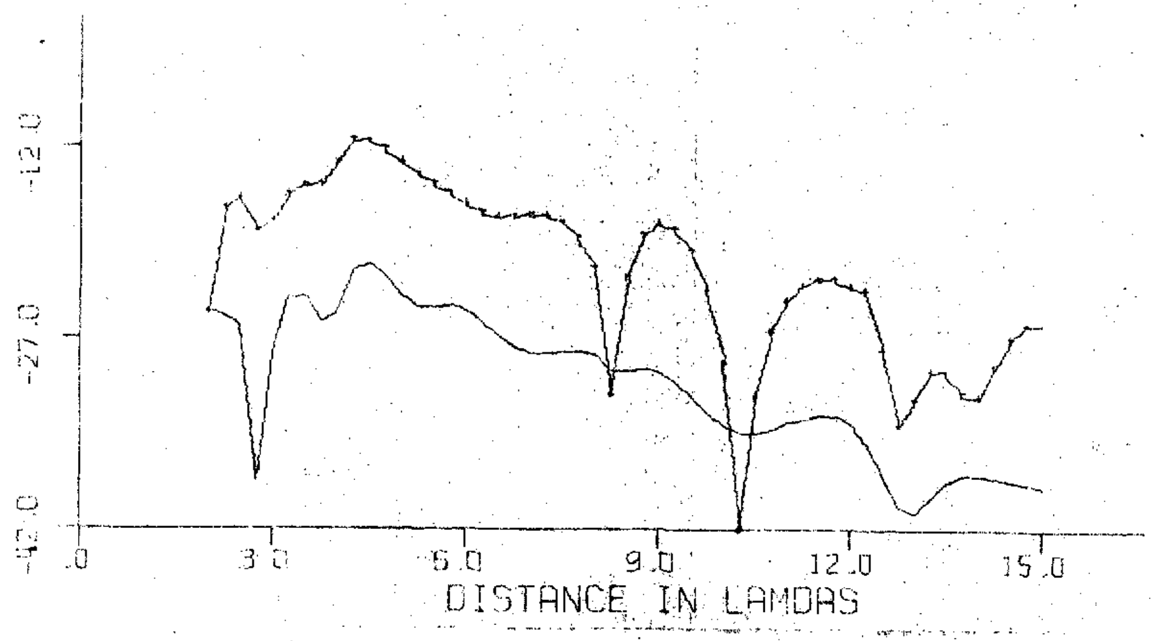
H_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\cdot 01)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

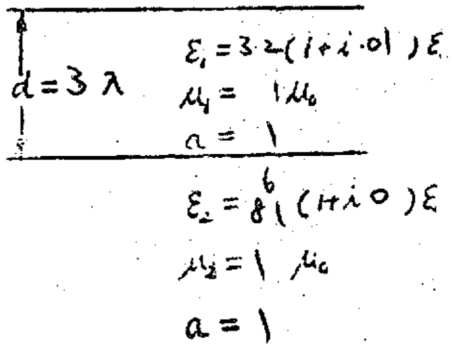

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Eφ (HED)

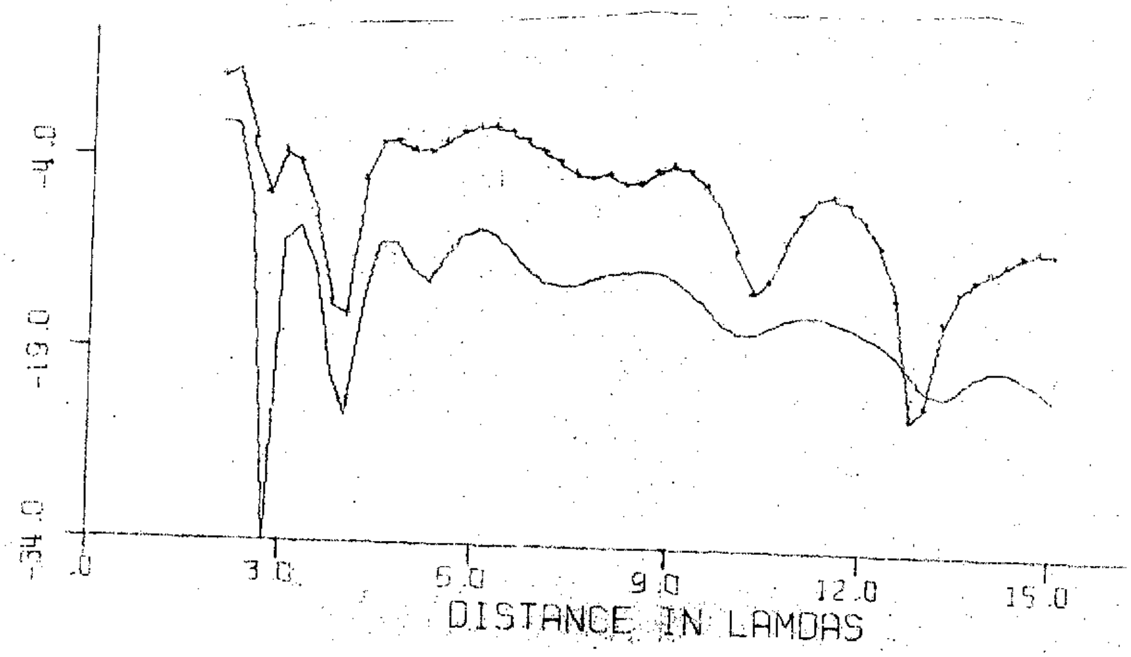

d = 3 λ
$\varepsilon_1 = 3.2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
a = 1
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon$
$\mu_2 = 1\ \mu_0$
a = 1


-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

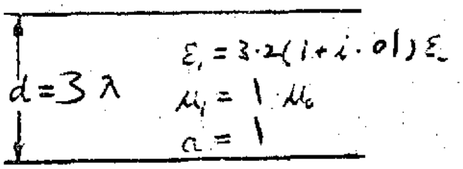


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon$
$\mu_1 = 1\mu_0$
$a = 1$
$\varepsilon_2 = 8^6 1(1+i0)\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$



-4.0
-19.0
-34.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

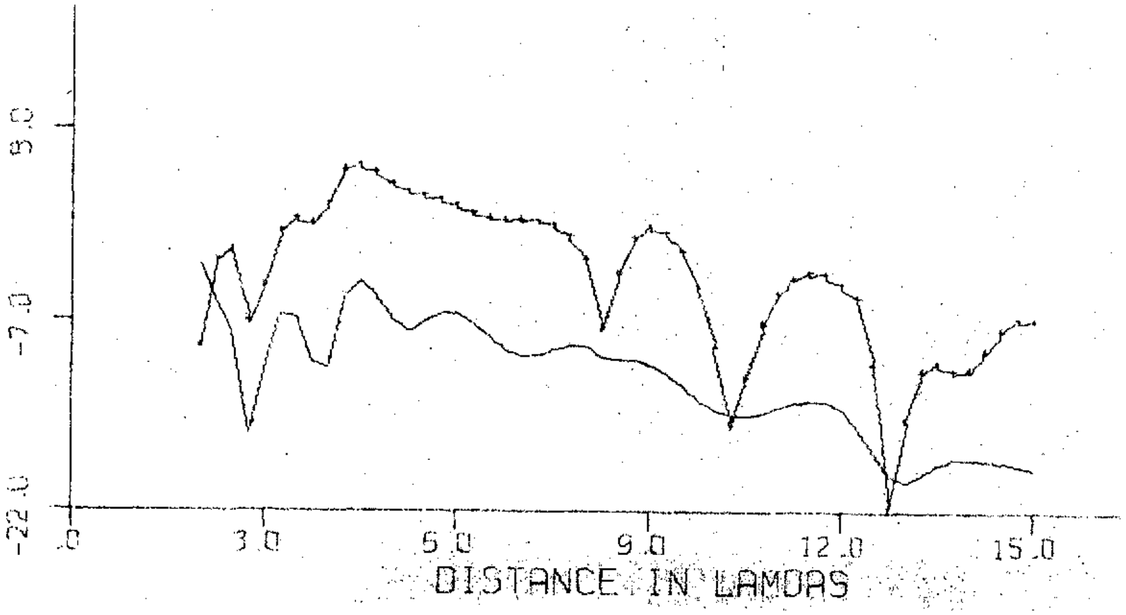


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

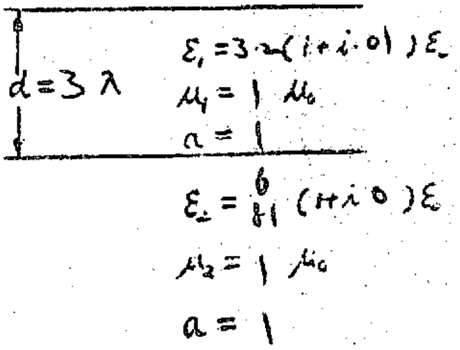
$\varepsilon_2 = 81(1+i\,0\,)\varepsilon_0$

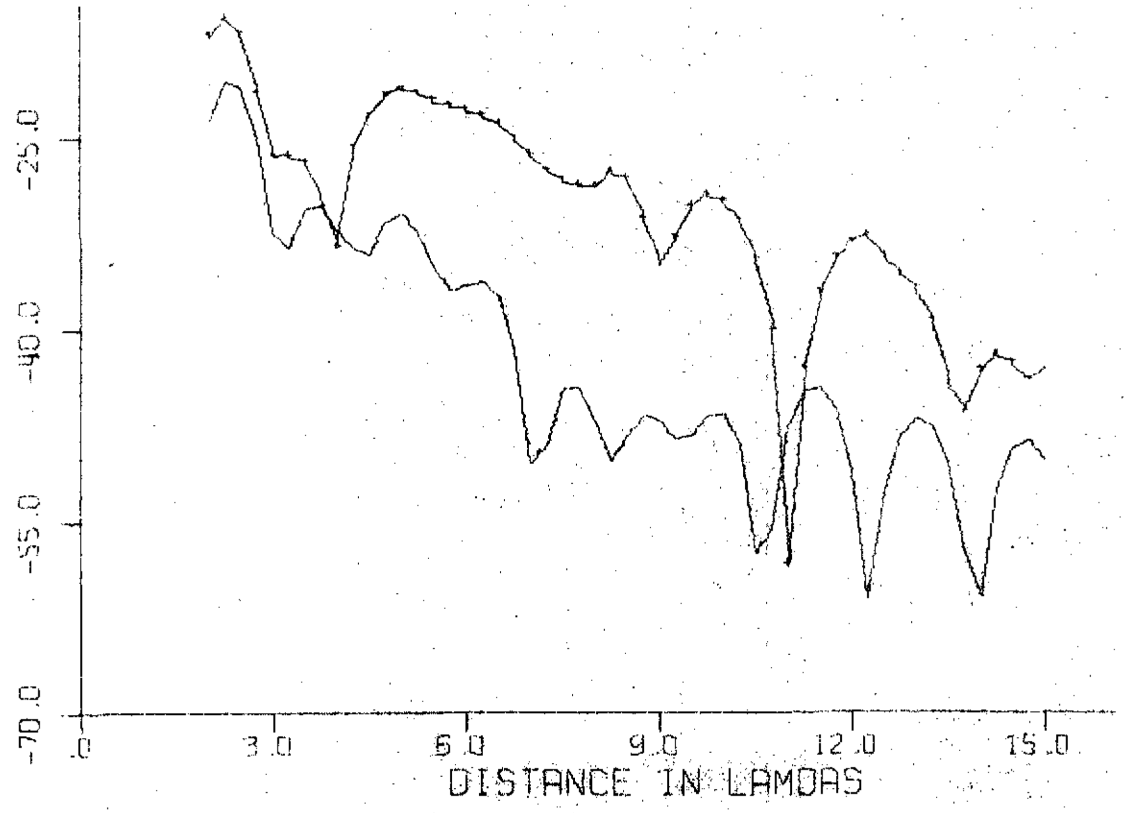
$\mu_2 = 1\,\mu_0$

$a = 1$

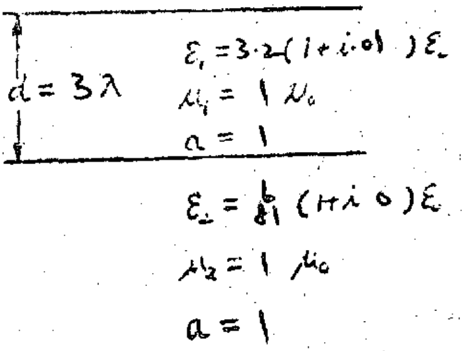


E_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)



$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

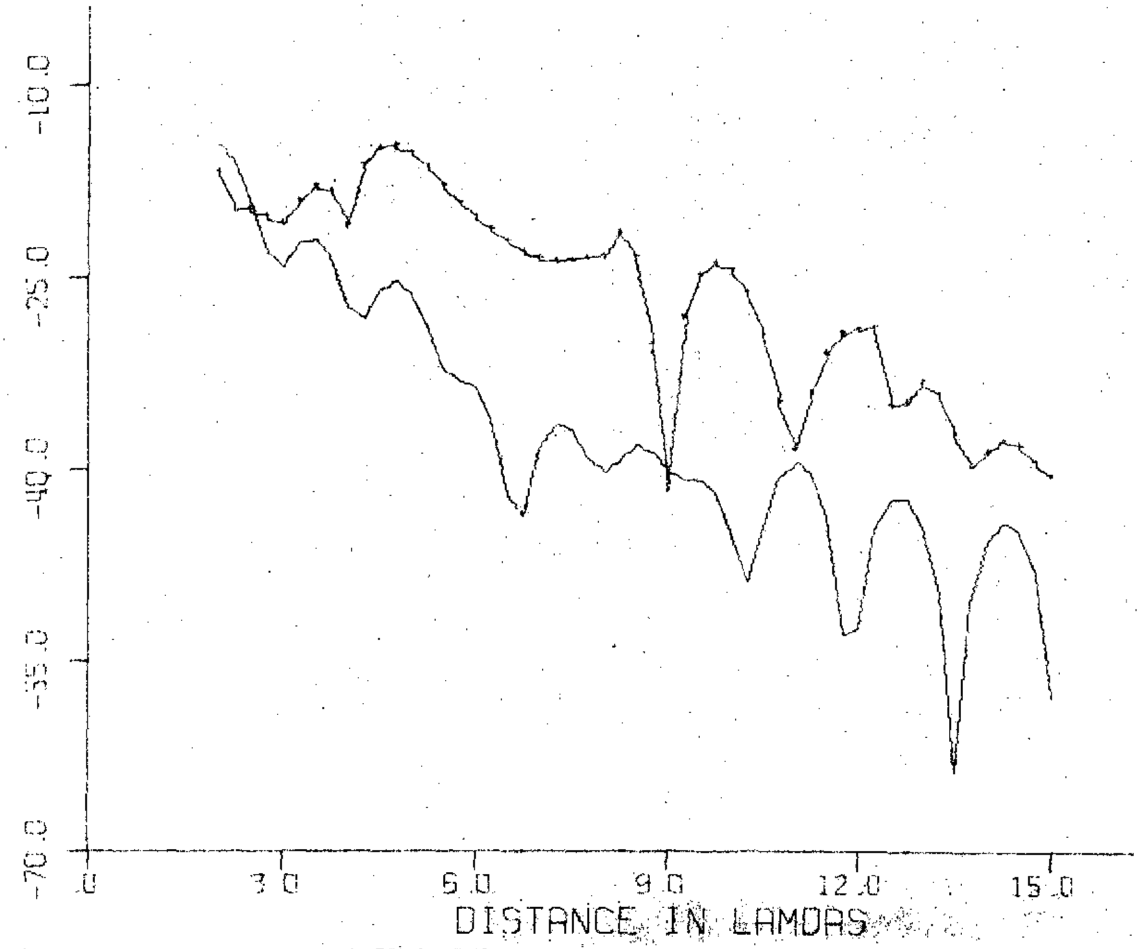
$\mu_1 = 1\,\mu_0$

$a = 1$

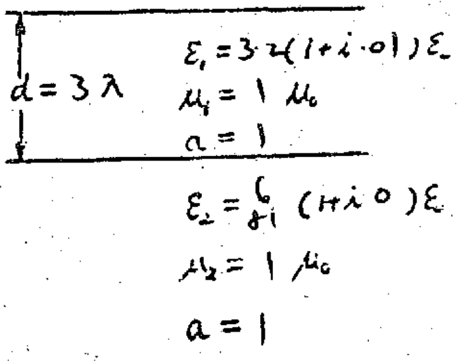
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$

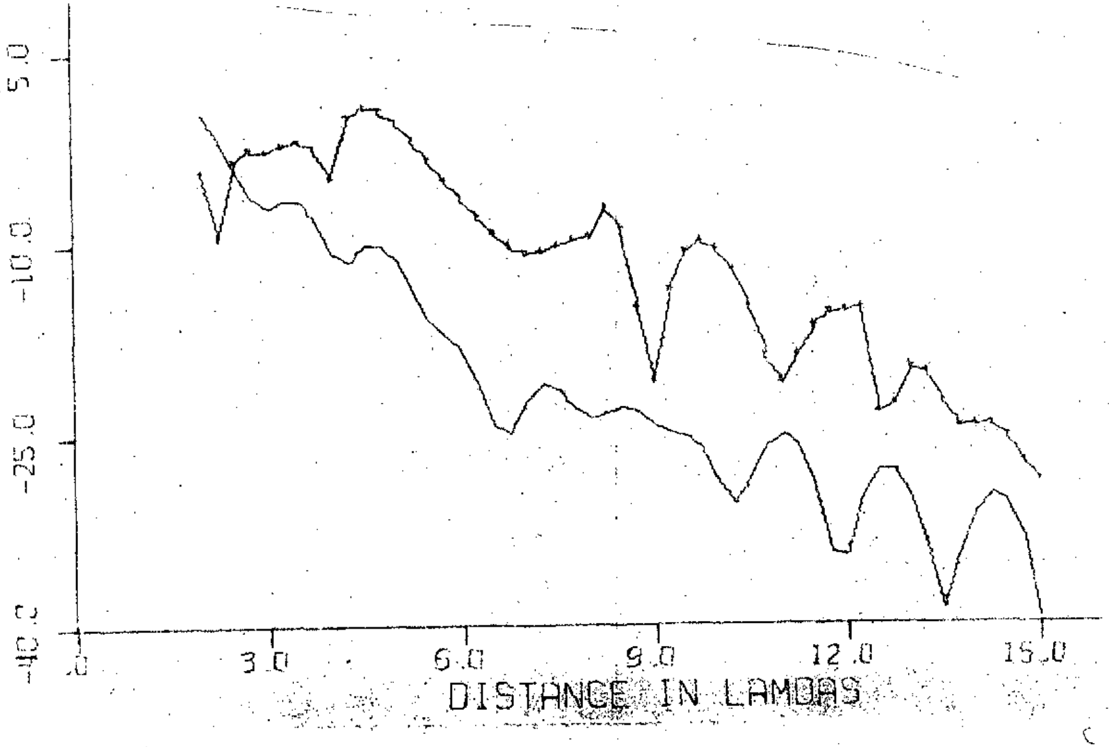
$\mu_2 = 1\,\mu_0$

$a = 1$

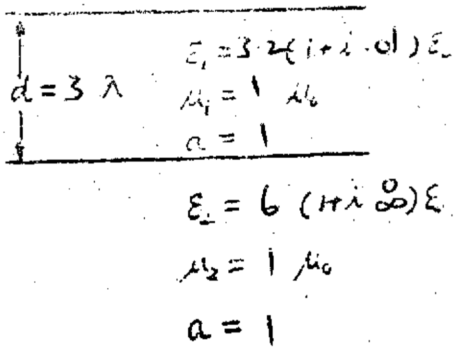


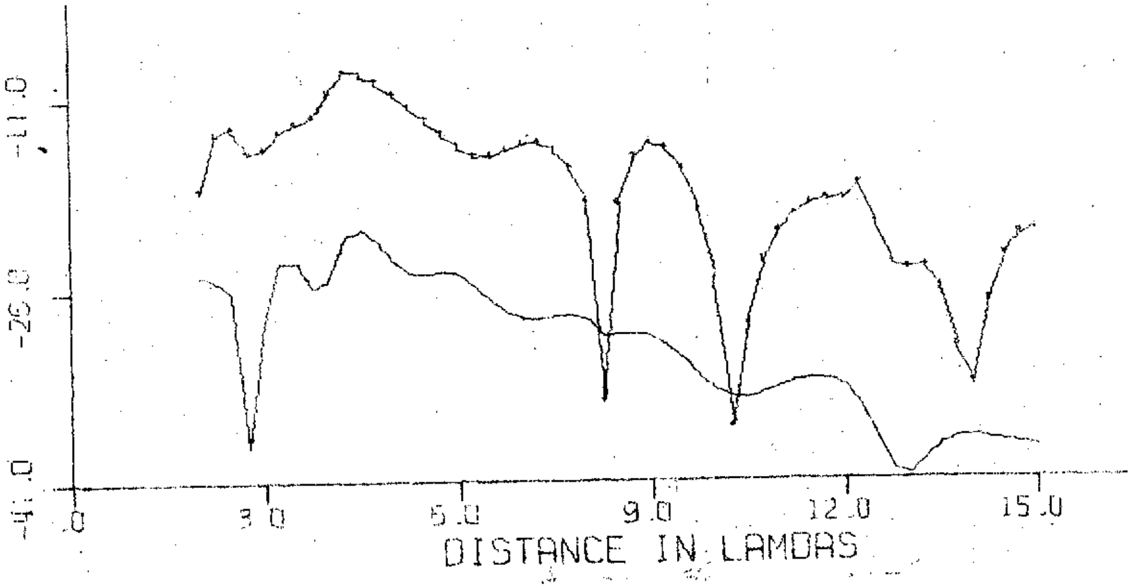
H_ϕ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$

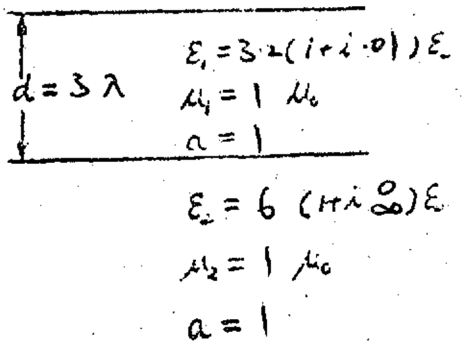

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

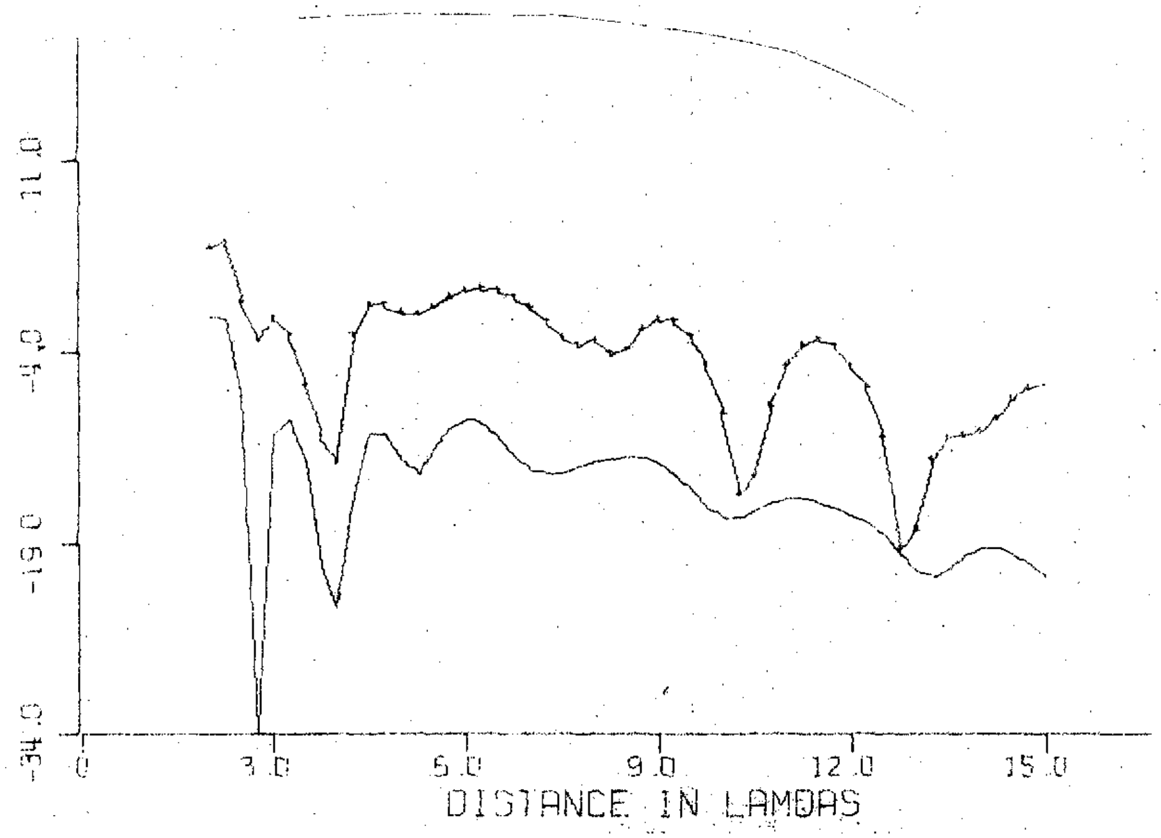
E_ϕ (HED)


$d = 3\ \lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\,.00)\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$

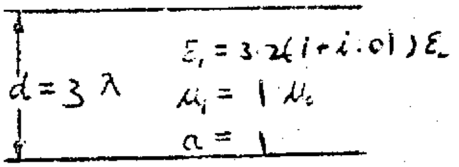

-11.0
-26.0
-41.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\overset{0}{\infty})\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$


11.0
-4.0
-19.0
-34.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_y (HED)



$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

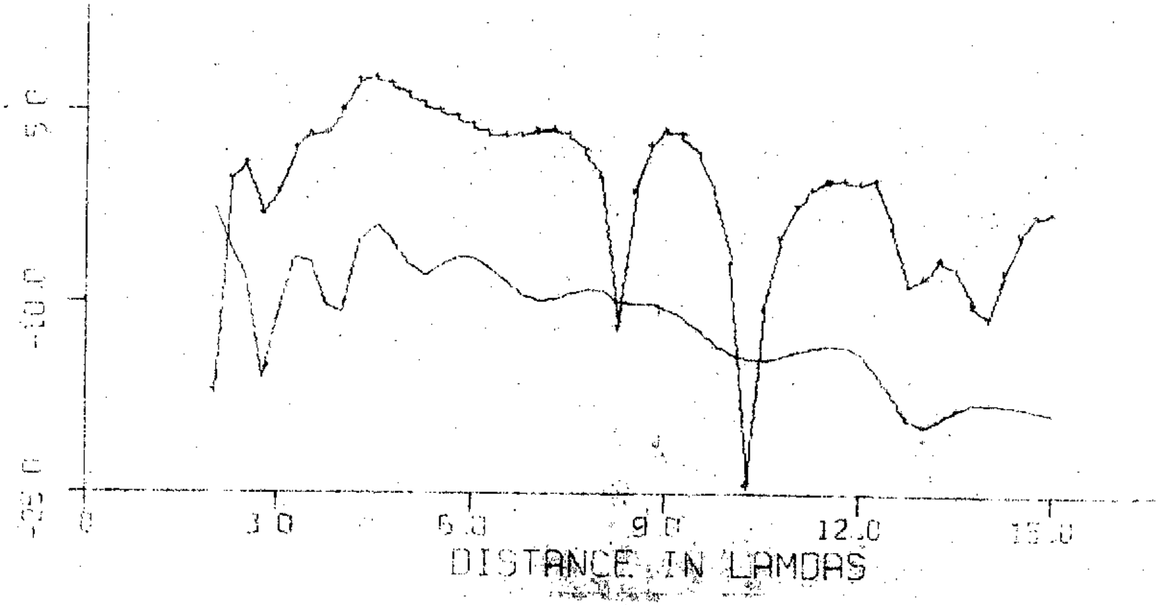
$\mu_1 = 1\,\mu_0$

$a = 1$

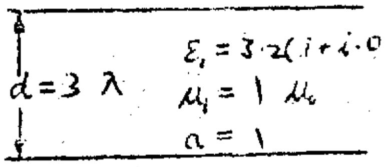
$\varepsilon_2 = 6\,(1+i.00)\varepsilon_0$

$\mu_2 = 1\,\mu_0$

$a = 1$



E_z (HED)



$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

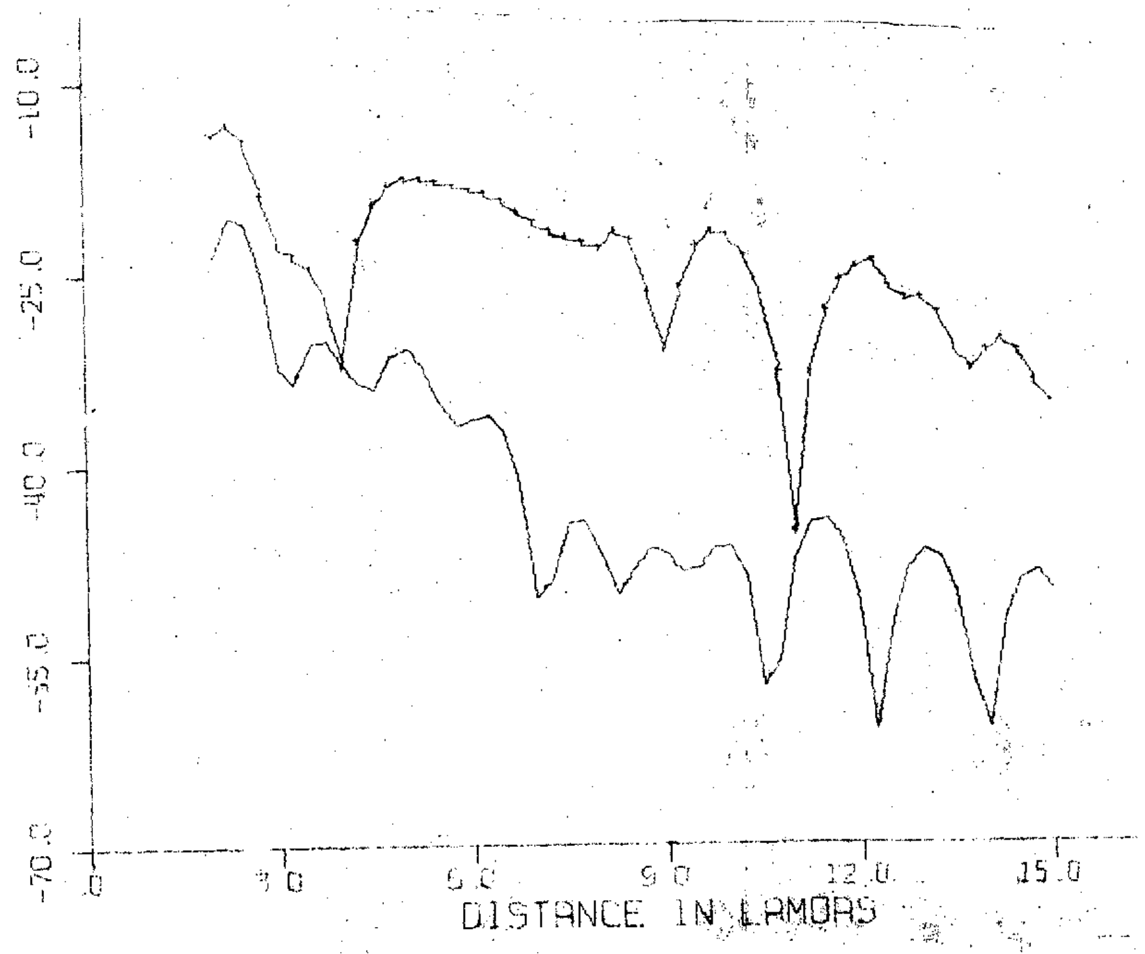
$\mu_1 = 1\ \mu_0$

$a = 1$

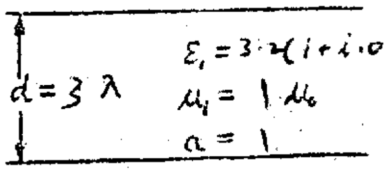
$\varepsilon_2 = 6\ (1+i\overset{\circ}{\infty})\varepsilon$

$\mu_2 = 1\ \mu_0$

$a = 1$

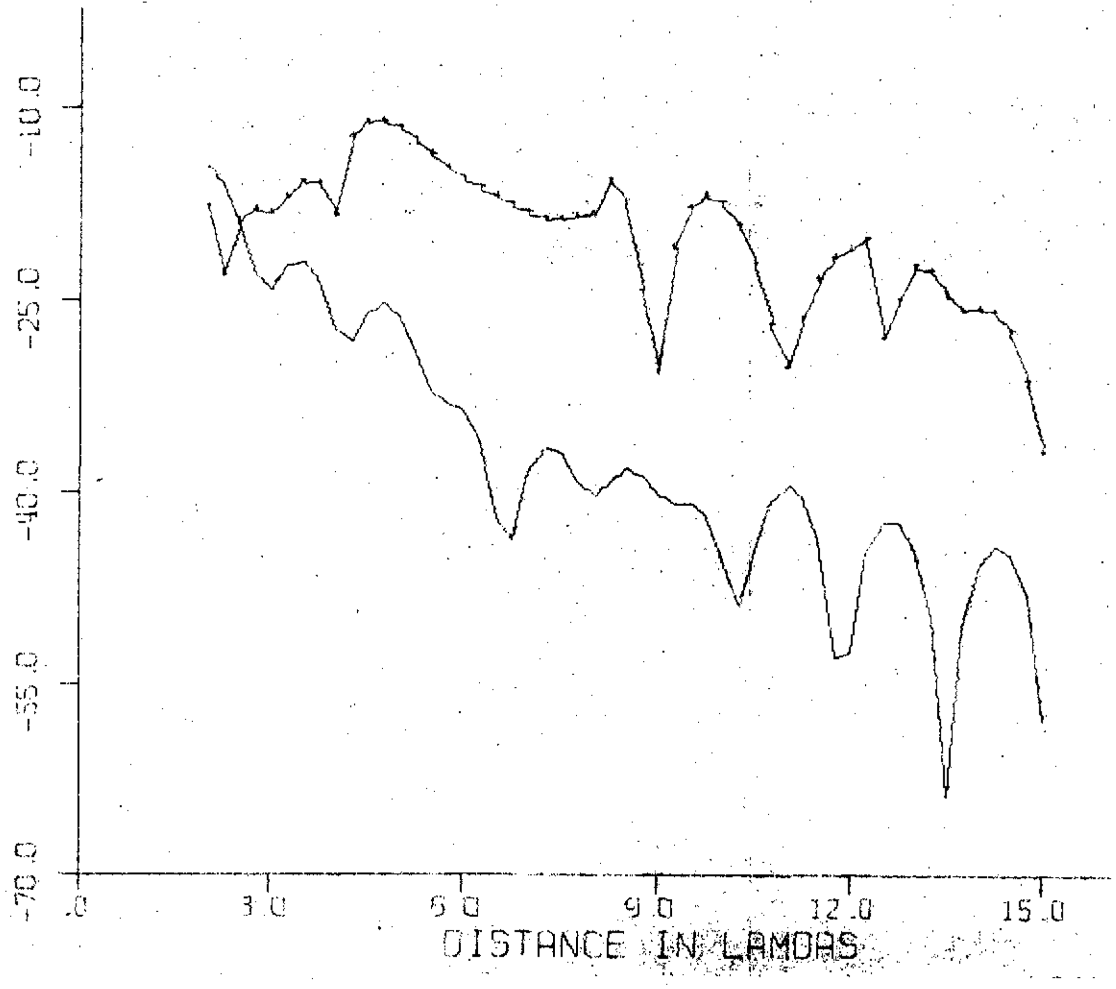


E_z (HED)

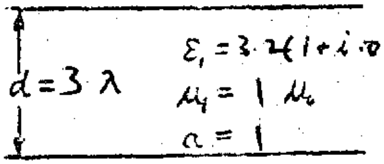


$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

$\varepsilon_2 = 6\,(1+i.00)\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1$



H_φ (HED)



$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

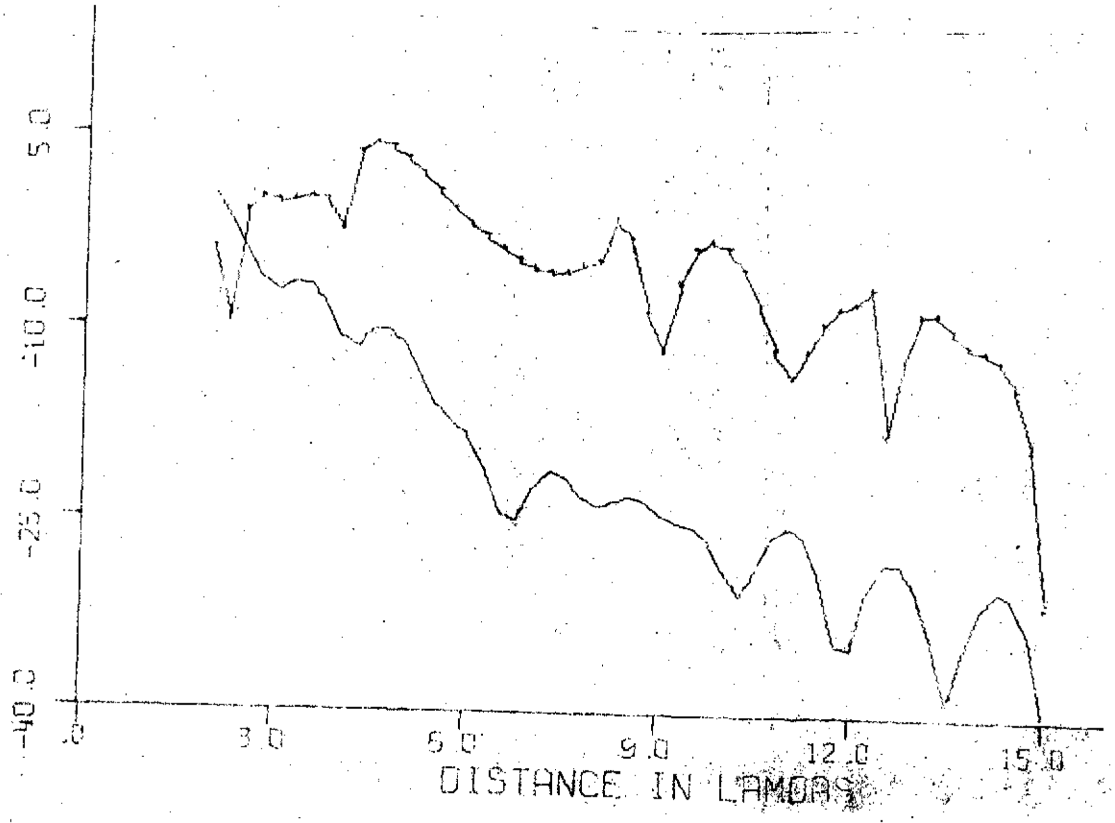
$\mu_1 = 1\,\mu_0$

$a = 1$

$\varepsilon_2 = 6(1+i.08)\varepsilon$

$\mu_2 = 1\,\mu_0$

$a = 1$



E_ϕ (HED)

$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

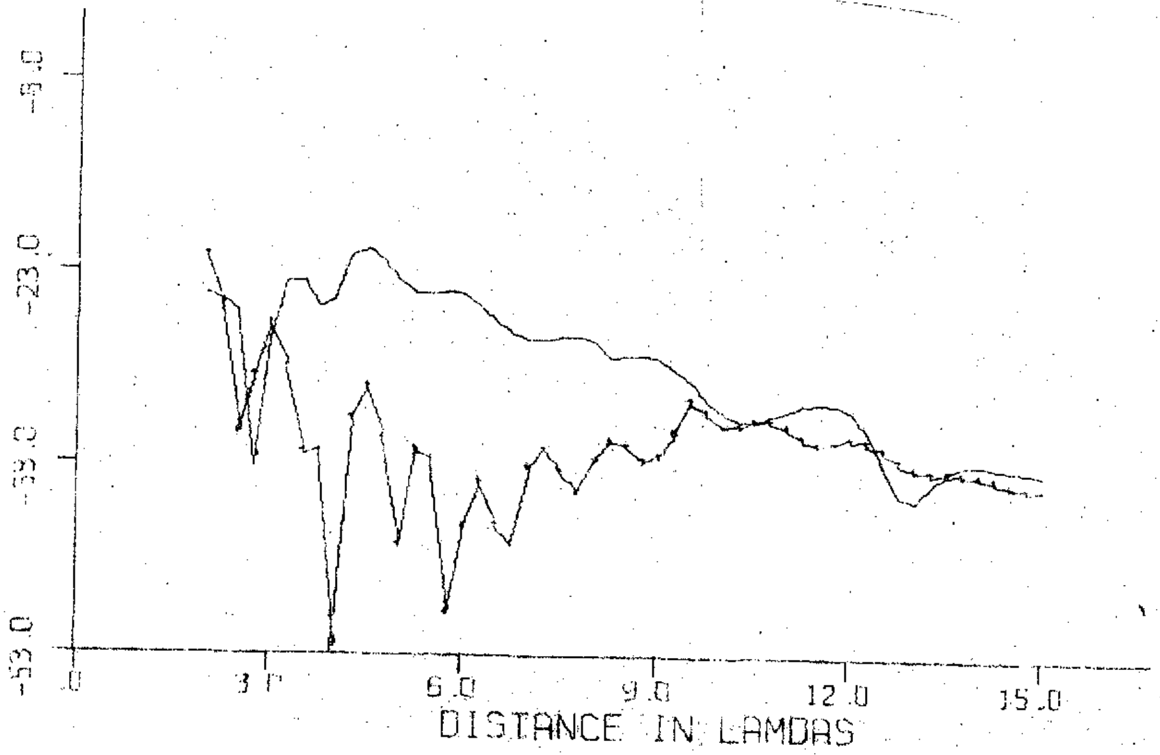
$\mu_1 = 1\,\mu_0$

$a = .8$

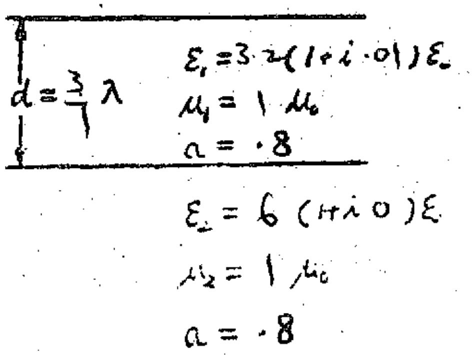
$\varepsilon_2 = 6(1+i\,0)\varepsilon_0$

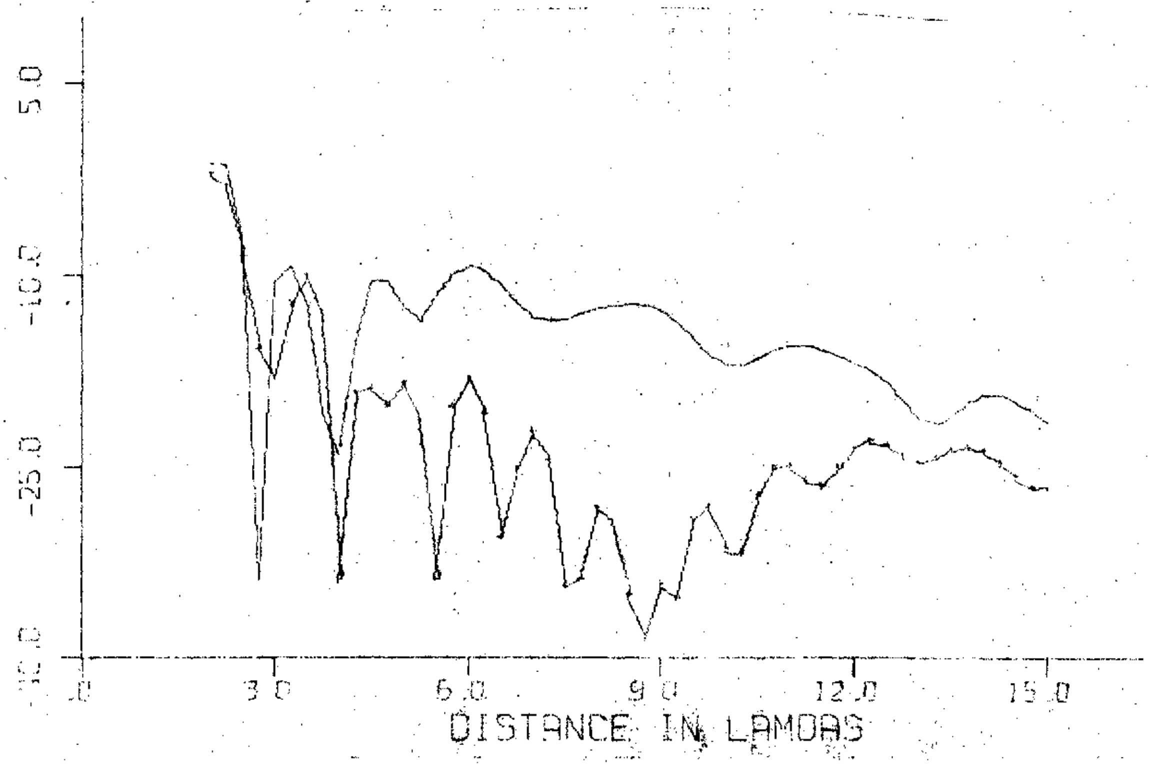
$\mu_2 = 1\,\mu_0$

$a = .8$

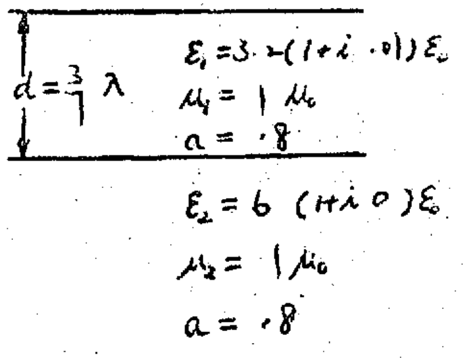


H_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = .8$

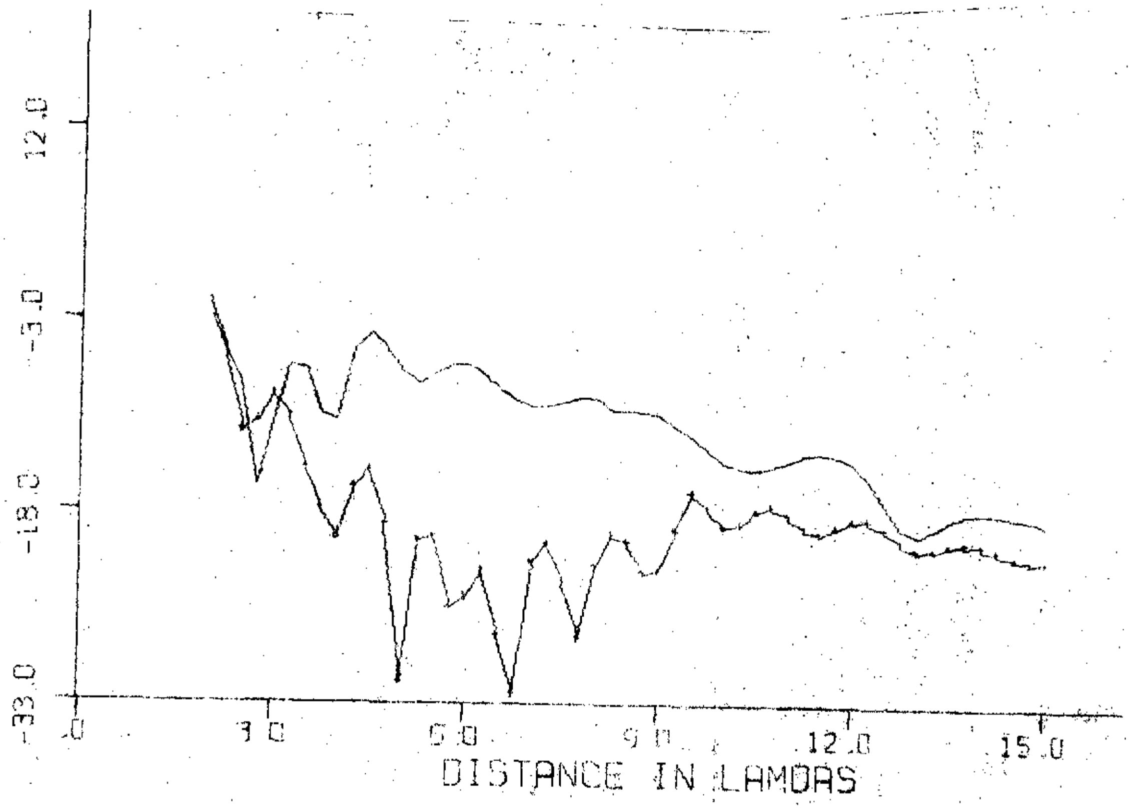

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_y (HED)

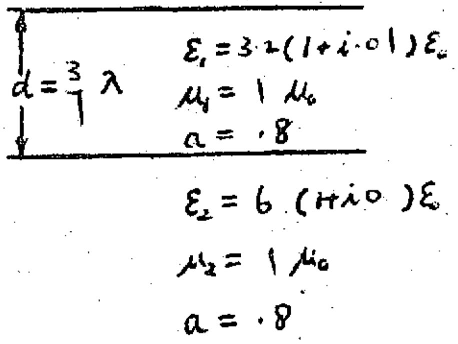

$d = \frac{3}{7}\lambda$

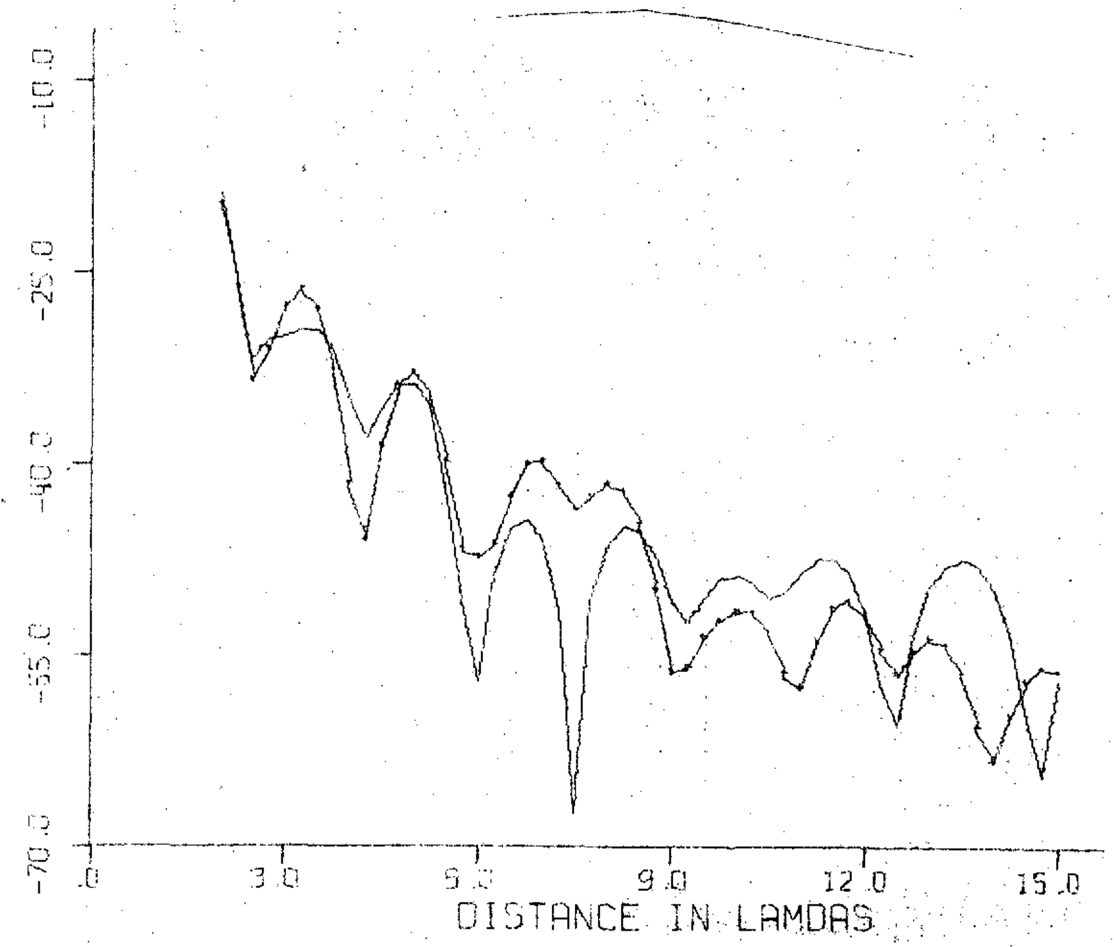
$\varepsilon_1 = 3.2(1 + i\ .01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = .8$

$\varepsilon_2 = 6\ (1 + i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = .8$

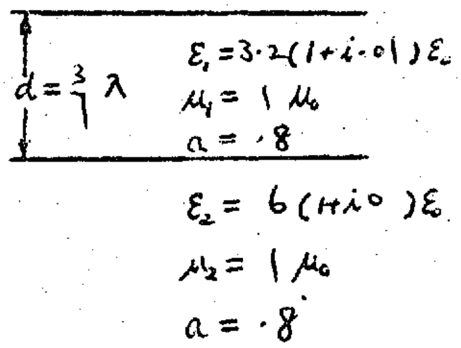


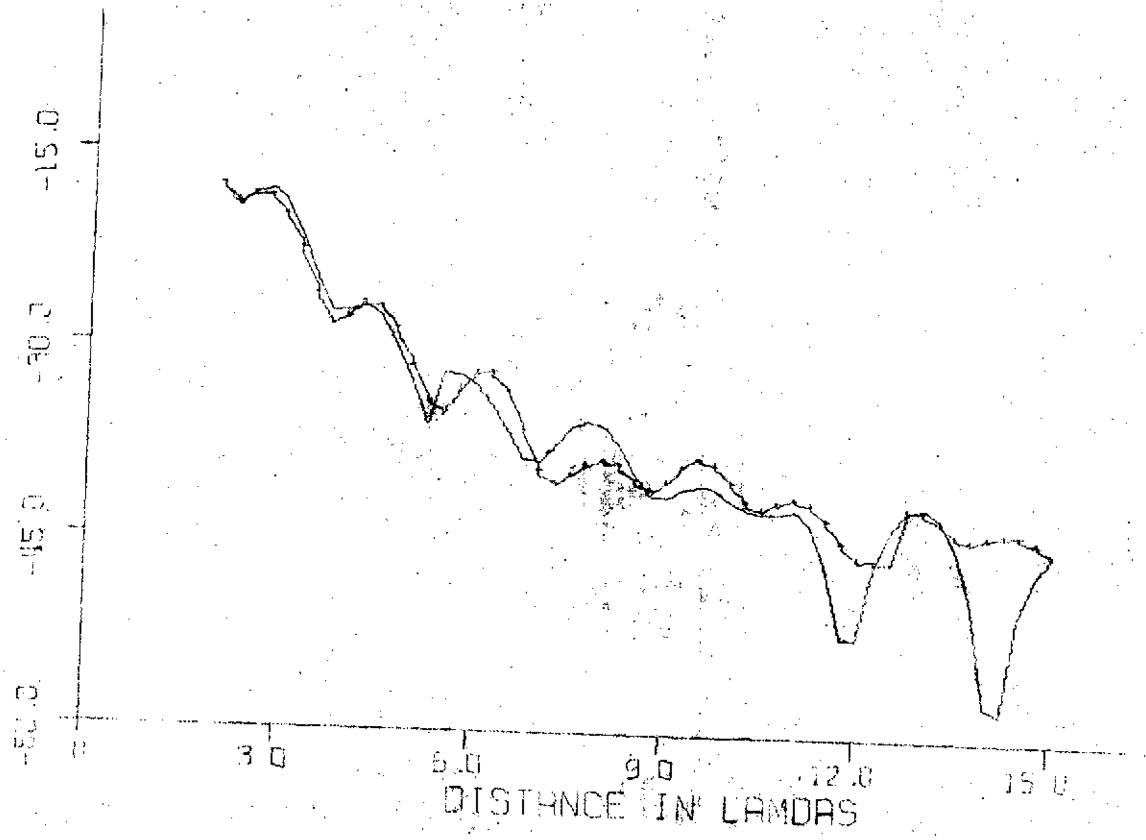
$\overline{E}_z$ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 6\,(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$

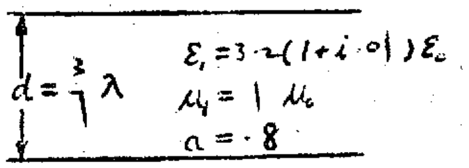


E_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1 + i .01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 6(1 + i 0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$


-15.0
-30.0
-45.0
-60.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

Hφ (HED)

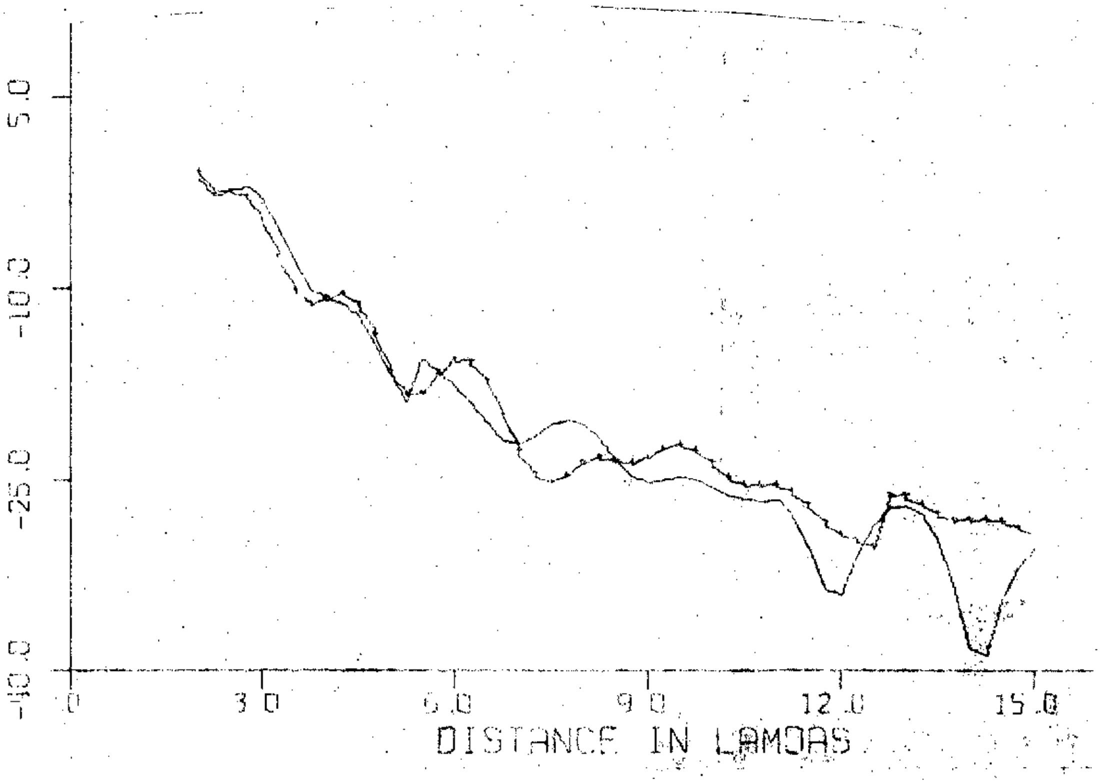


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3\cdot2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = \cdot 8$

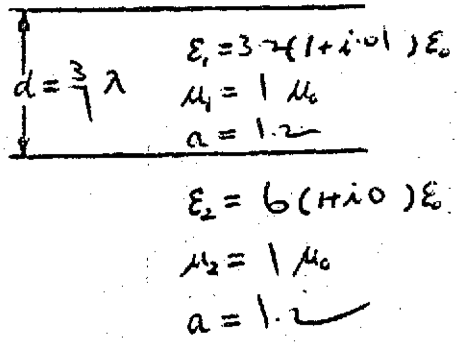
$\varepsilon_2 = 6\ (1+i\,0)\varepsilon_0$

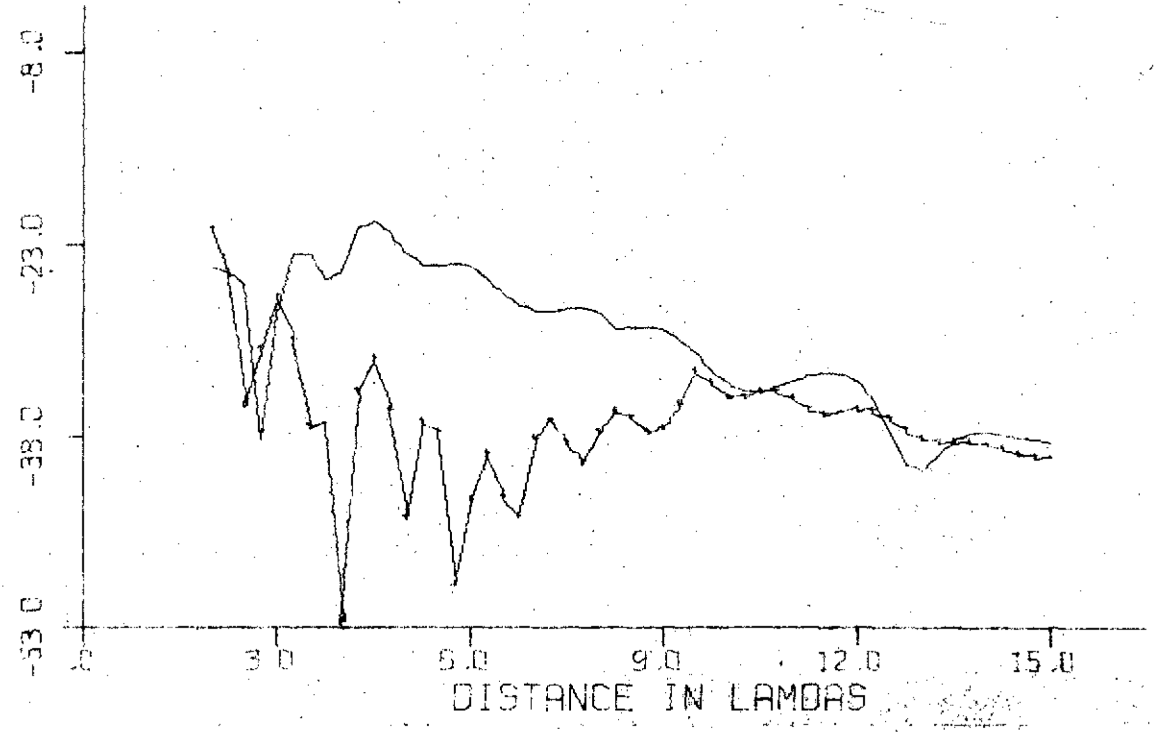
$\mu_2 = 1\ \mu_0$

$a = \cdot 8$

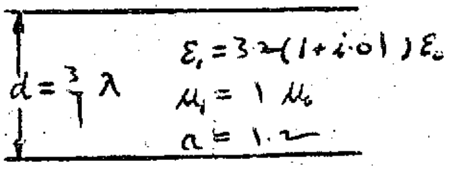


Eφ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.7(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.2$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1.2$


-8.0
-23.0
-38.0
-53.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

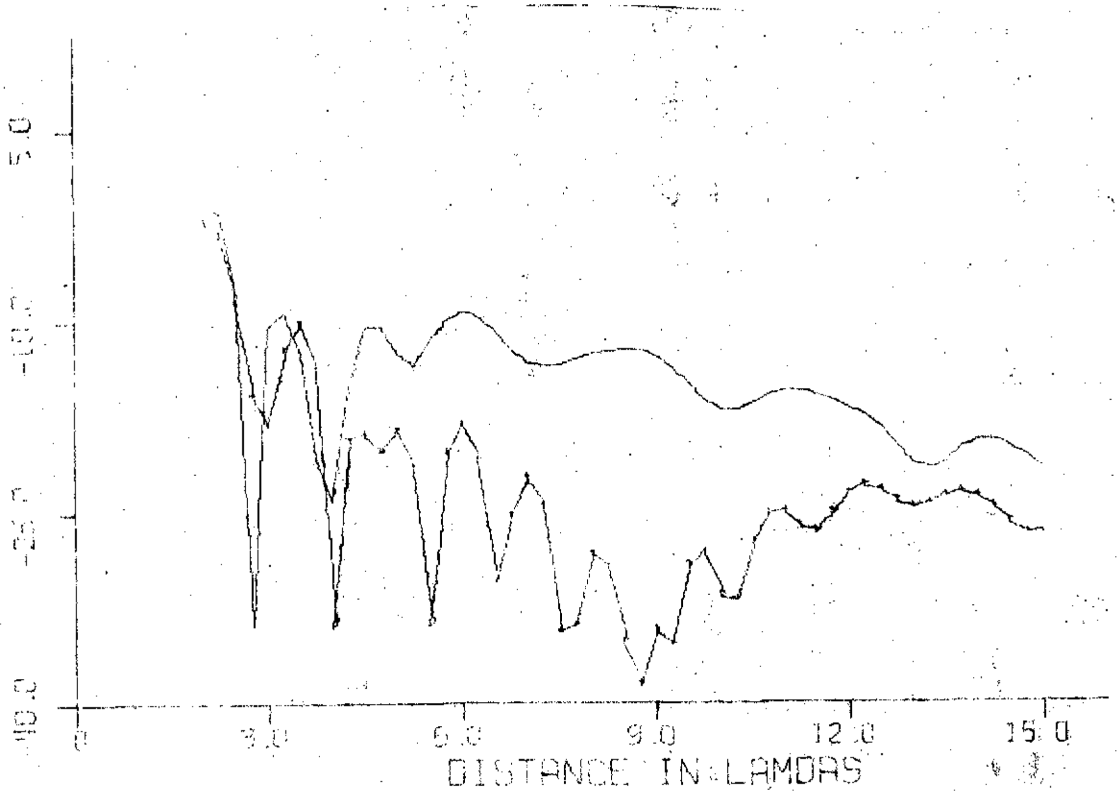
H_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$

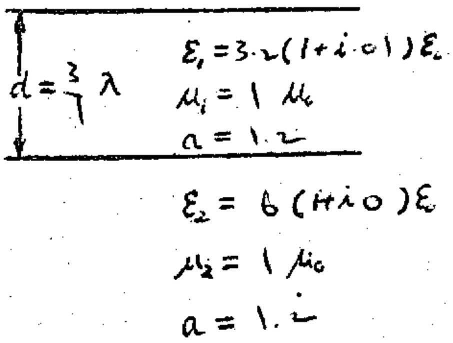
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$

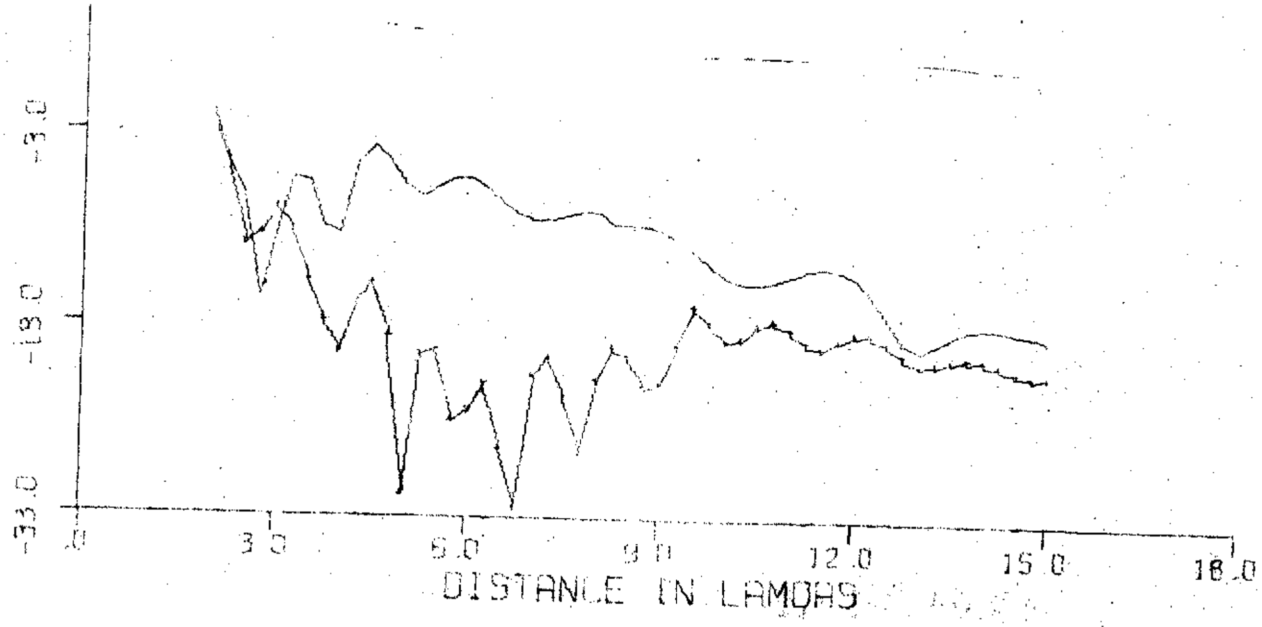
$\mu_2 = 1\,\mu_0$

$a = 1.2$

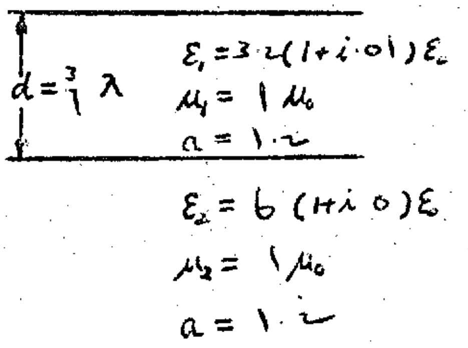


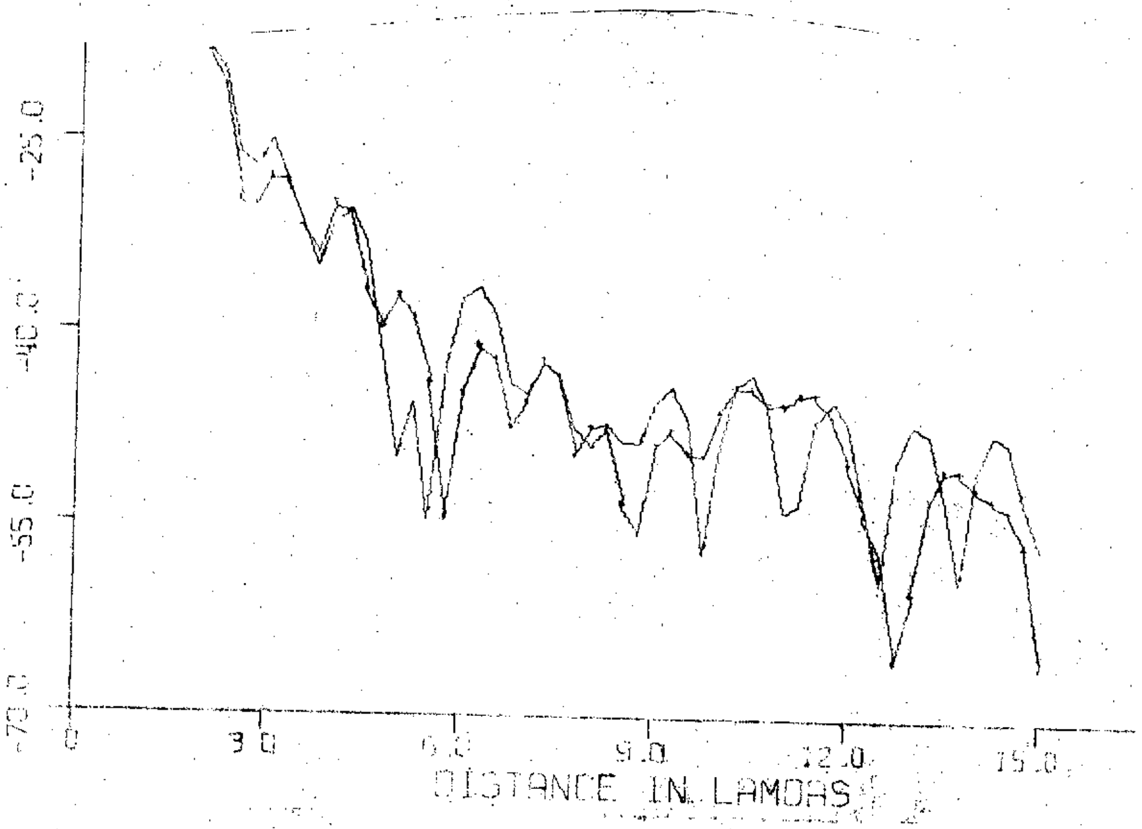
H_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.2$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1.2$

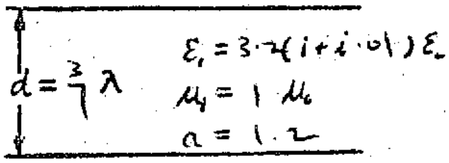

-3.0
-18.0
-33.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

E_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\mu_0$
$a = 1.2$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1\mu_0$
$a = 1.2$


-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

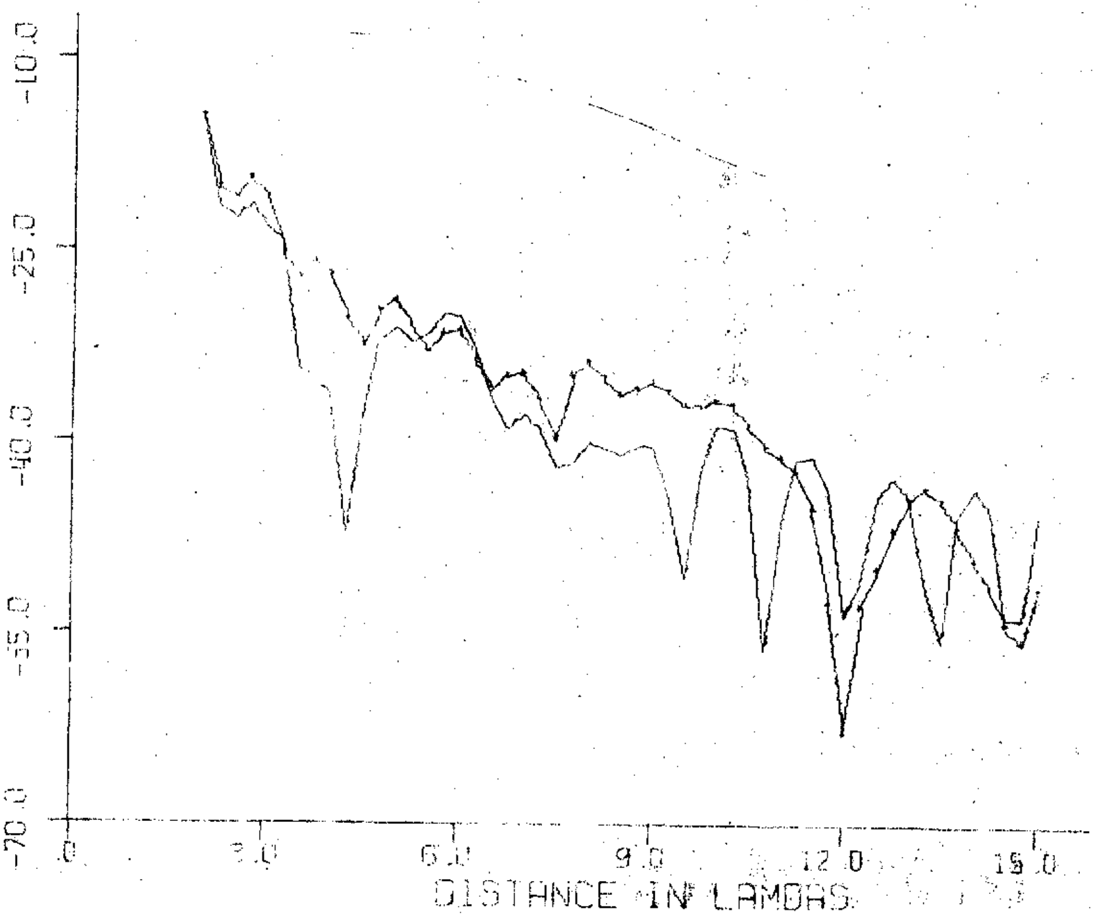
E_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.7(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$

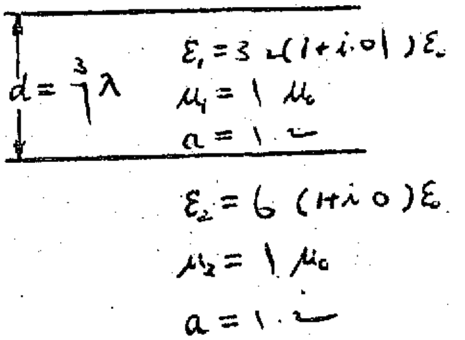
$\varepsilon_2 = 6(1+i\,0)\varepsilon_0$

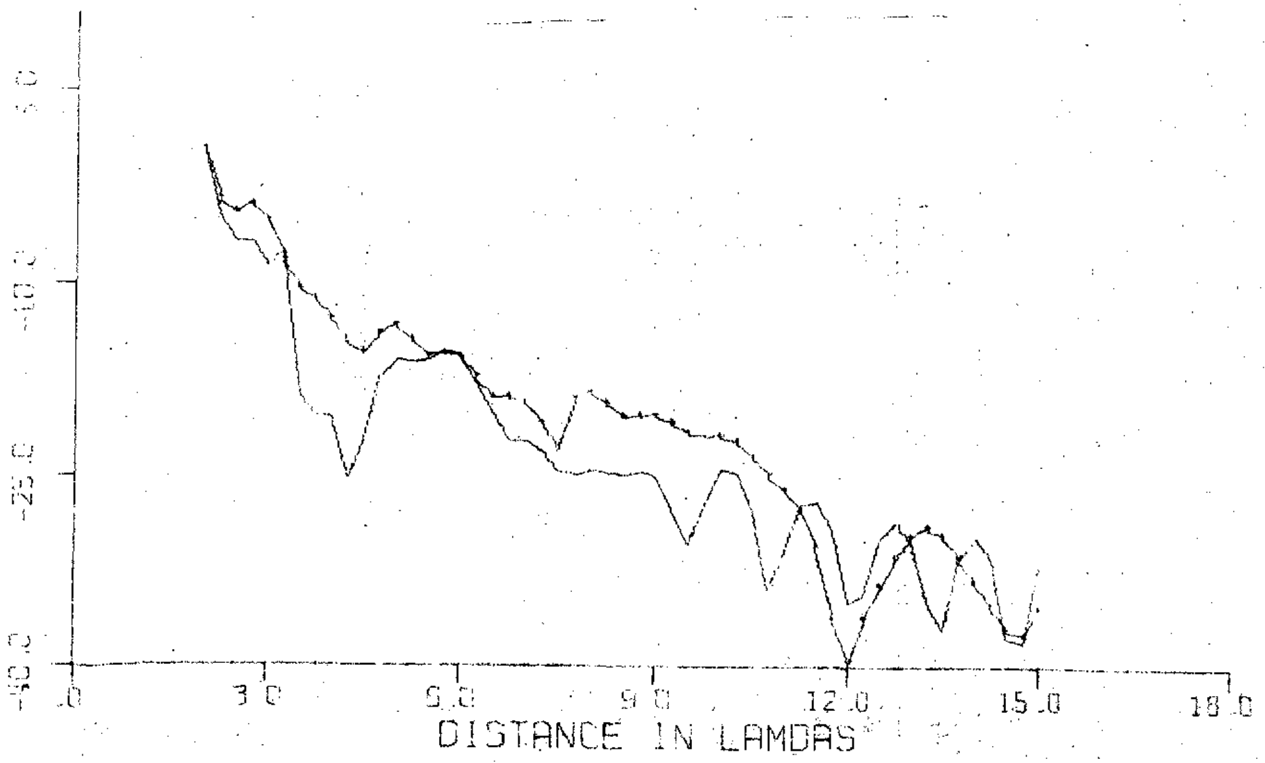
$\mu_2 = 1\,\mu_0$

$a = 1.2$

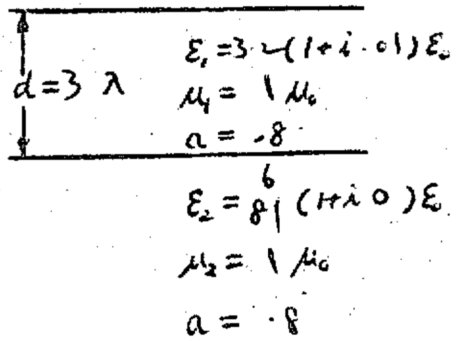


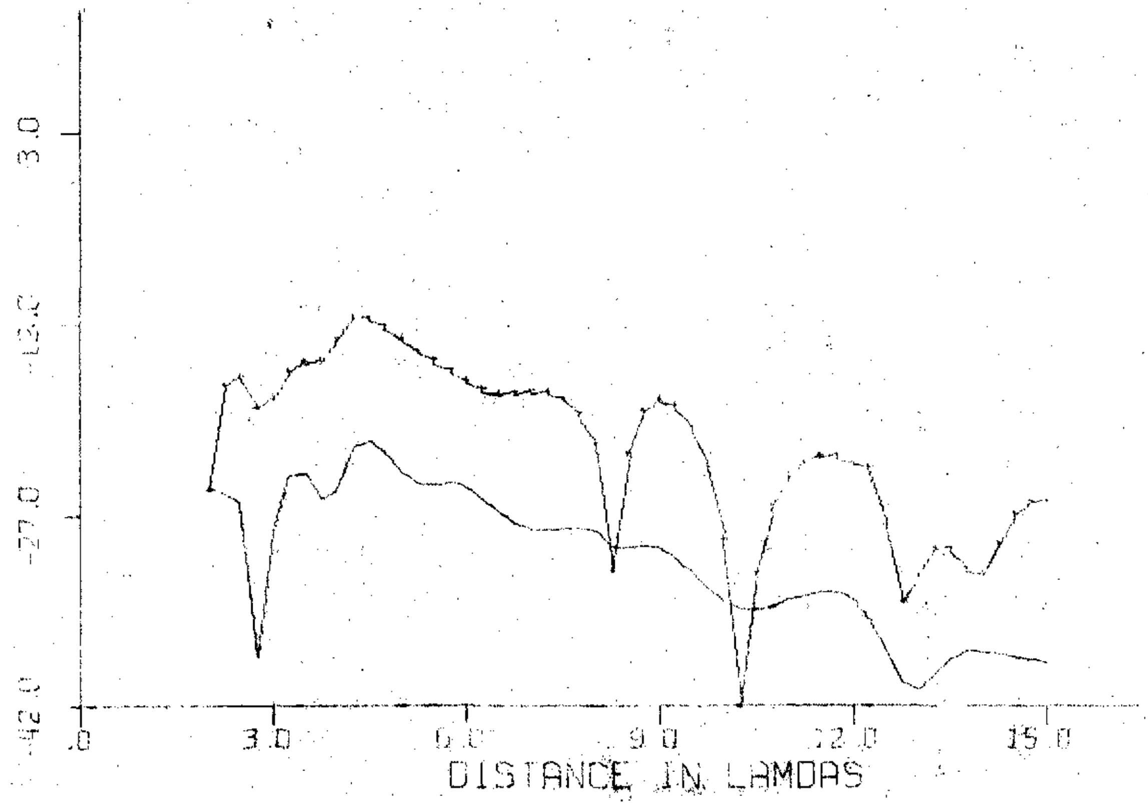
H_φ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.$

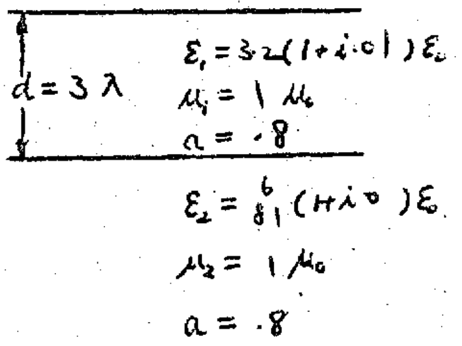

0.0
-10.0
-20.0
-30.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

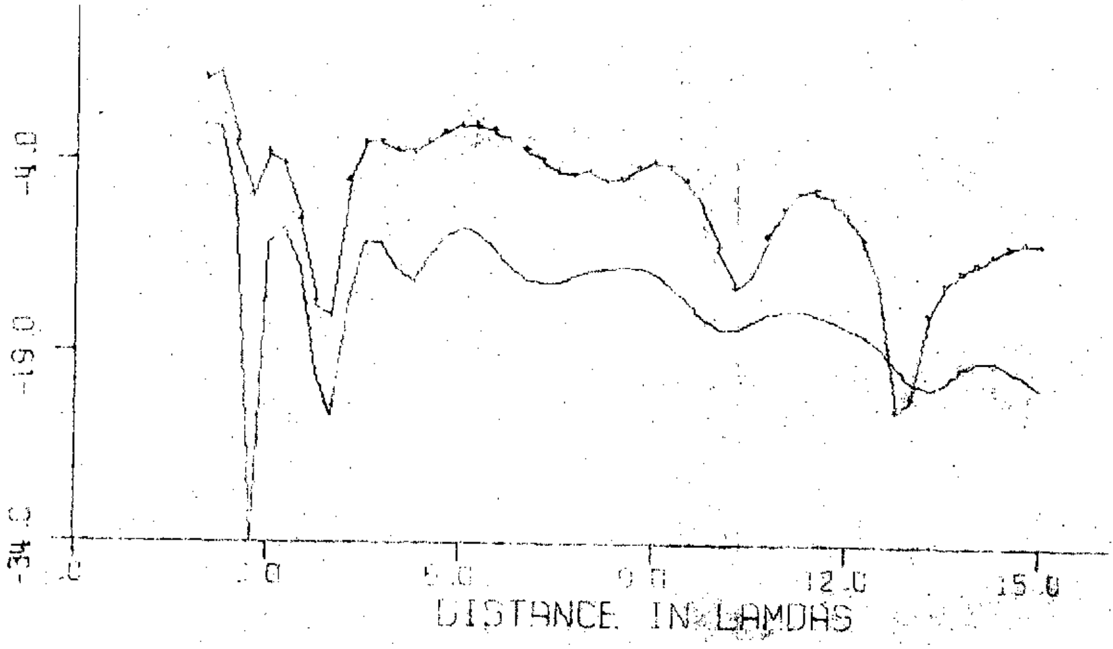
E_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i\cdot .01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = \overset{6}{8}1\,(1+i\,0)\,\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = .8$

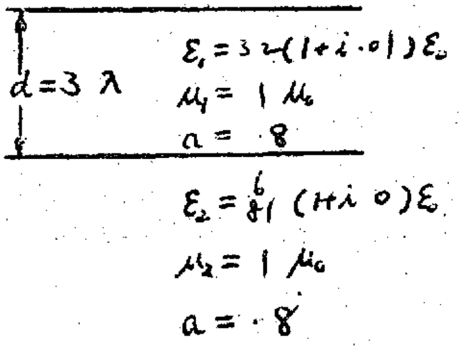

3.0
-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

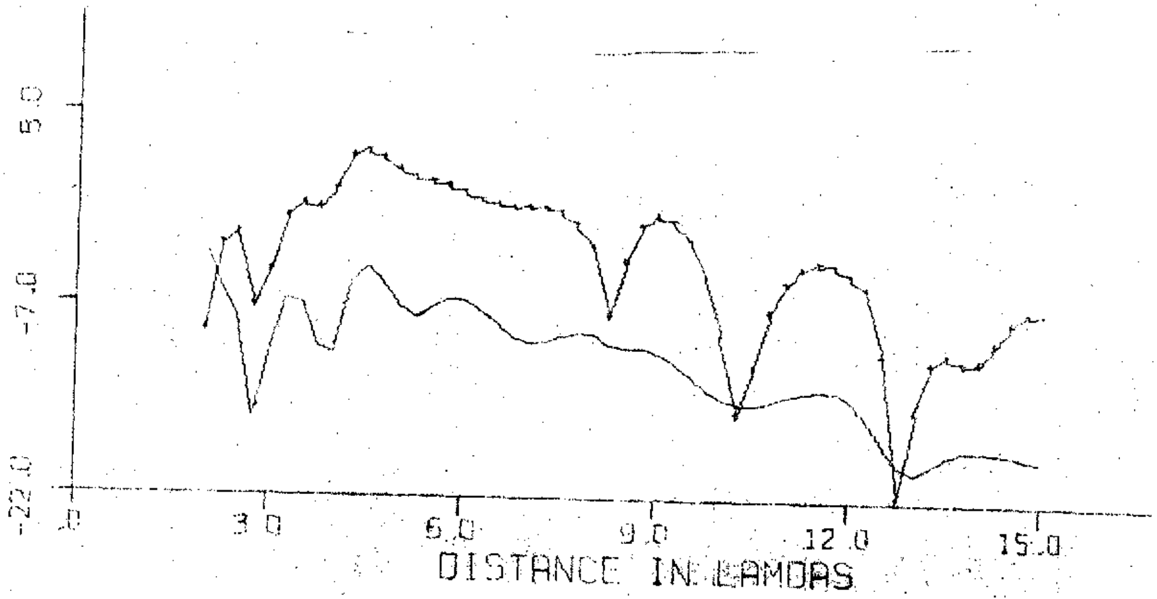
H_ρ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$

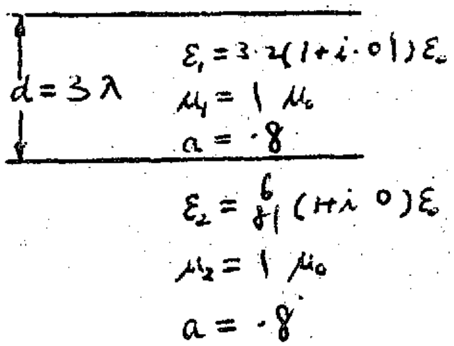

-4.0
-19.0
-34.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

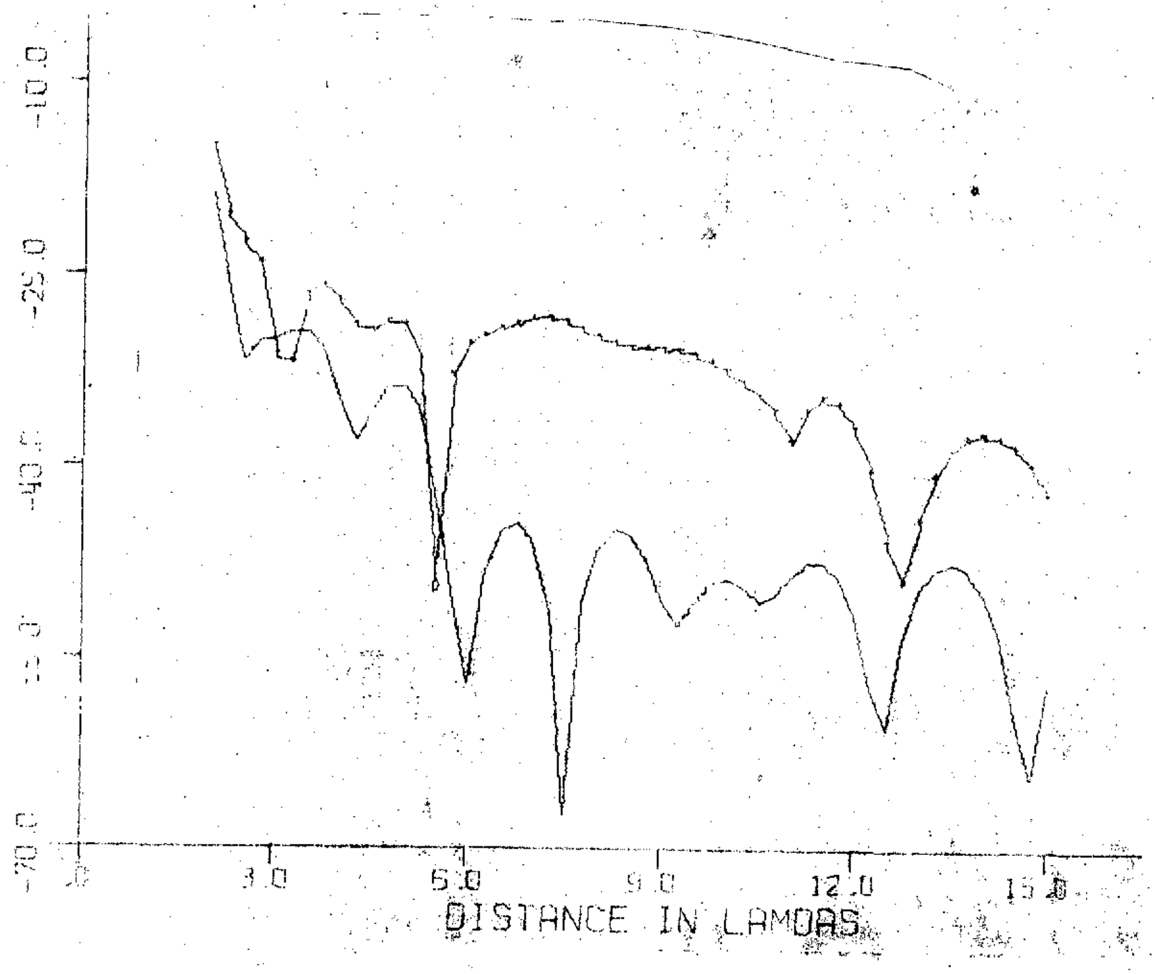
H_z (HED)


$d = 3\ \lambda$
$\varepsilon_1 = 3\,2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = \cdot 8$
$\varepsilon_2 = \overset{6}{81}\,(1+i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = \cdot 8$

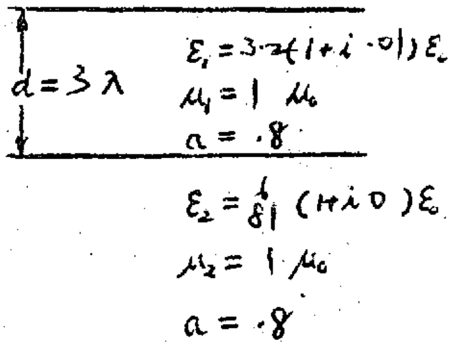

5.0
-7.0
-22.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

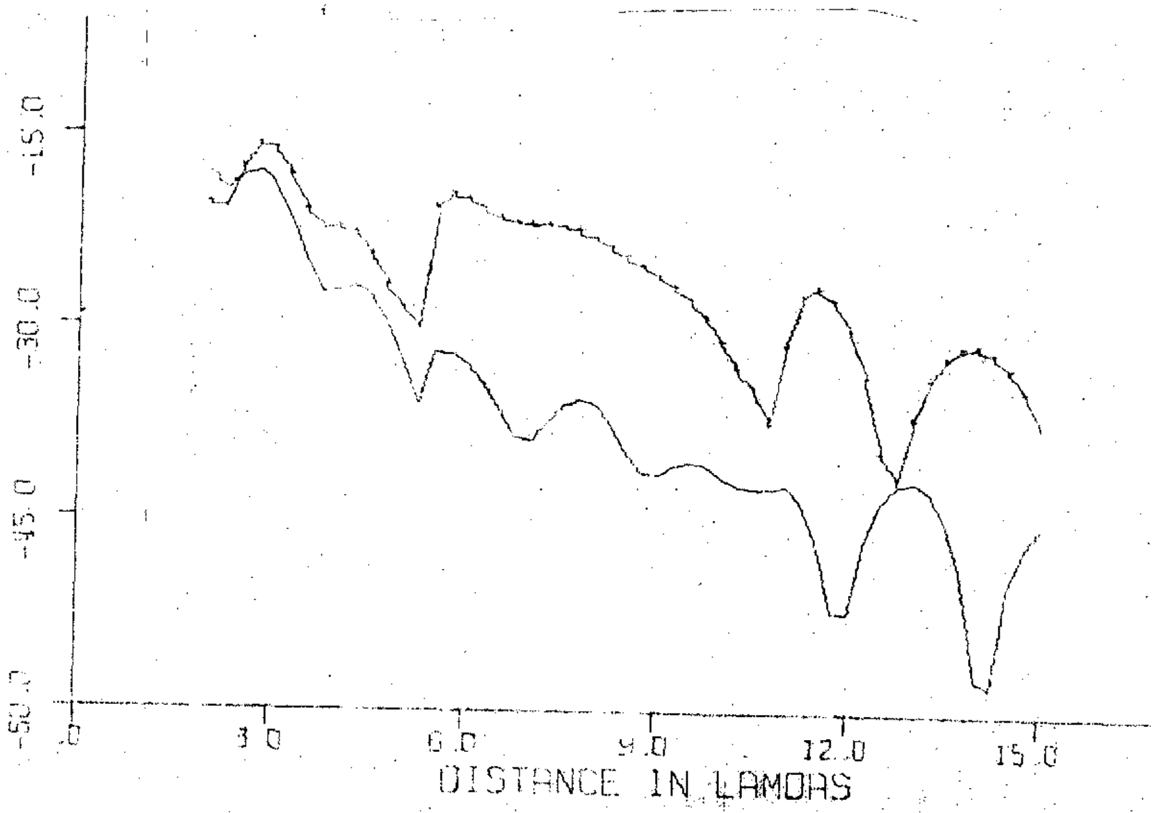
E_z (HED)


d = 3λ
ε₁ = 3·2(1+i·0)ε₀
μ₁ = 1 μ₀
a = ·8
ε₂ = 81 (1+i 0)ε
6
μ₂ = 1 μ₀
a = ·8

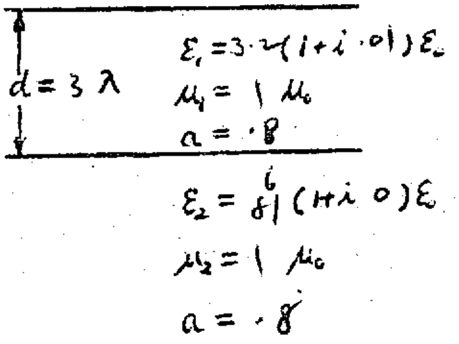

-10.0
-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

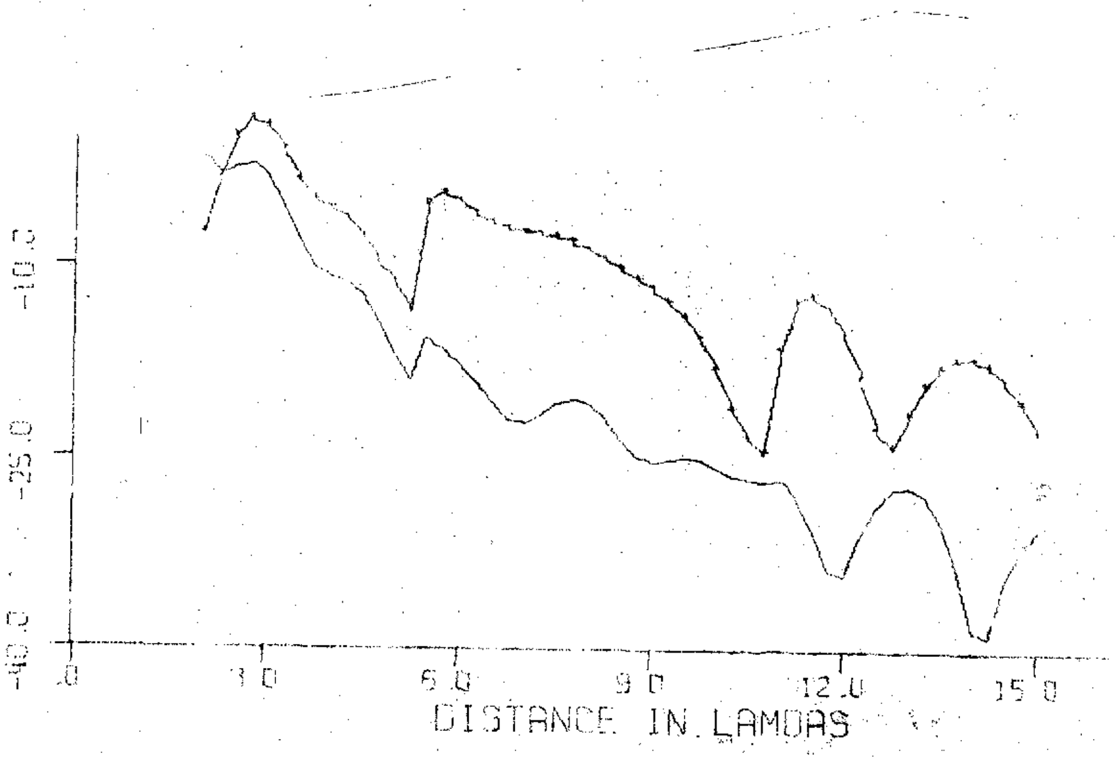

$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = .8$
$\varepsilon_2 = \frac{1}{81}(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = .8$


-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_φ (HED)

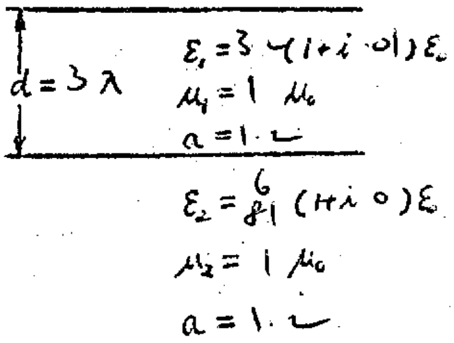


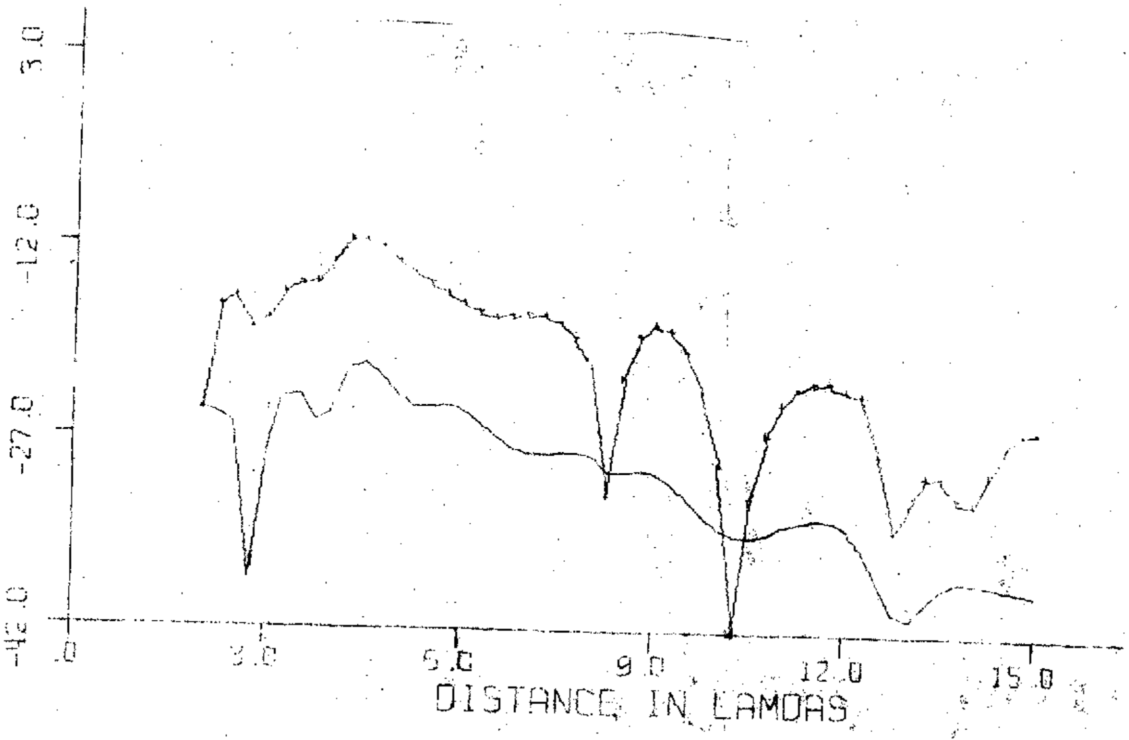
$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$



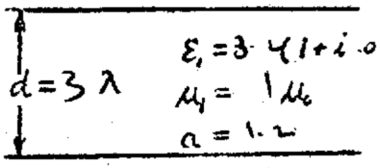
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.\smile$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1.\smile$

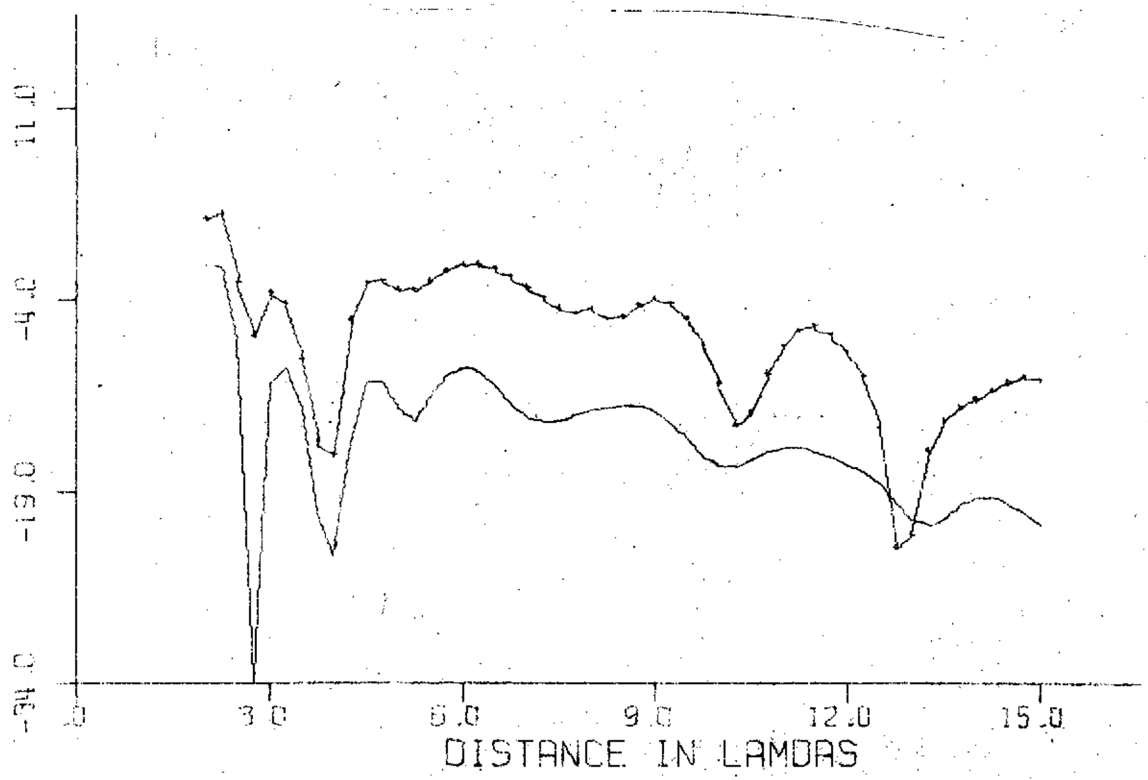

3.0
-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

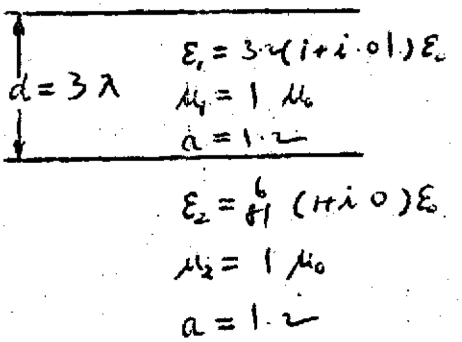


$\varepsilon_1 = 3.4(1+i.01)\varepsilon_0$
$\mu_1 = 1\mu_0$
$a = 1.2$

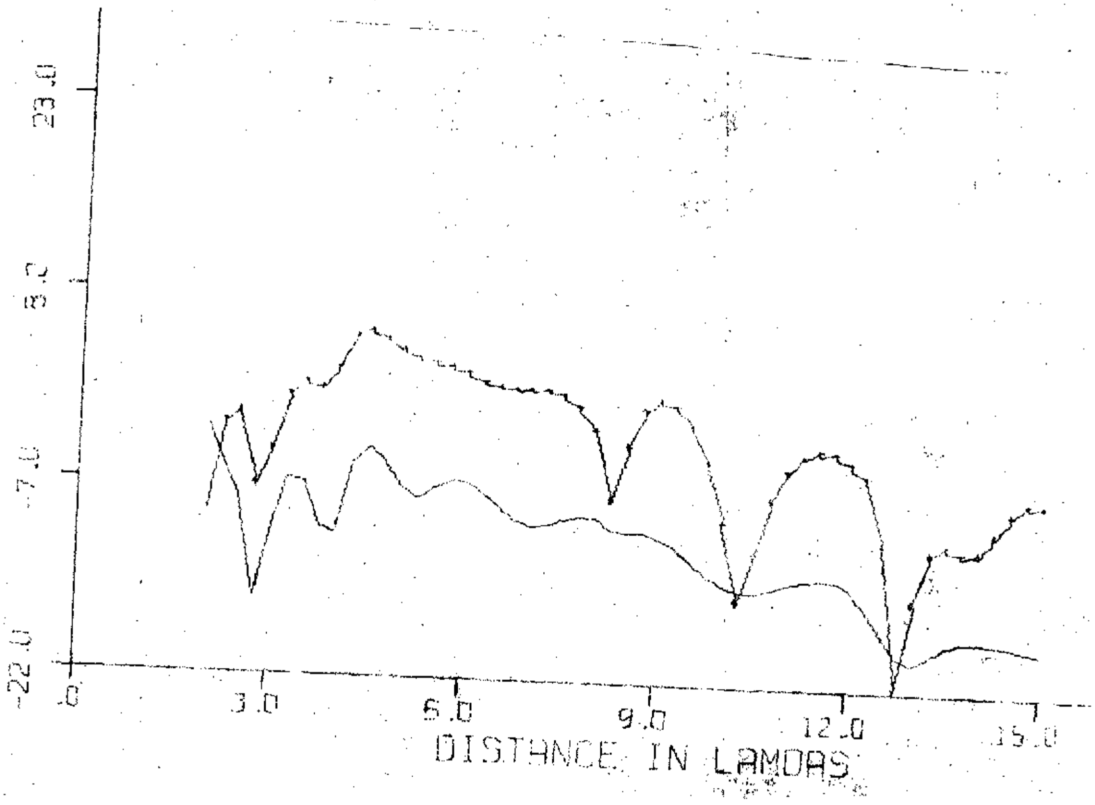
$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon_0$
$\mu_2 = 1\mu_0$
$a = 1.2$



H_z (HED)

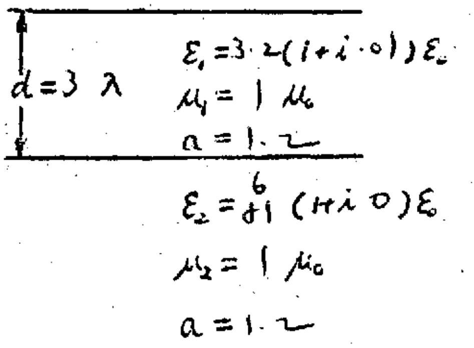


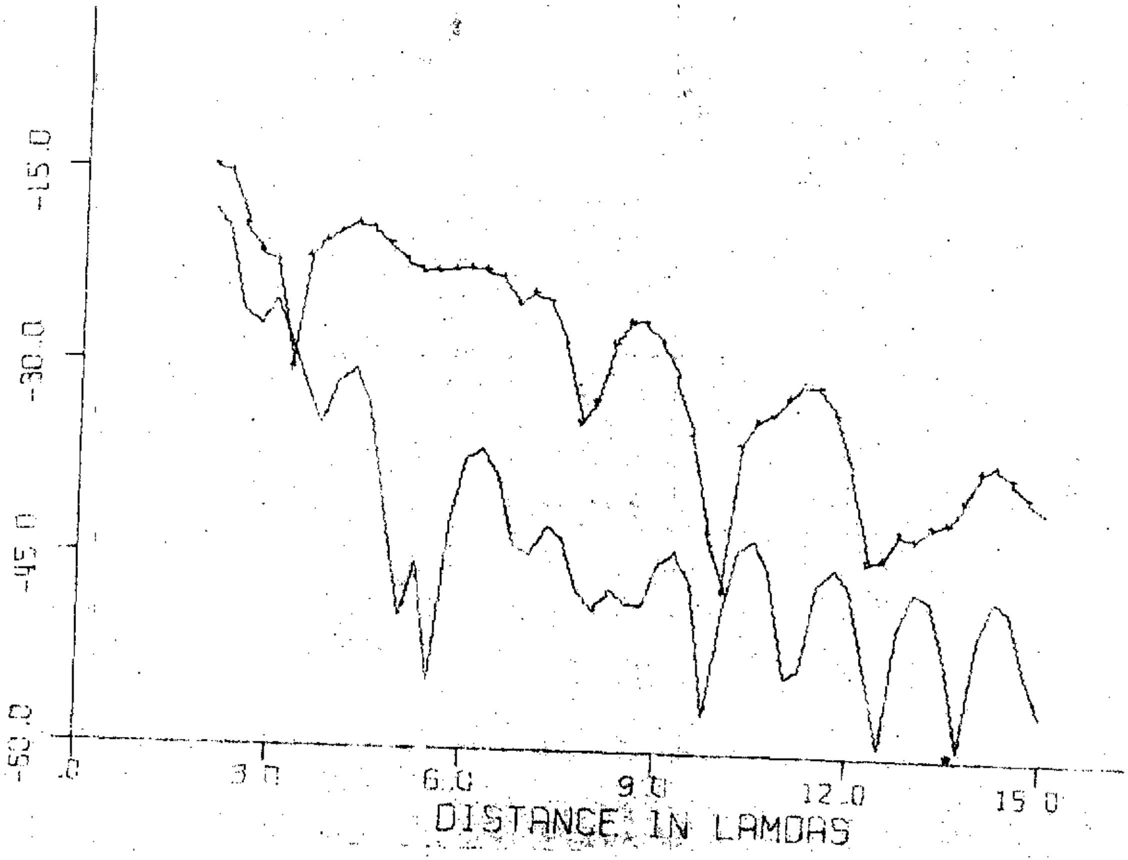
$d = 3\lambda$
$\varepsilon_1 = 3.4(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1.2$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1.2$



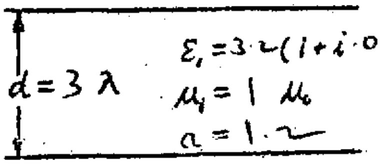
23.0
8.0
-7.0
-22.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)


d=3 λ
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
a = 1.2
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
a = 1.2


-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_γ (HED)



$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$

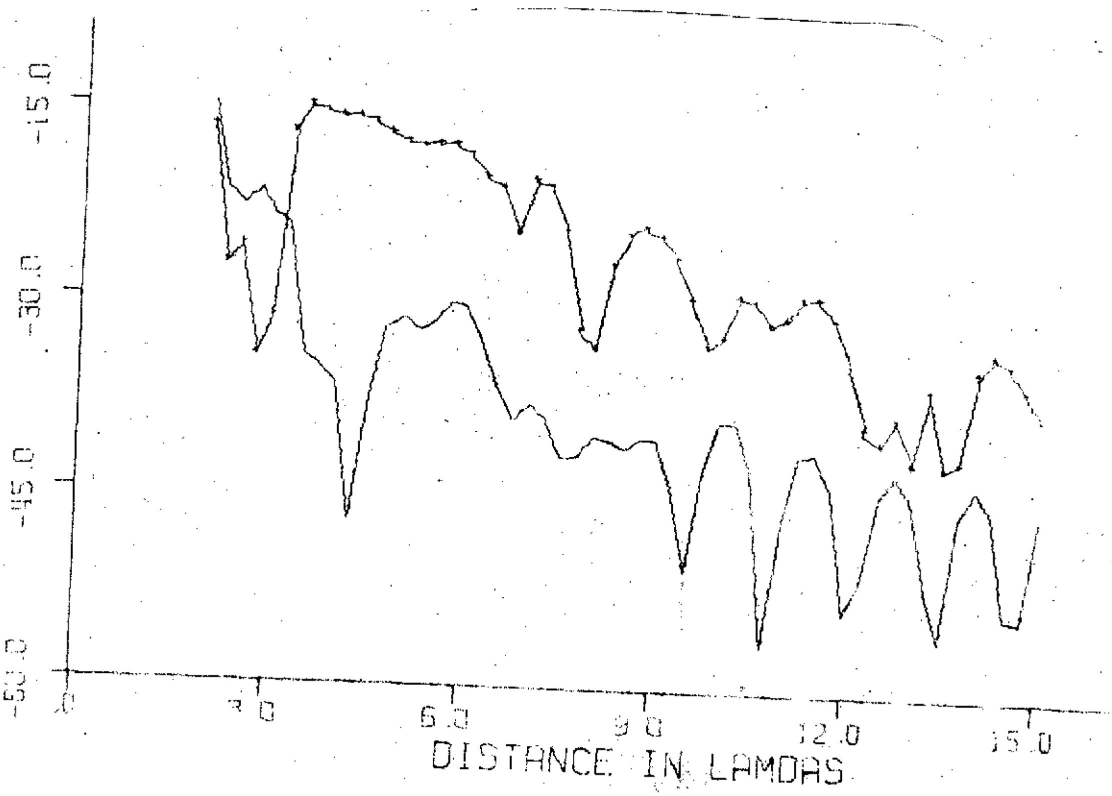
$\mu_1 = 1\ \mu_0$

$a = 1.2$

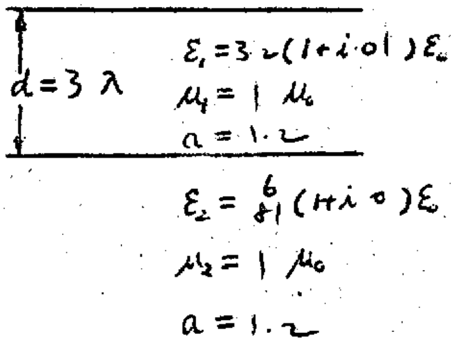
$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon_0$

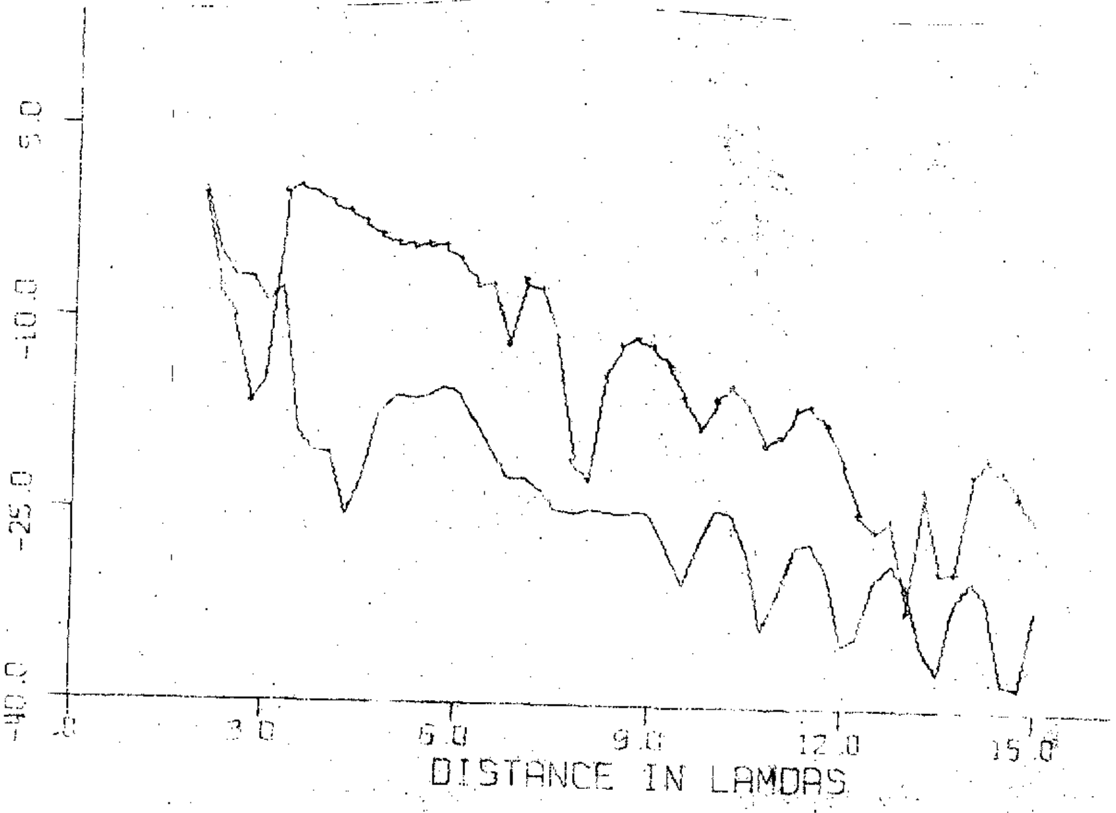
$\mu_2 = 1\ \mu_0$

$a = 1.2$

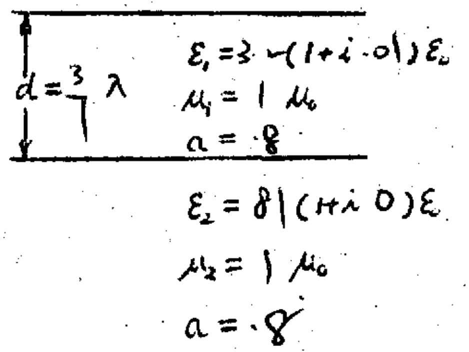


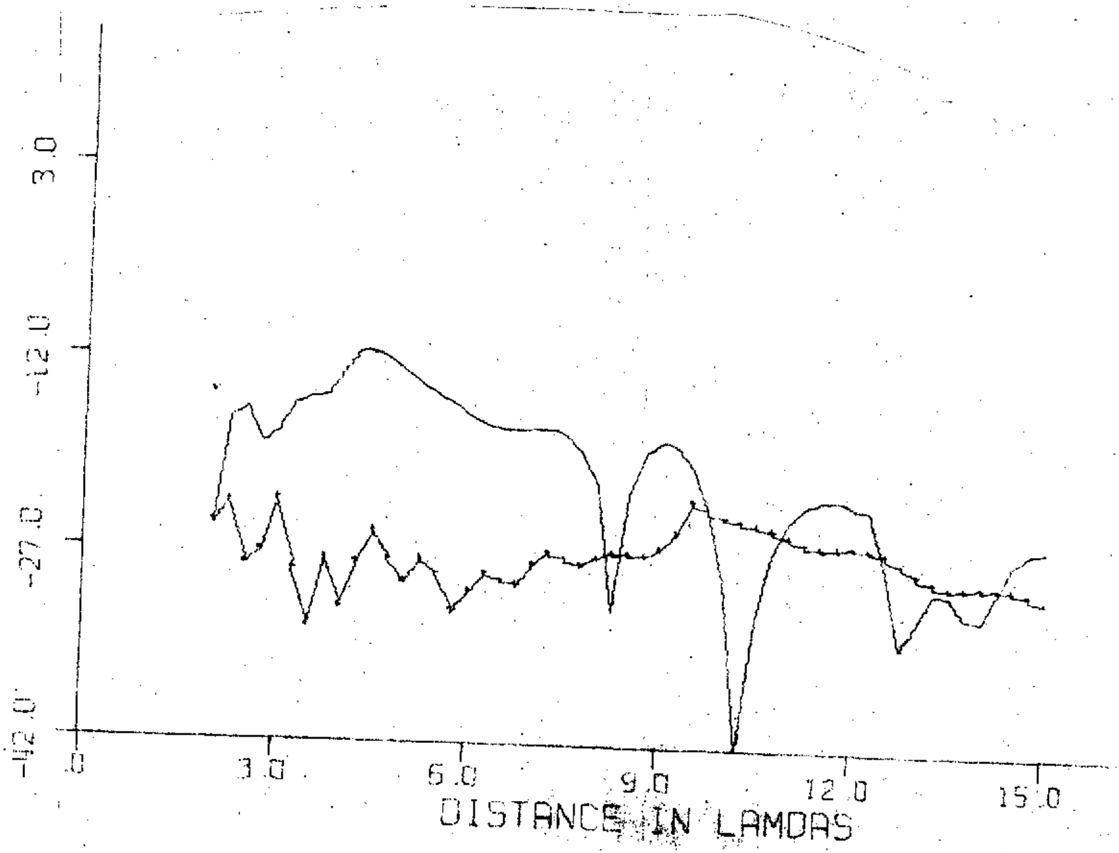
H_φ (HED)


$d = 3\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$

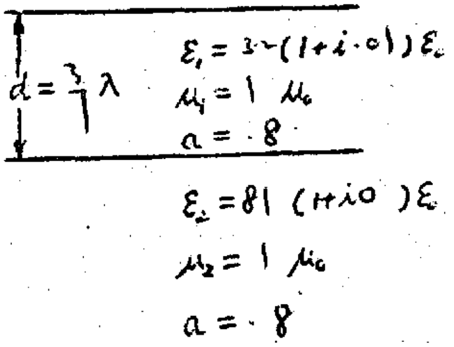

5.0
-10.0
-25.0
-40.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

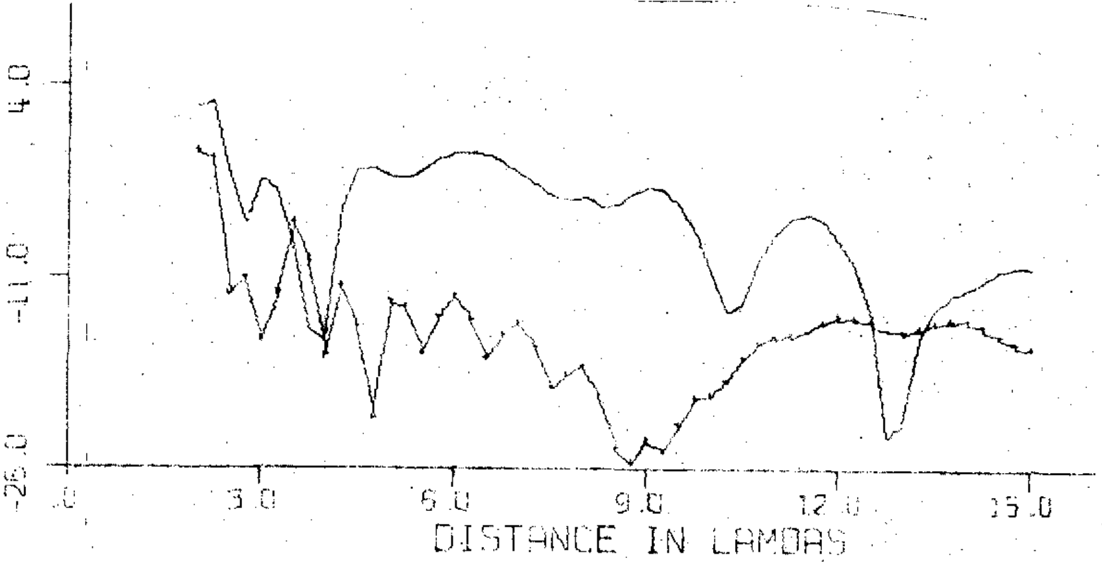
E_φ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.7(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 81(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$

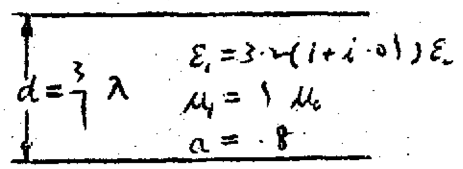

3.0
-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ζ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = .8$
$\varepsilon_2 = 81\ (1+i0\ )\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = .8$


4.0
-11.0
-26.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)


$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3\cdot2(1+i\cdot0)\varepsilon_0$

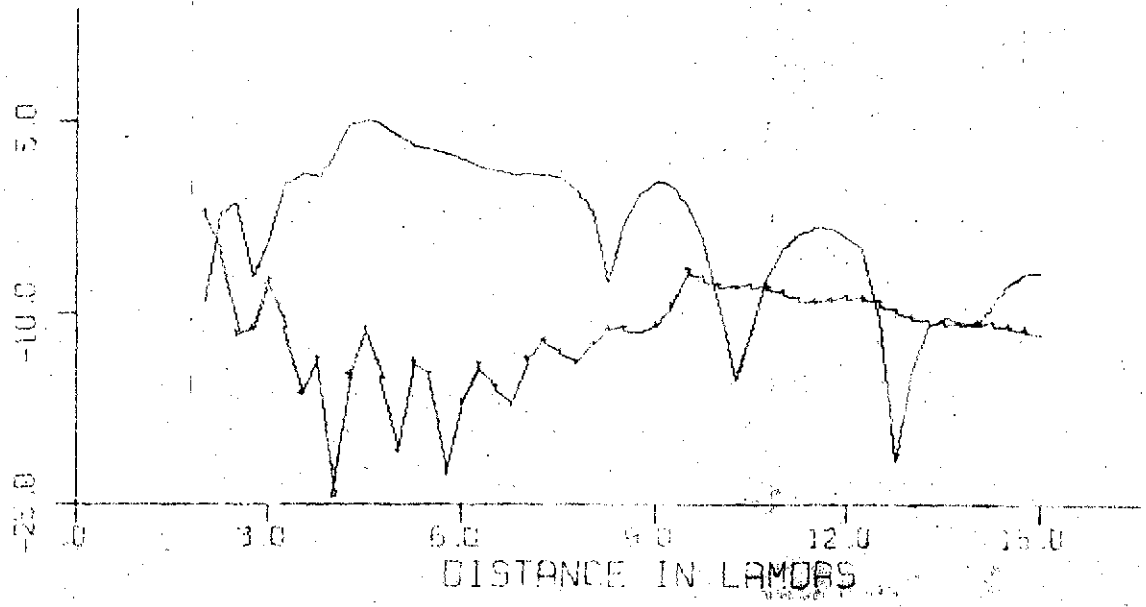
$\mu_1 = 1\,\mu_0$

$a = \cdot8$

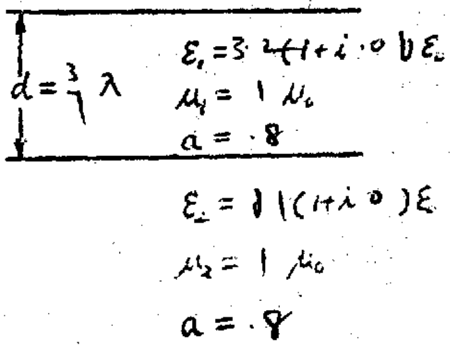
$\varepsilon_2 = 81(1+i0\cdot)\varepsilon_0$

$\mu_2 = 1\,\mu_0$

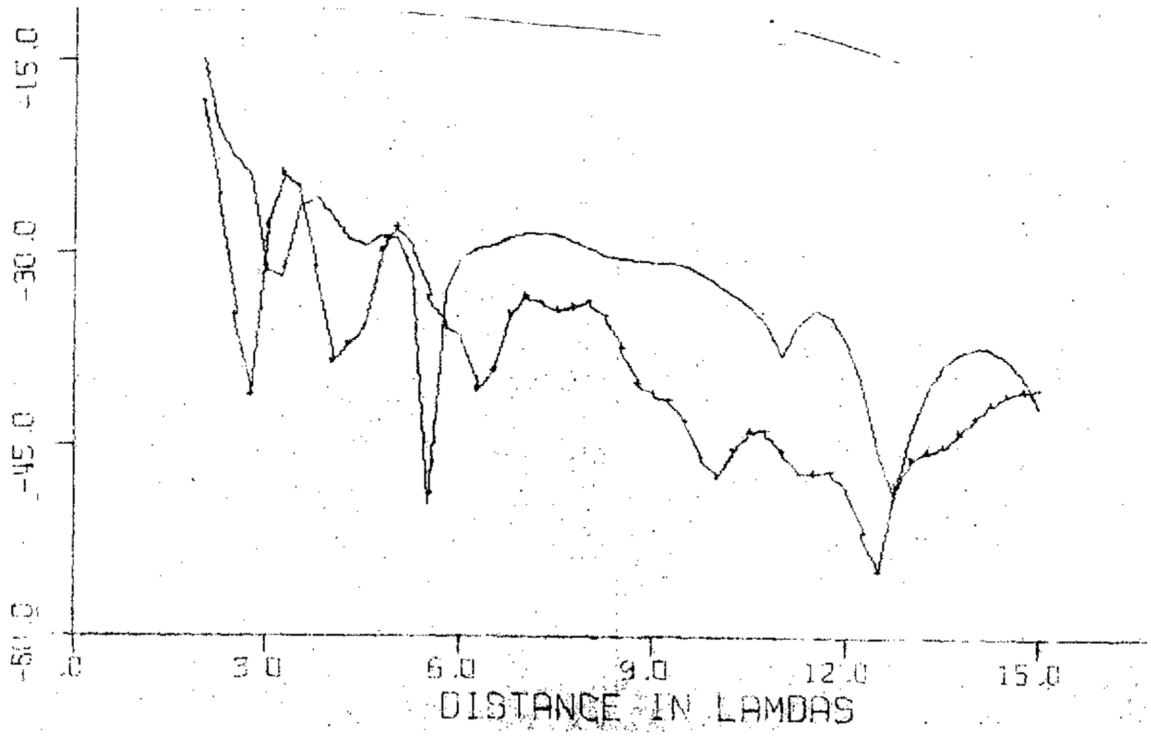
$a = \cdot8$



E_z (HED)

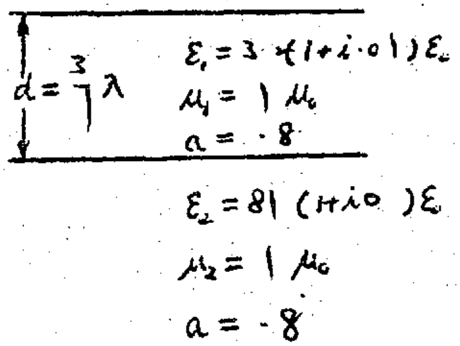


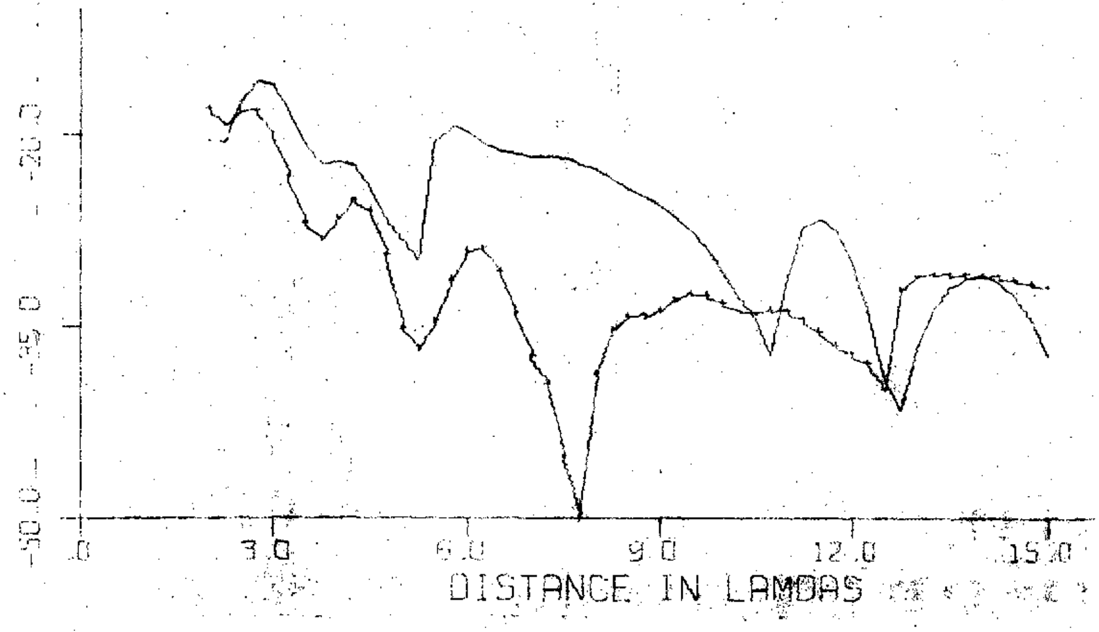
$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.24(1+i\cdot0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$



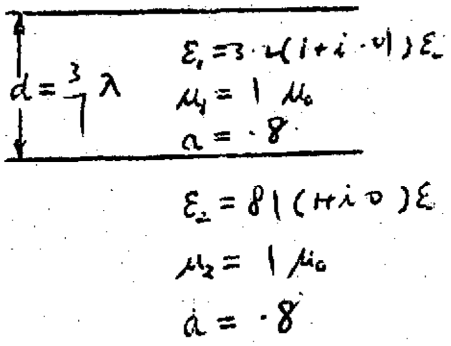
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

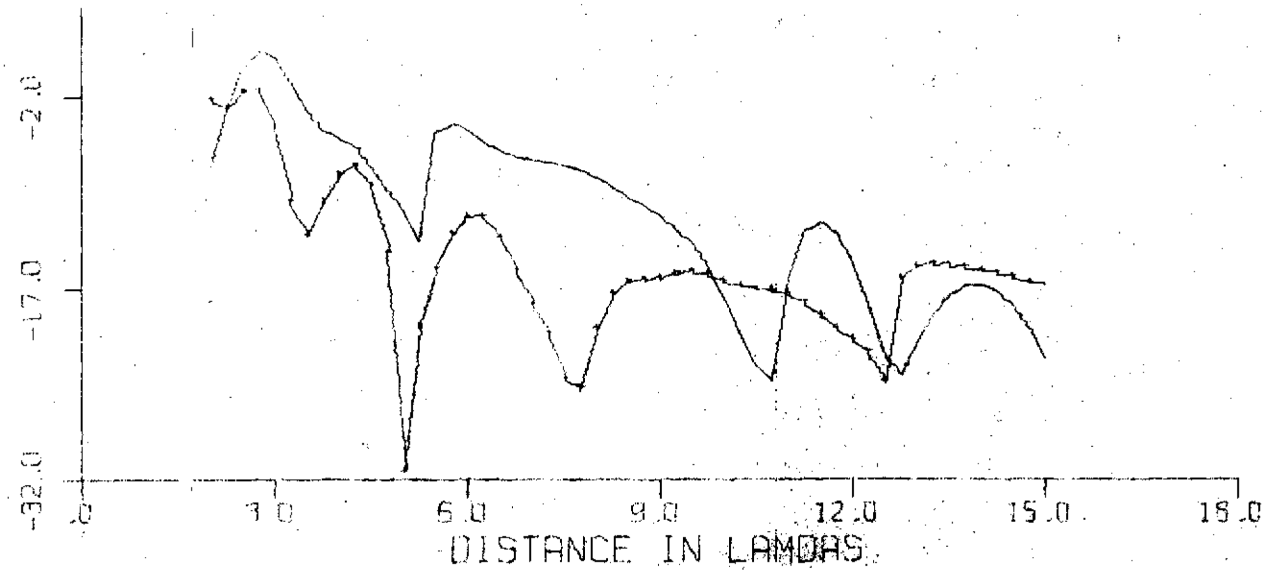
E_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3\cdot(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = \cdot 8$
$\varepsilon_2 = 81\,(1+i0\,)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = \cdot 8$

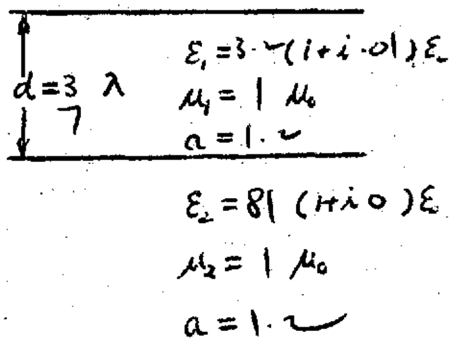

-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

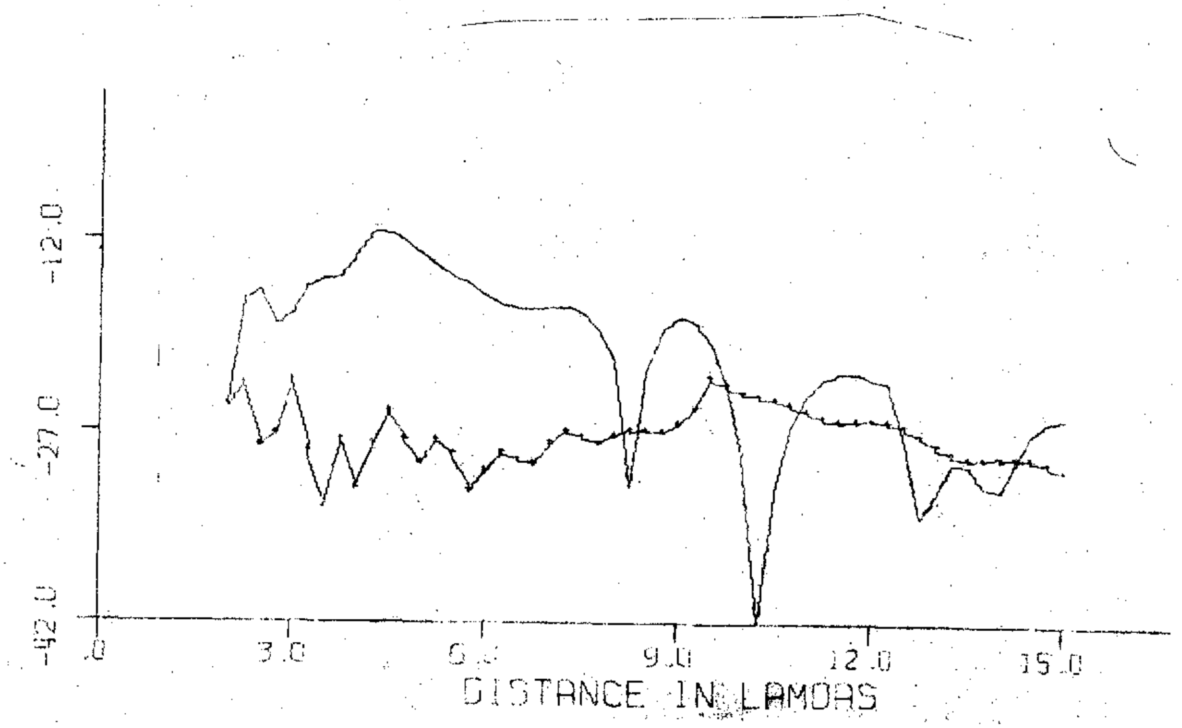
Hφ (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3\cdot4(1+i\cdot4)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = .8$
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = .8$

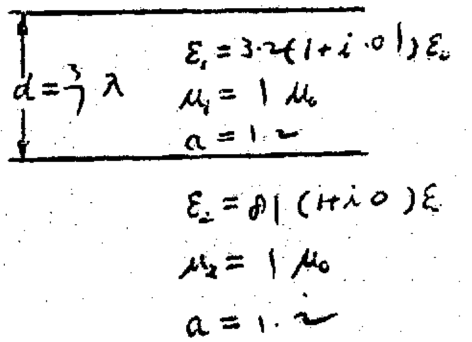

-2.0
-17.0
-32.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

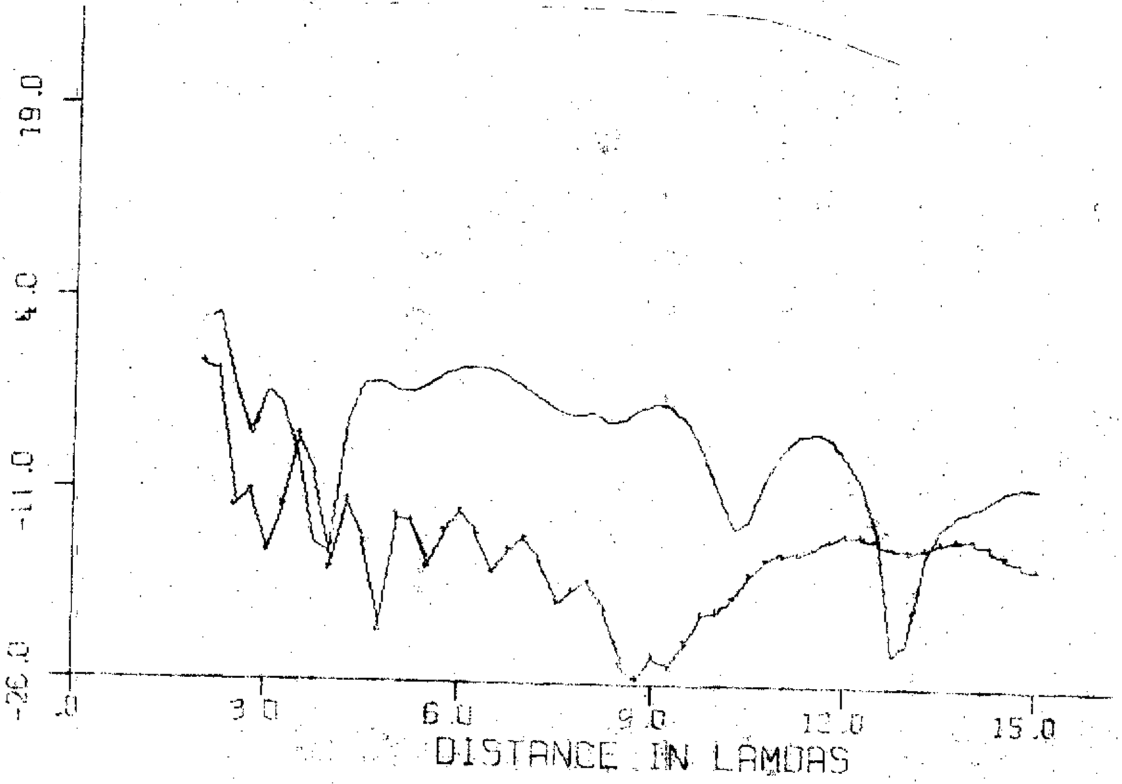
E_φ (HED)


d=3 λ
7
$\varepsilon_1 = 3.4(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
a = 1.
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
a = 1.

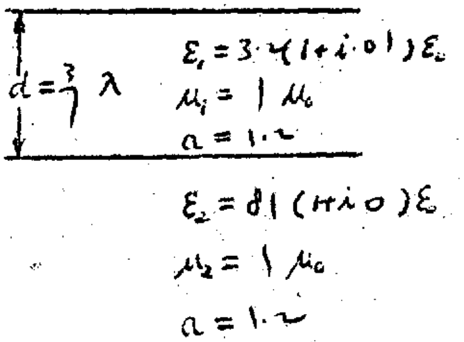

-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ρ (HED)

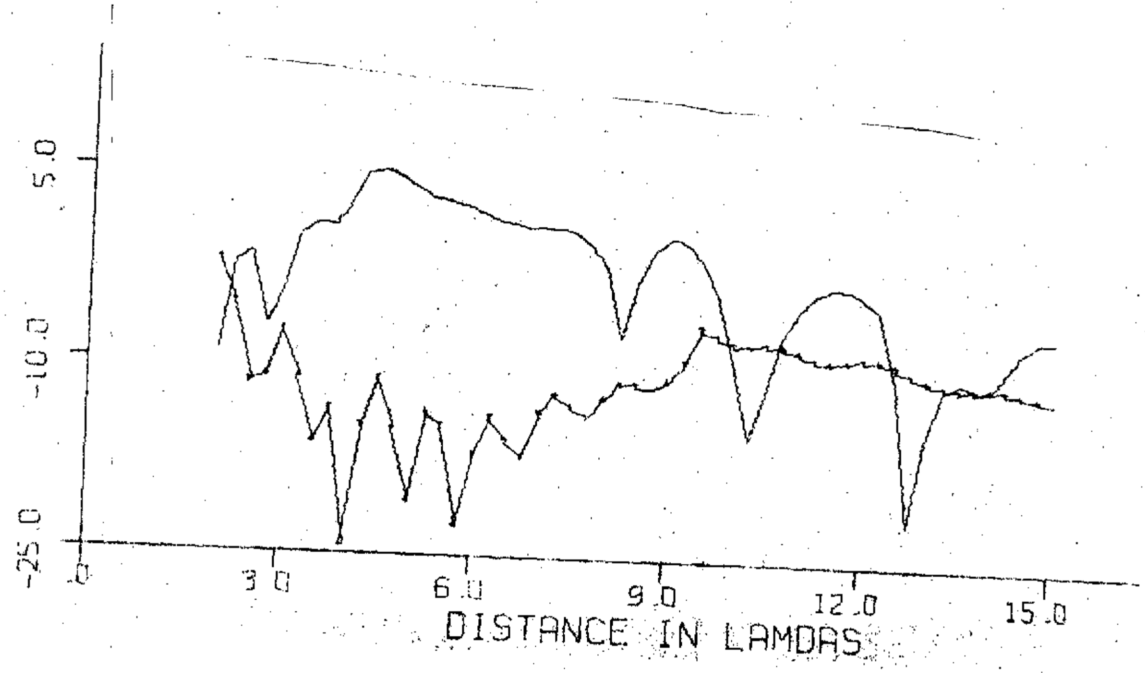

$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.\sim$
$\varepsilon_2 = 81(1+i0)\varepsilon$
$\mu_2 = 1\,\mu_0$
$a = 1.\sim$


19.0
4.0
-11.0
-26.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

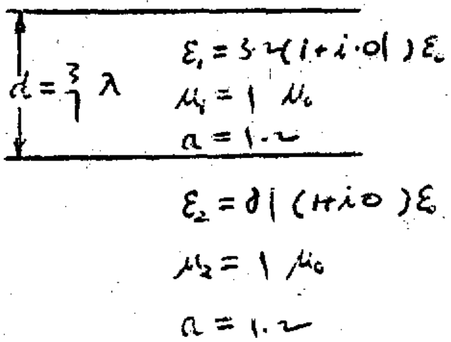


d = 3/7 λ
ε₁ = 3.4(1+i·.01)ε₀
μ₁ = 1 μ₀
a = 1.2
ε₂ = 81(1+i·0)ε₀
μ₂ = 1 μ₀
a = 1.2



5.0
-10.0
-25.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_ρ (HED)


$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.4(1+i\cdot 01)\varepsilon_0$

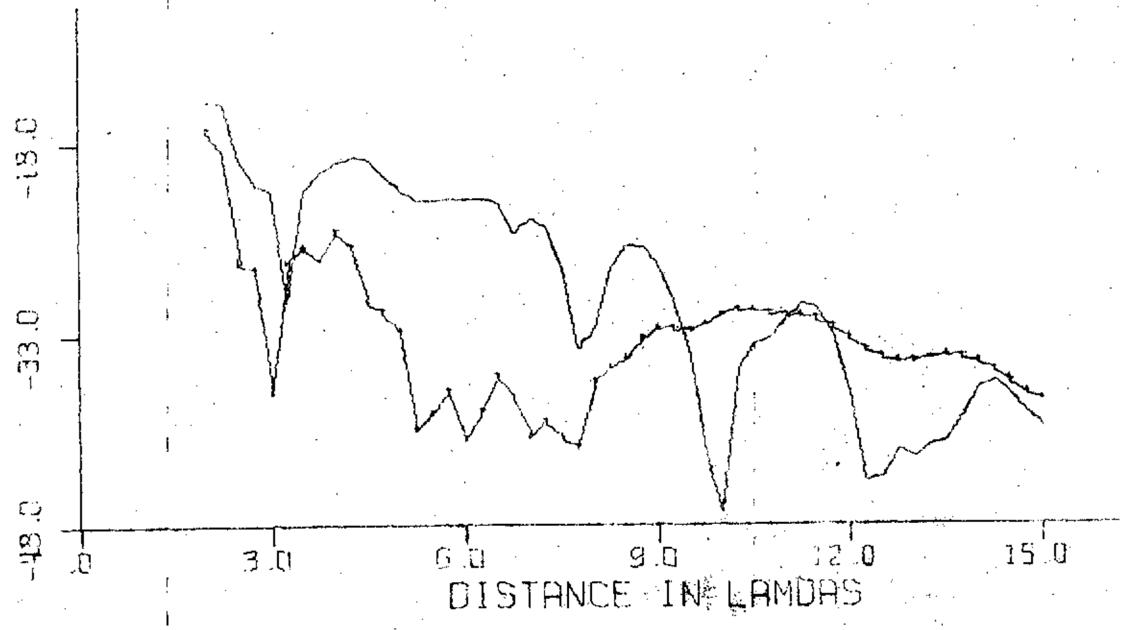
$\mu_1 = 1\ \mu_0$

$a = 1.2$

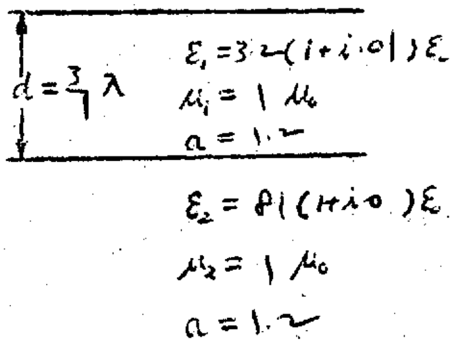
$\varepsilon_2 = 81(1+i0)\varepsilon_0$

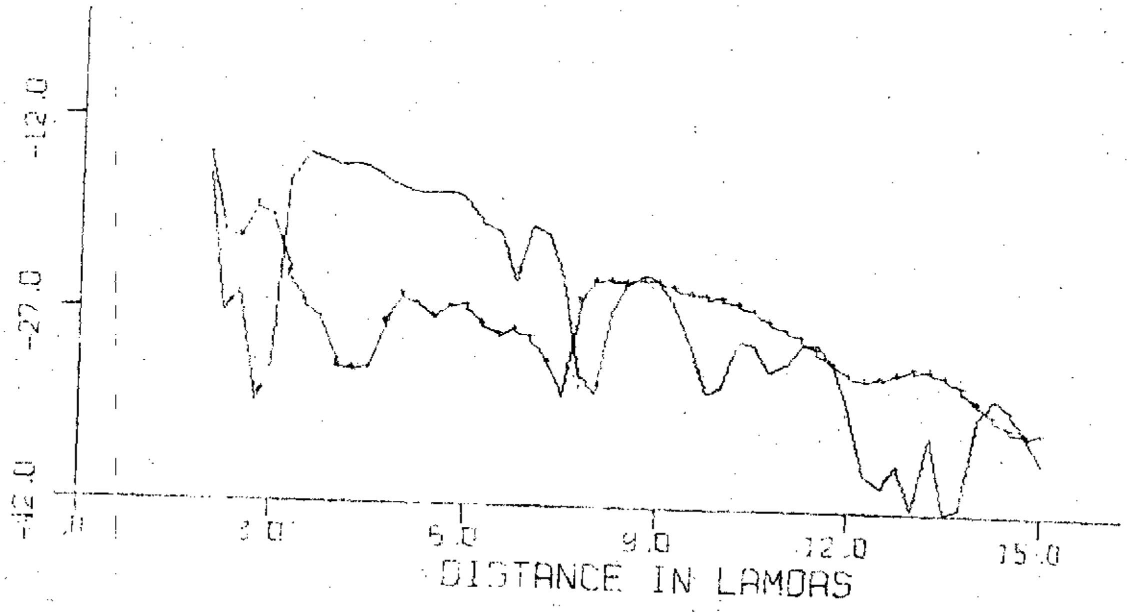
$\mu_2 = 1\ \mu_0$

$a = 1.2$

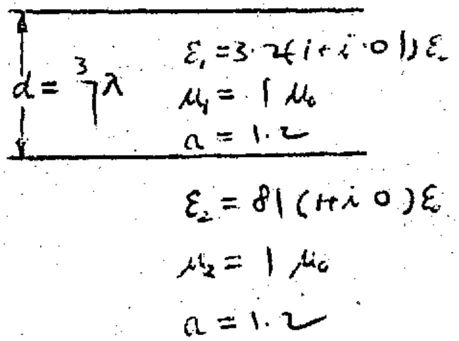


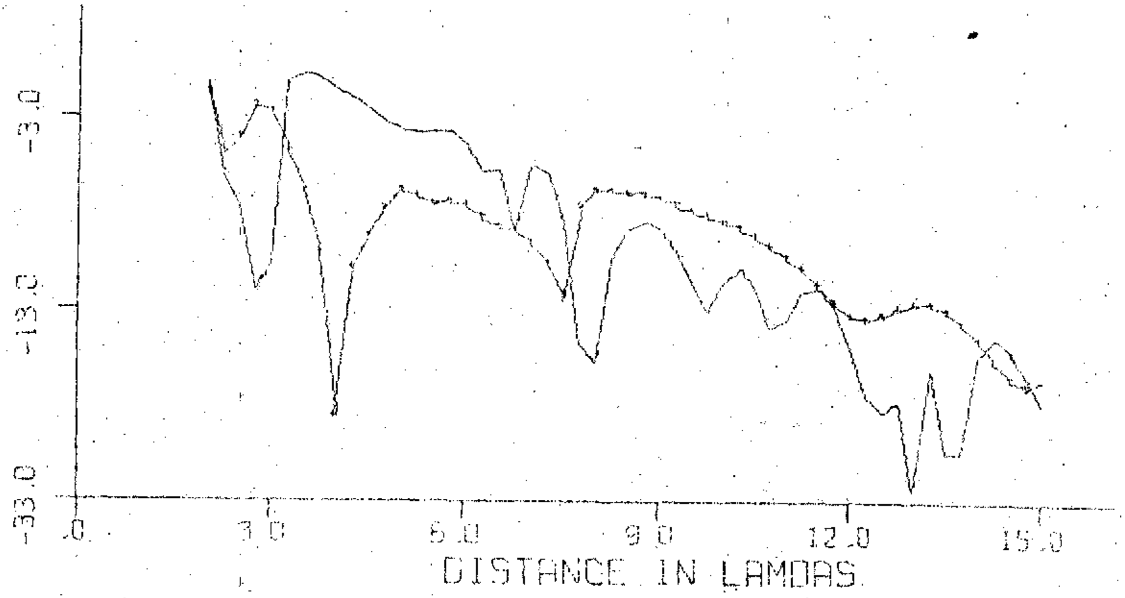
E_y (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = 81(1+i0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$

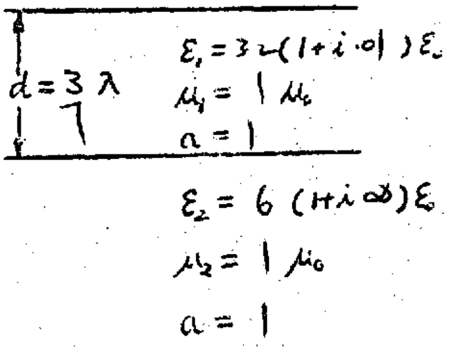

-12.0
-27.0
-42.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_φ (HED)

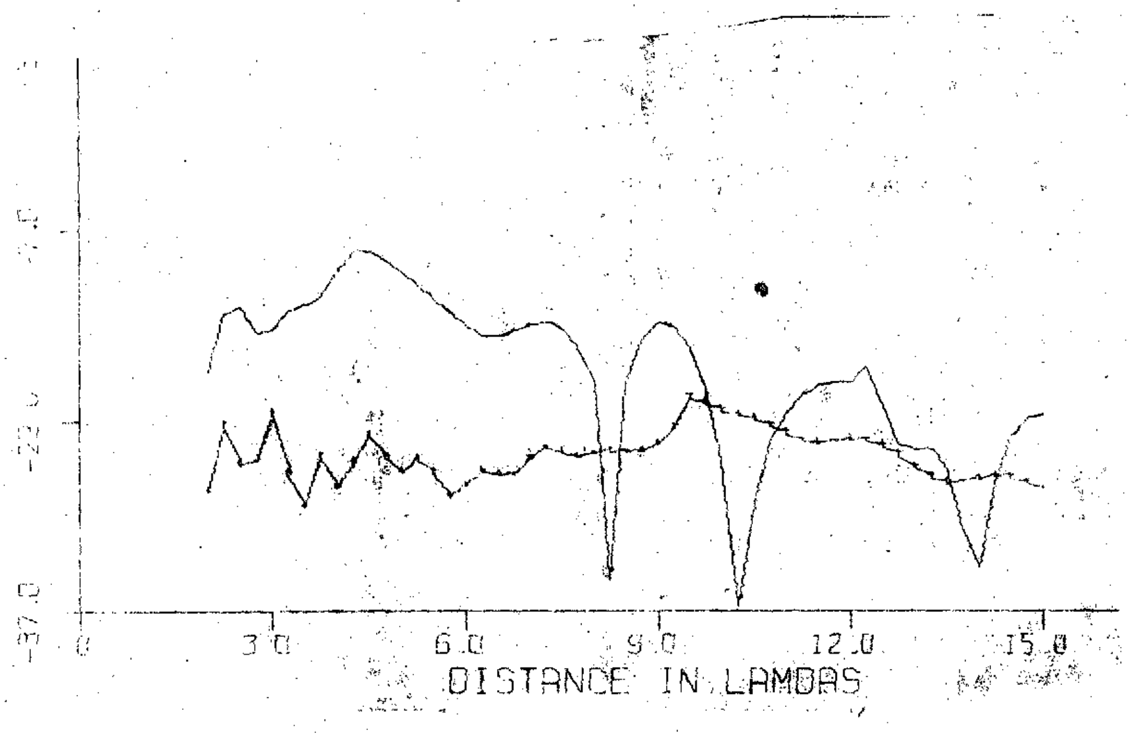

$d = {}^{3}7\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1.2$
$\varepsilon_2 = 81(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1.2$


-3.0
-13.0
-33.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (HED)

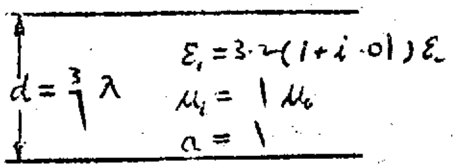


$d = 3\lambda$
$\varepsilon_1 = 32(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\infty)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$



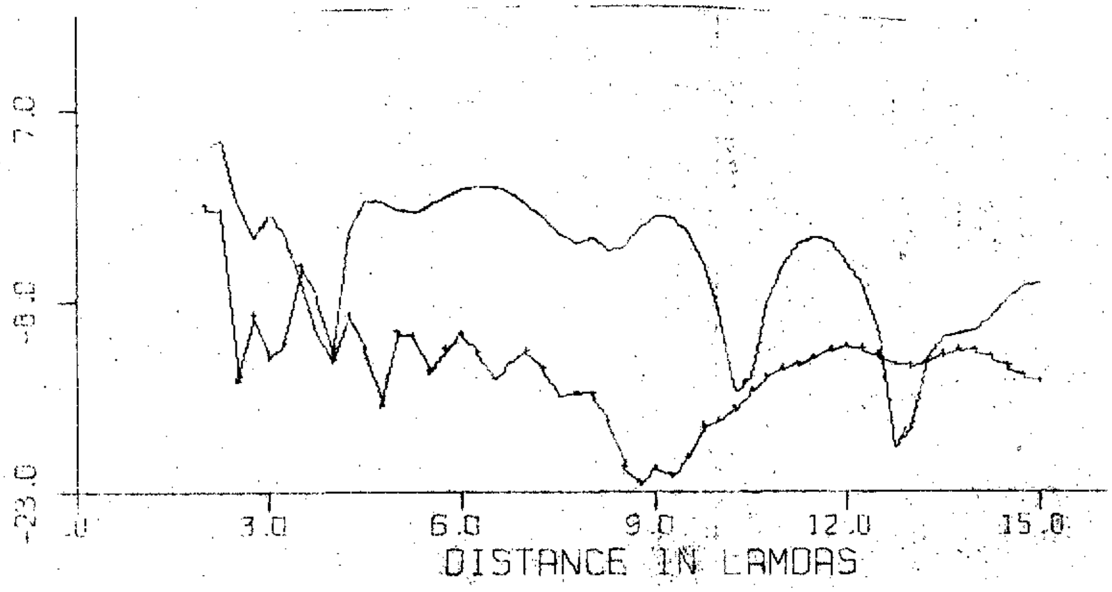
-7.0
-22.0
-37.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ζ (HED)

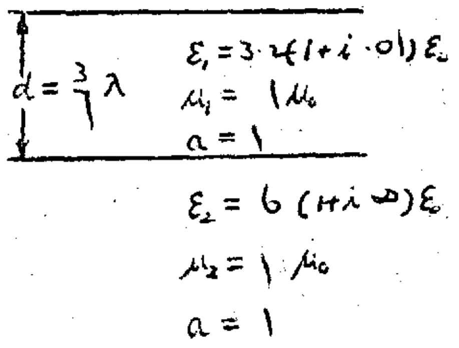

$d = \frac{3}{7}\lambda$

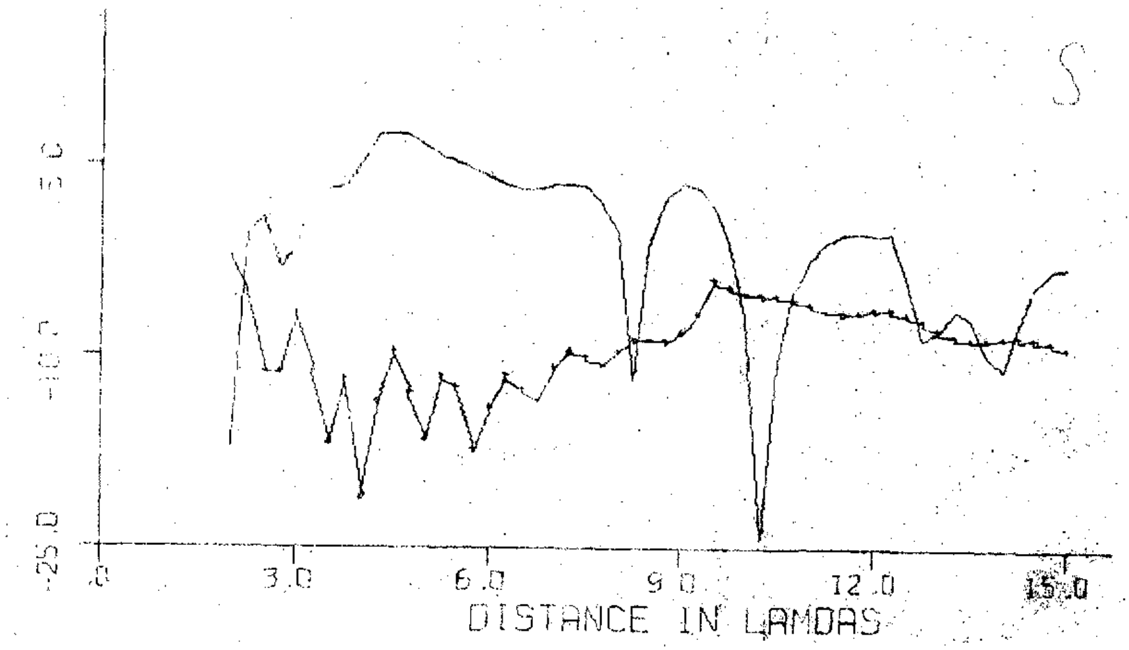
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

$\varepsilon_2 = 6(1+i\infty)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

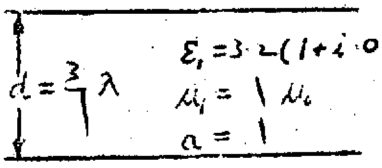


H_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.24(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i\infty)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$


S
5.0
-10.0
-25.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

$\bar{E}_\rho$ (HED)



$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$

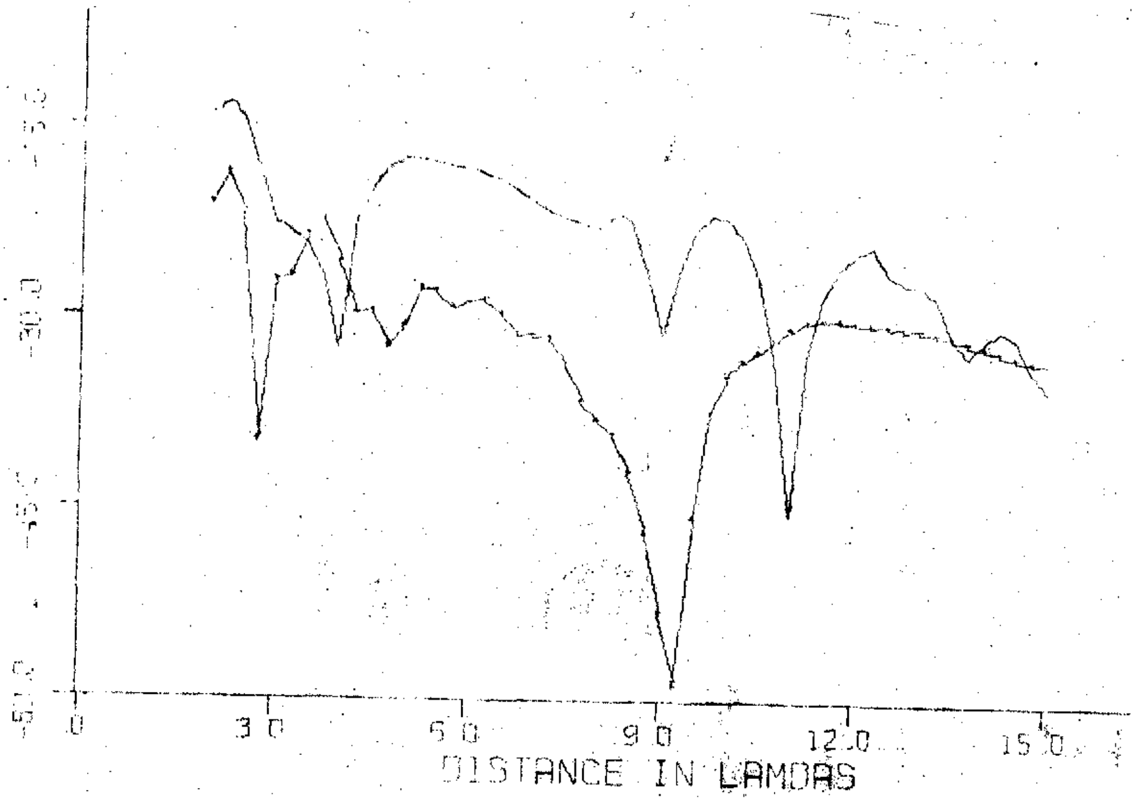
$\mu_1 = 1\,\mu_0$

$a = 1$

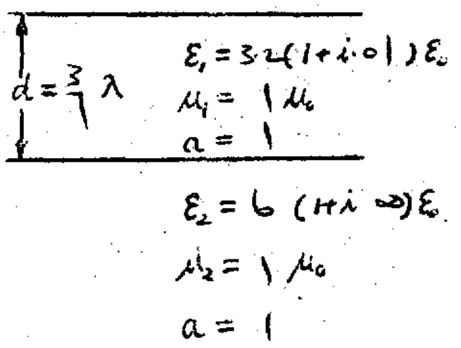
$\varepsilon_2 = 6\,(1+i00)\,\varepsilon_0$

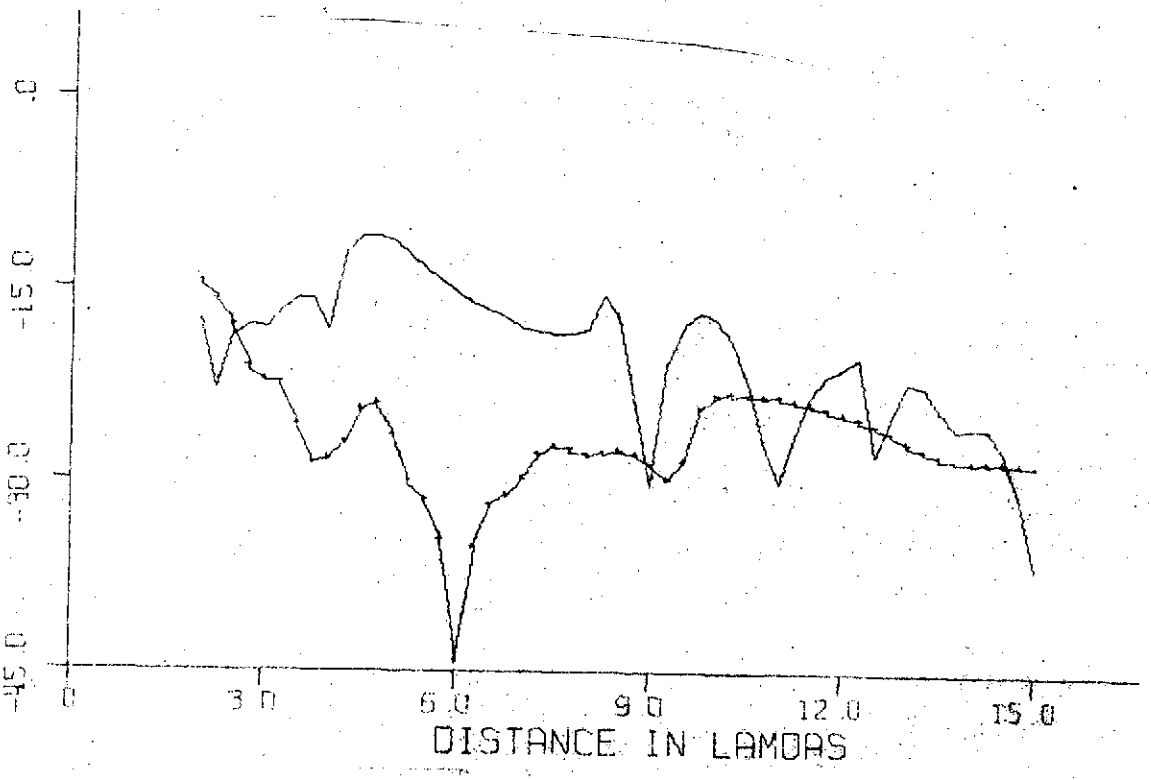
$\mu_2 = 1\,\mu_0$

$a = 1$



E_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i\infty)\varepsilon_0$
$\mu_2 = 1\mu_0$
$a = 1$


0
-15.0
-30.0
-45.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_φ (HED)

$d = \frac{3}{7}\lambda$

$\varepsilon_1 = 3.4(1+i\cdot01)\varepsilon_0$

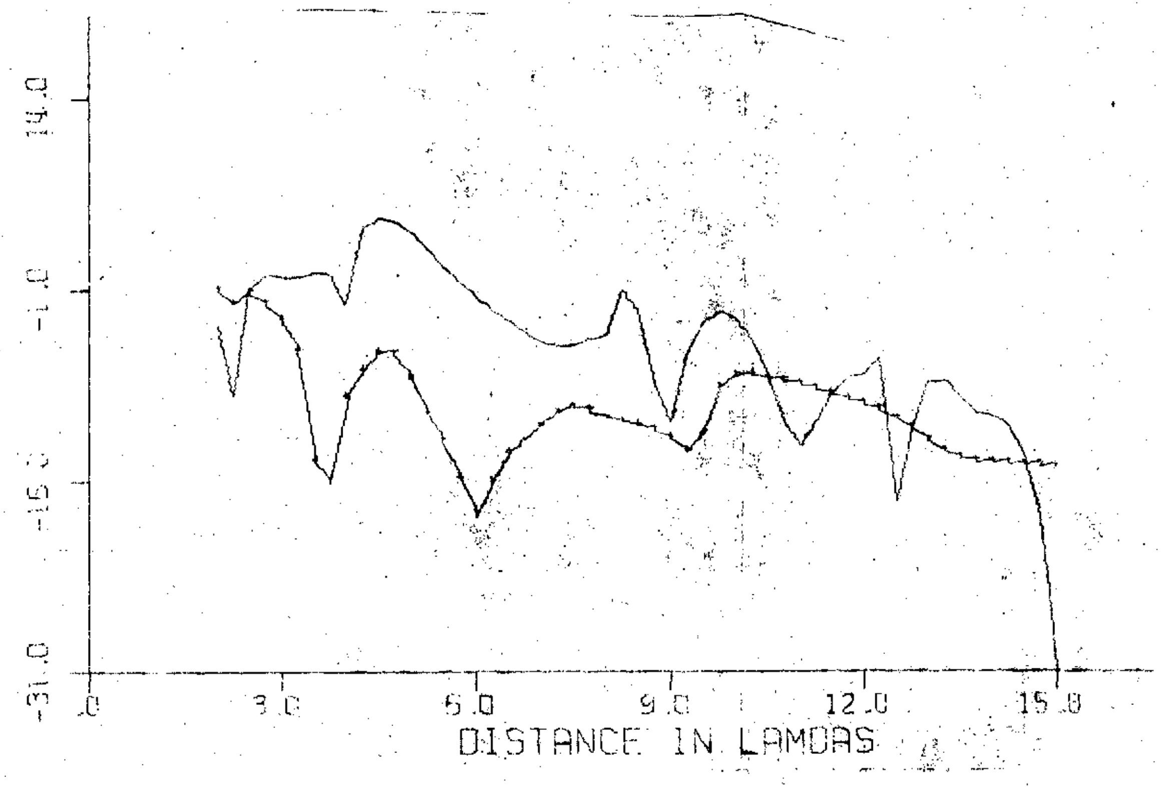
$\mu_1 = 1\,\mu_0$

$a = 1$

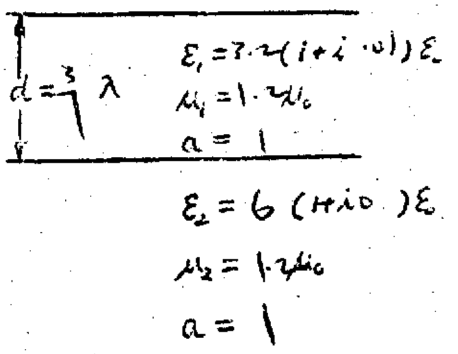
$\varepsilon_2 = 6\,(1+i\infty)\varepsilon_0$

$\mu_2 = 1\,\mu_0$

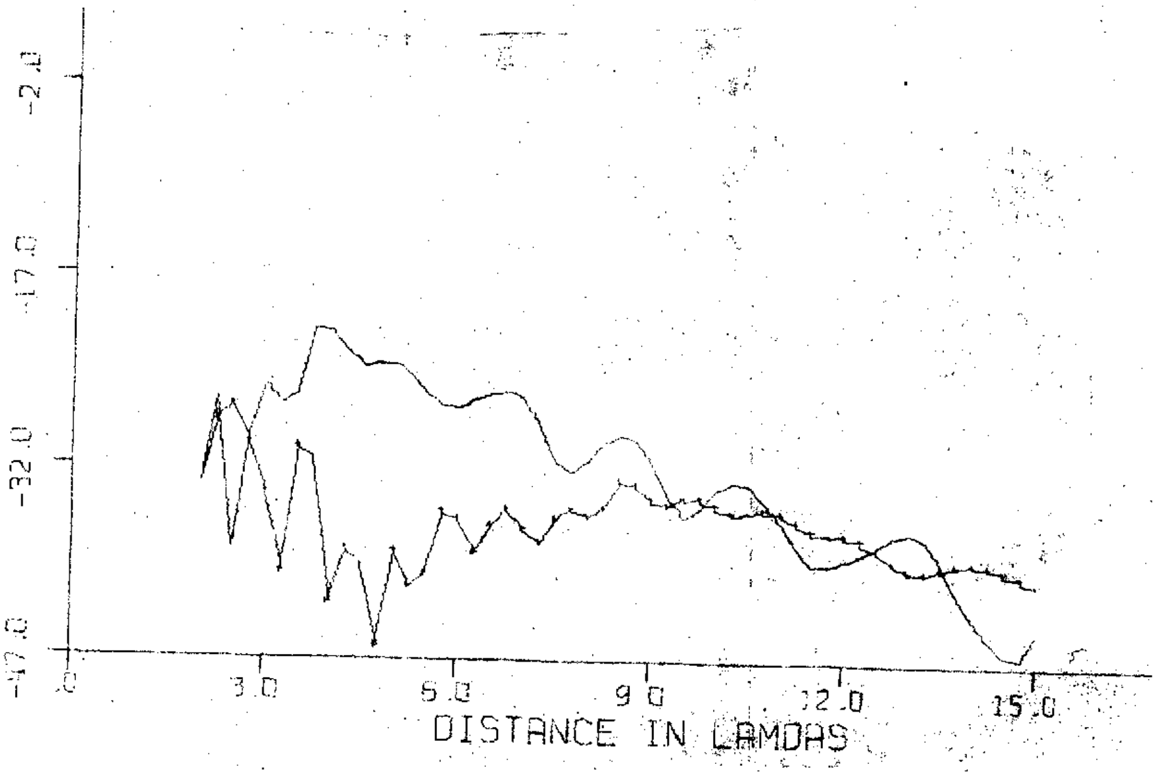
$a = 1$



E_φ (HED)

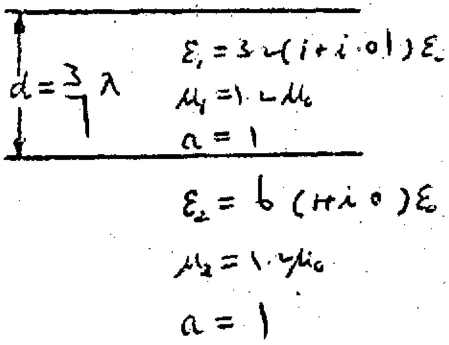


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 7.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$

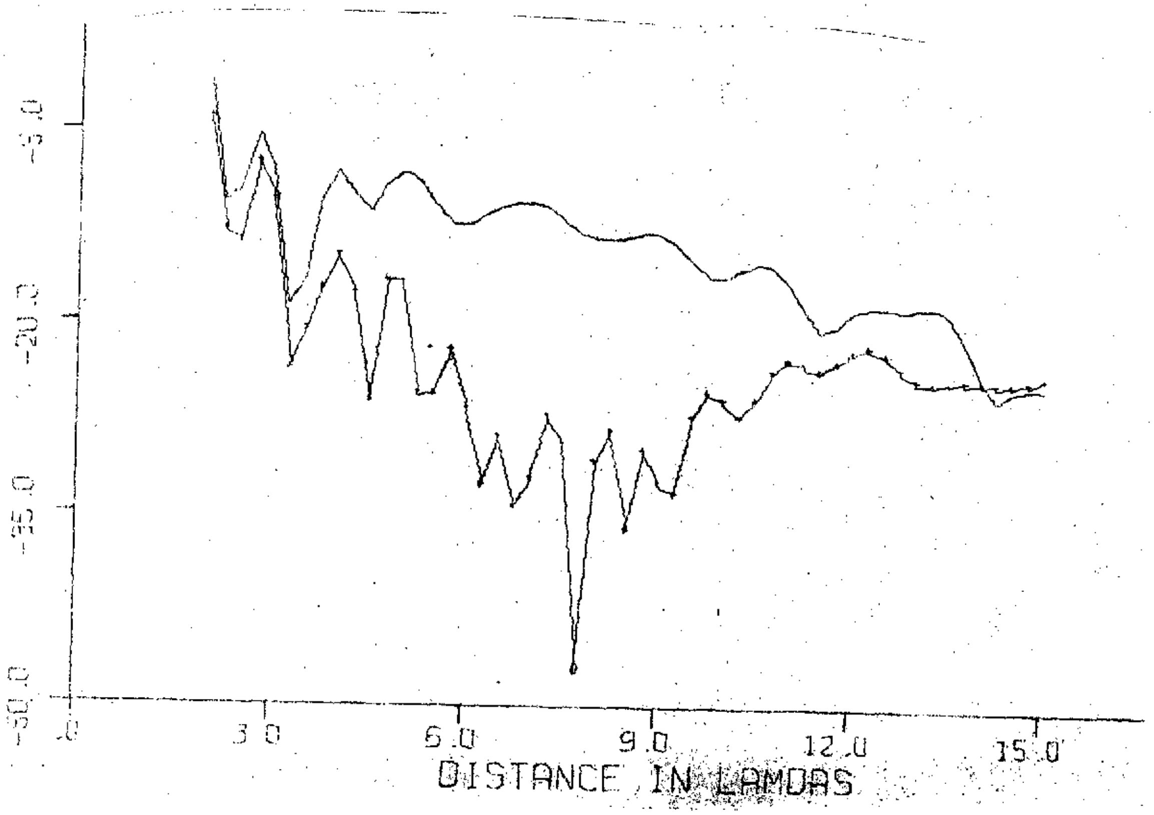


-2.0
-17.0
-32.0
-47.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ρ (HED)

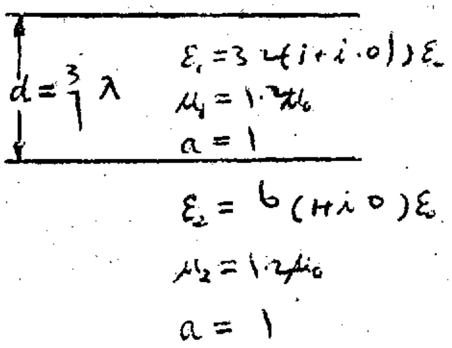


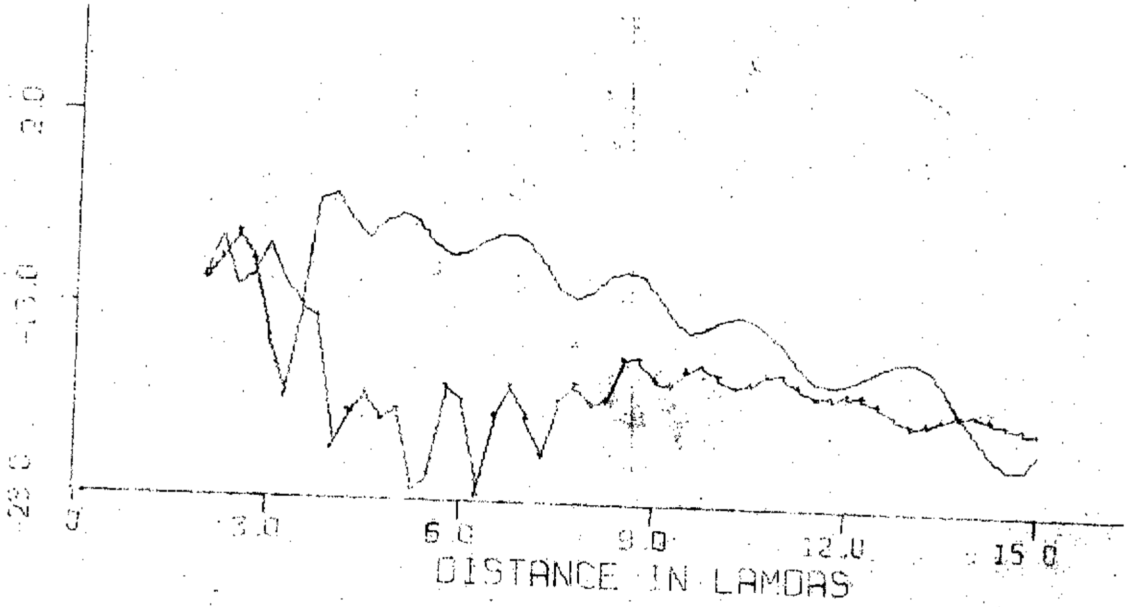
$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.4(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1.4\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.4\mu_0$
$a = 1$



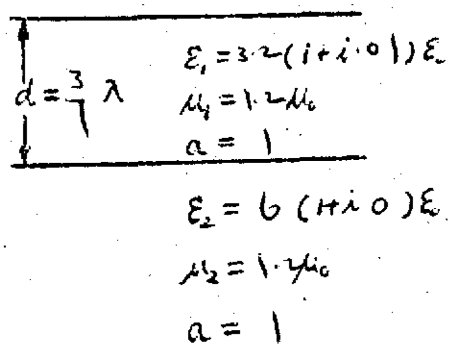
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)


$d = \frac{3}{7}\lambda$
$\varepsilon_1 = 3.4(1+i\cdot 0))\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$

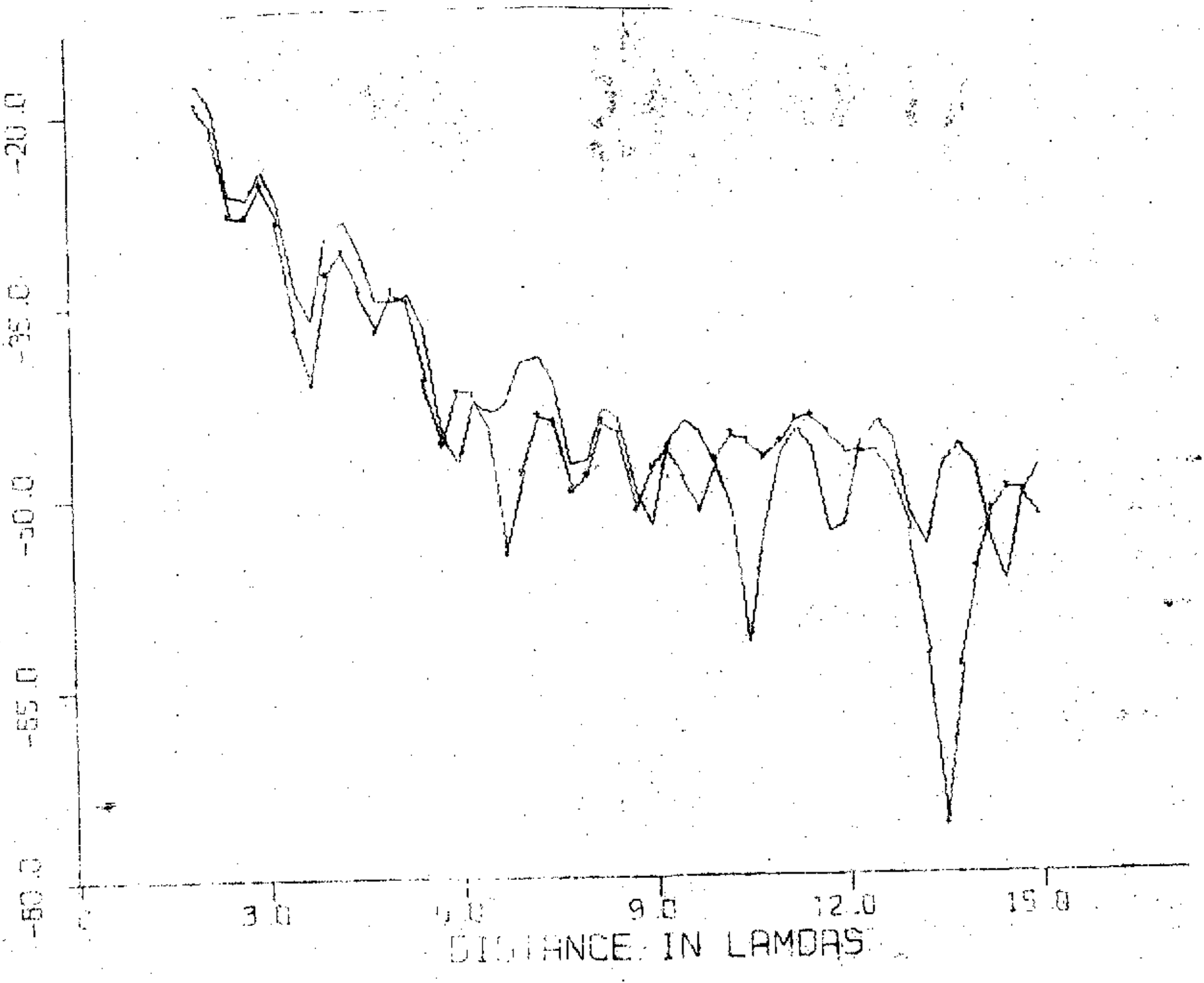

2.0
-13.0
-28.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_ρ (HED)

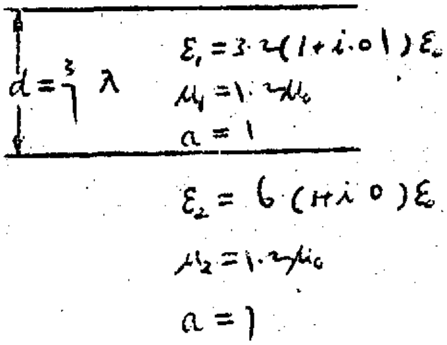

$d = \frac{3}{7}\lambda$

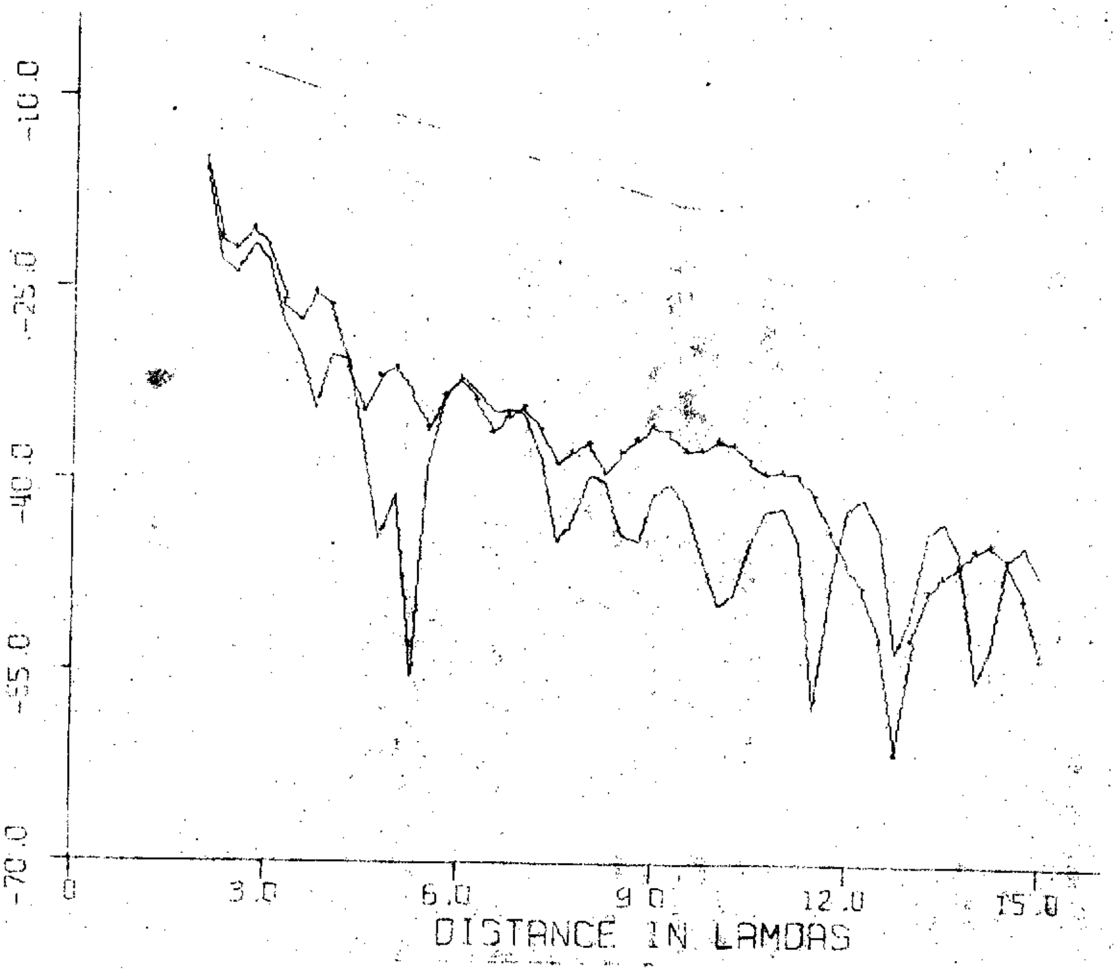
$\varepsilon_1 = 3.2(1 + i\cdot 0)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$

$\varepsilon_2 = 6(1 + i\,0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$

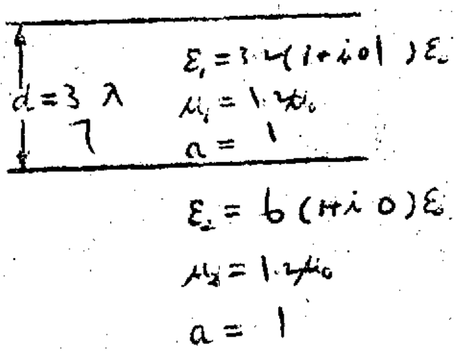


E_z (HED)

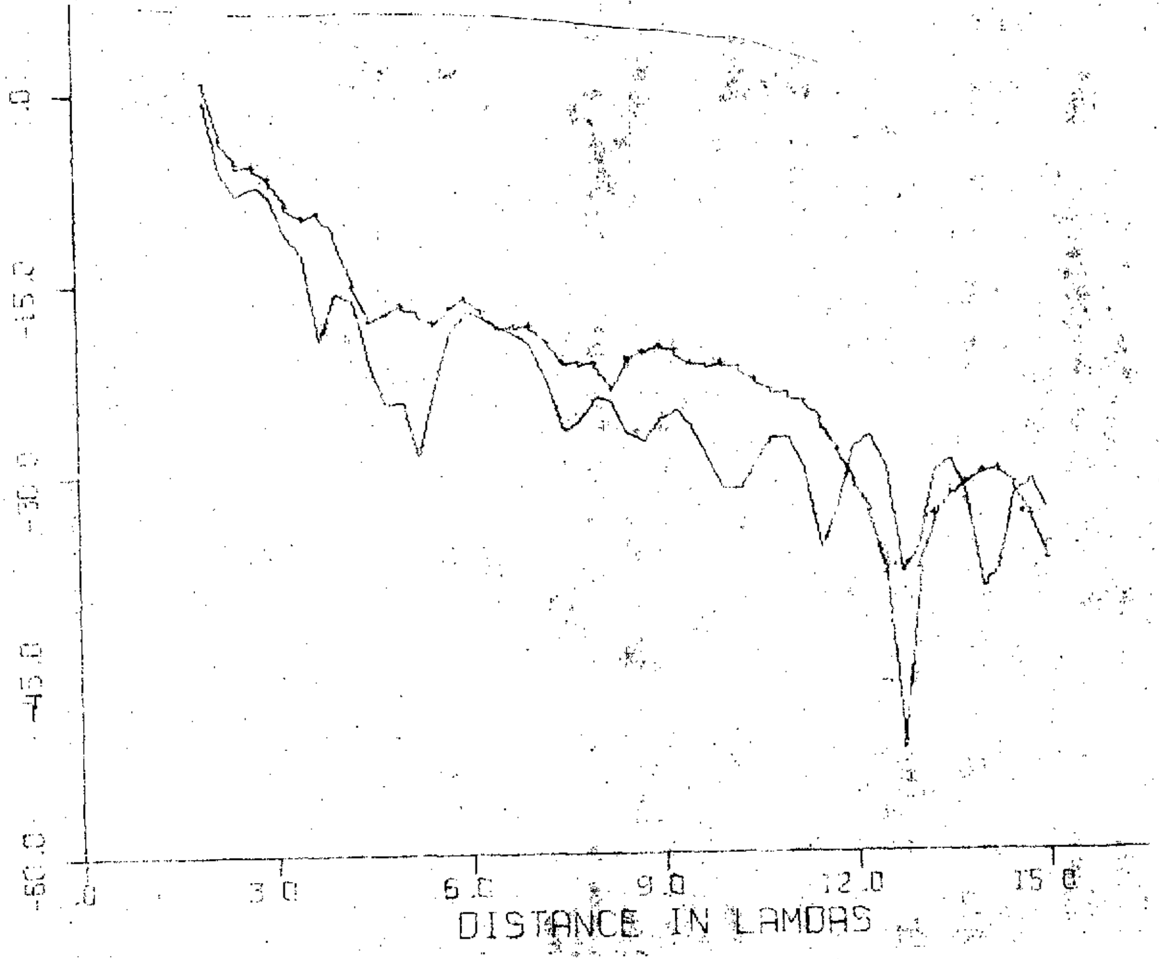

$d = {}^{3}7\ \lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
$a = 1$
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
$a = 1$


-10.0
-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_φ (HED)



d=3 λ
$\varepsilon_1 = 3.4(1+i.01)\varepsilon_0$
$\mu_1 = 1.2\mu_0$
a = 1
$\varepsilon_2 = 6(1+i0)\varepsilon_0$
$\mu_2 = 1.2\mu_0$
a = 1



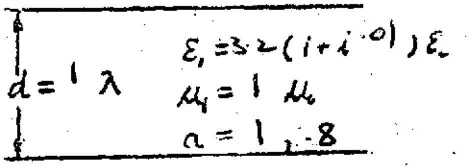
.0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

APPENDIX C

Figures 5.1-5.36 presents mode solutions for layer thickness equal to 1 wavelength.

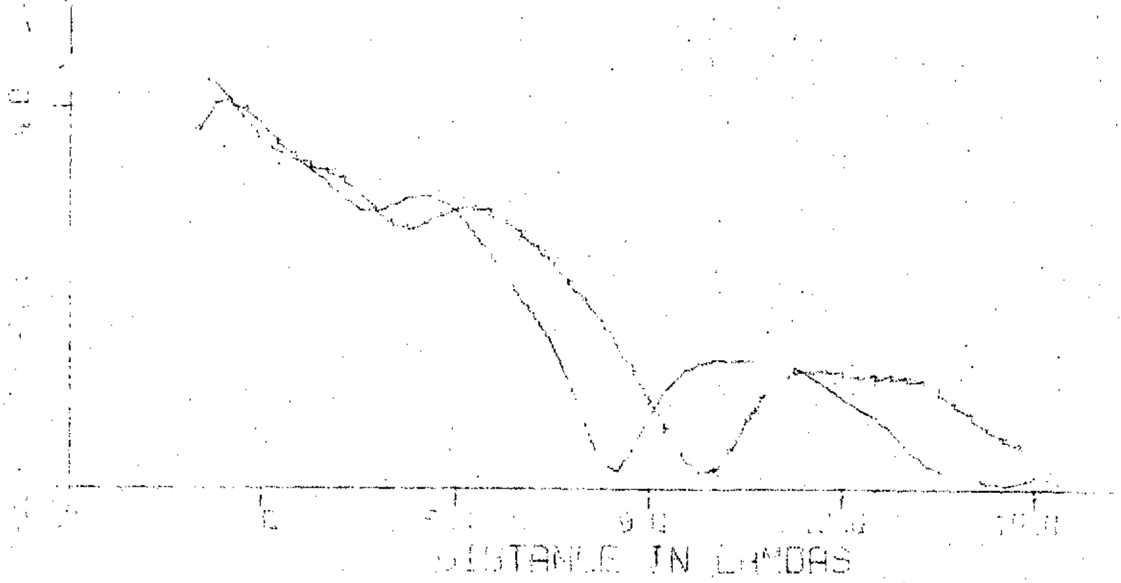
Figures 6.1-6.144 presents solutions for thin layers.

E_ϕ (VMD)

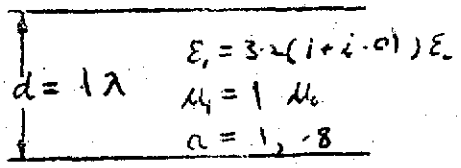


$\varepsilon_1 = 3.2\,(1 + i\cdot 01)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, .8$

$\varepsilon_2 = 6\ (1 + i\cdot 0)\,\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1, .8$



H_z (VMD)



$\varepsilon_1 = 3.2(1 + i\,.01)\varepsilon_0$

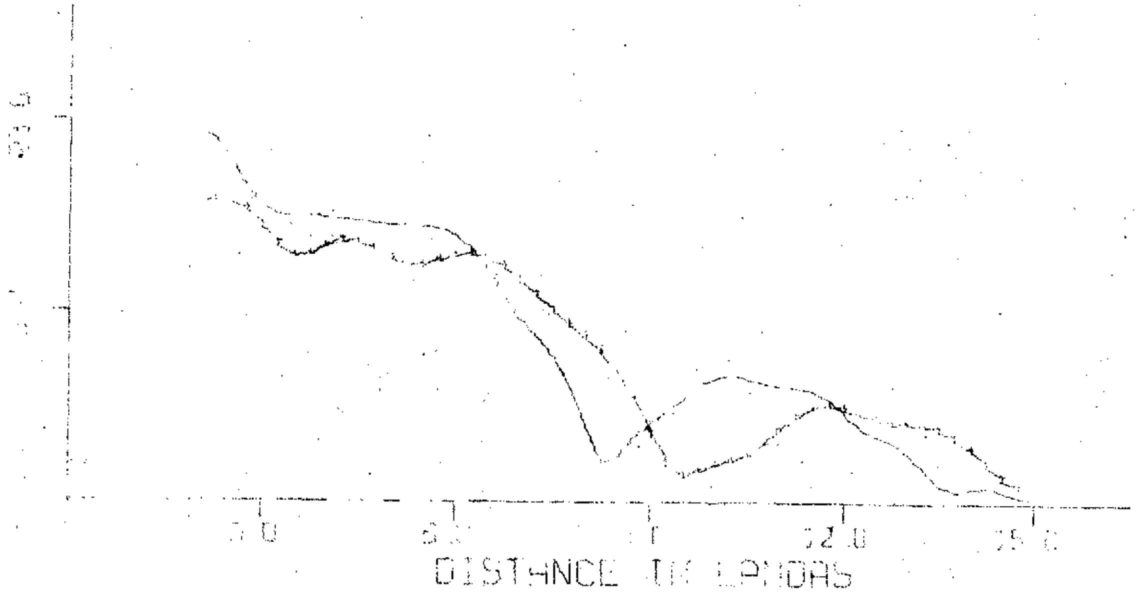
$\mu_1 = 1\ \mu_0$

$a = 1, .8$

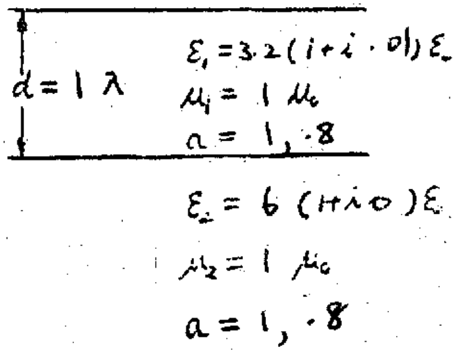
$\varepsilon_2 = 6\ (1 + i\,0)\varepsilon$

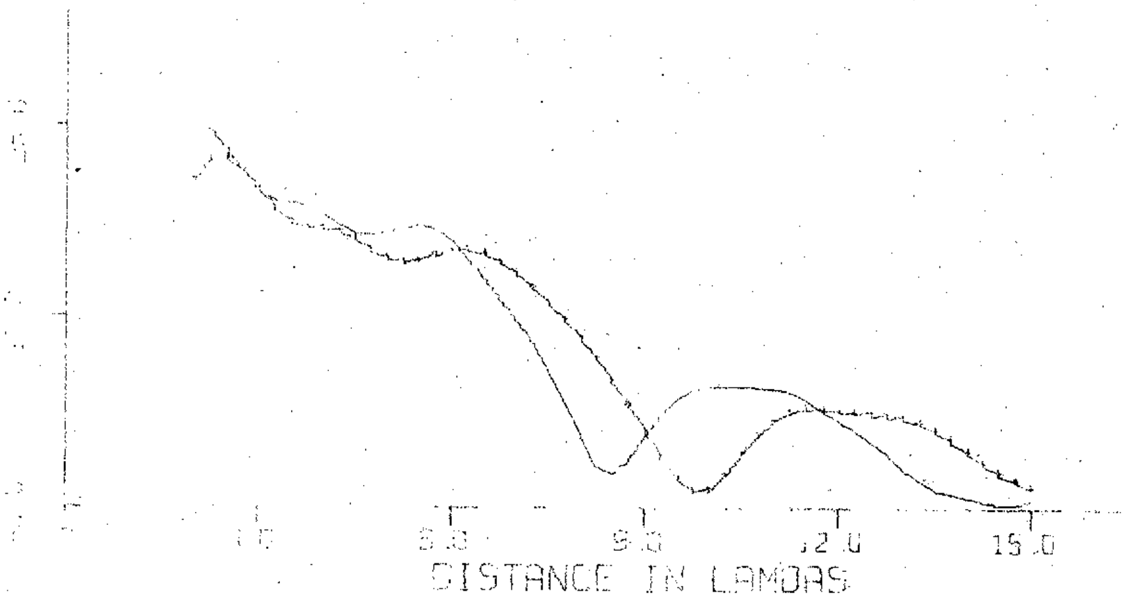
$\mu_2 = 1\ \mu_0$

$a = 1, .8$

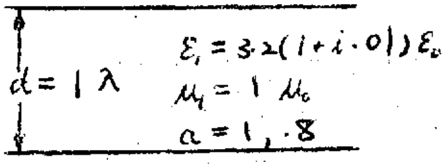


H_z (VMD)


d = 1 λ
ε₁ = 3.2 (1 + i · 01) ε₀
μ₁ = 1 μ₀
a = 1, ·8
ε₂ = 6 (1 + i 0) ε₀
μ₂ = 1 μ₀
a = 1, ·8


3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_ϕ (HED)



$\varepsilon_1 = 3.2(1+i\cdot 0)\,\varepsilon_0$

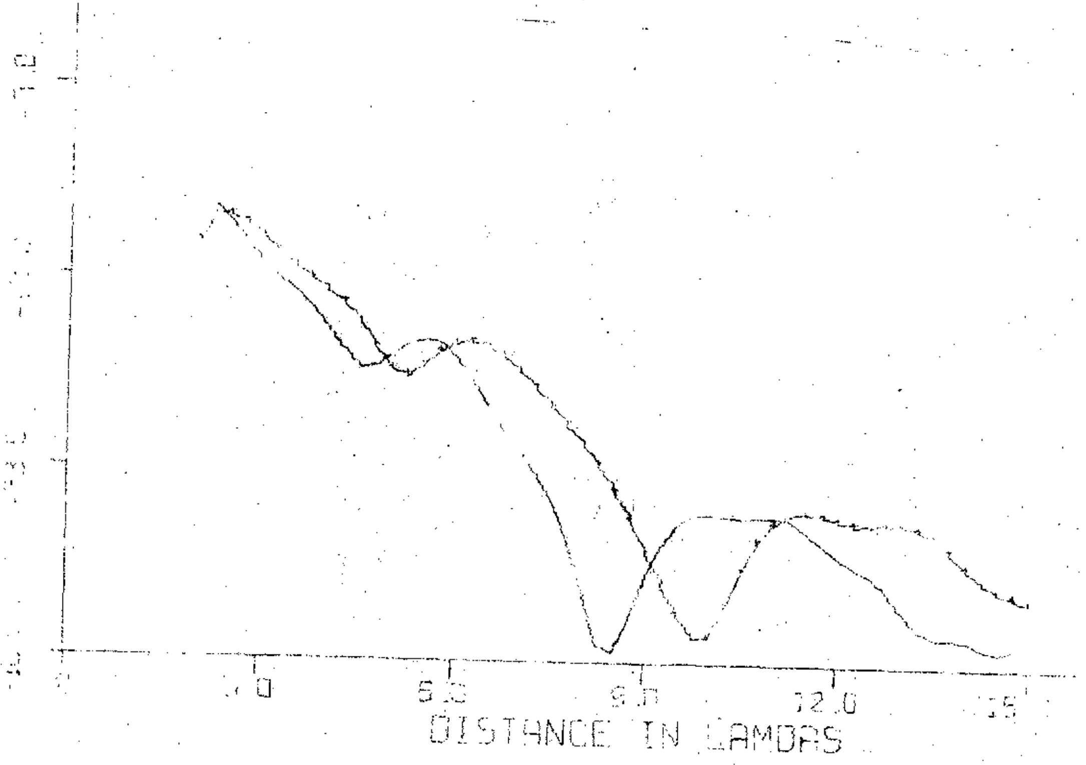
$\mu_1 = 1\ \mu_0$

$a = 1, .8$

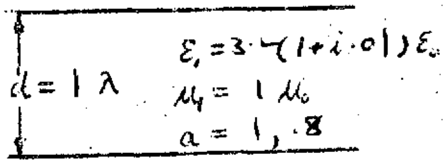
$\varepsilon_2 = 6\ (1+i\,0)\,\varepsilon_0$

$\mu_2 = 1\ \mu_0$

$a = 1, .8$

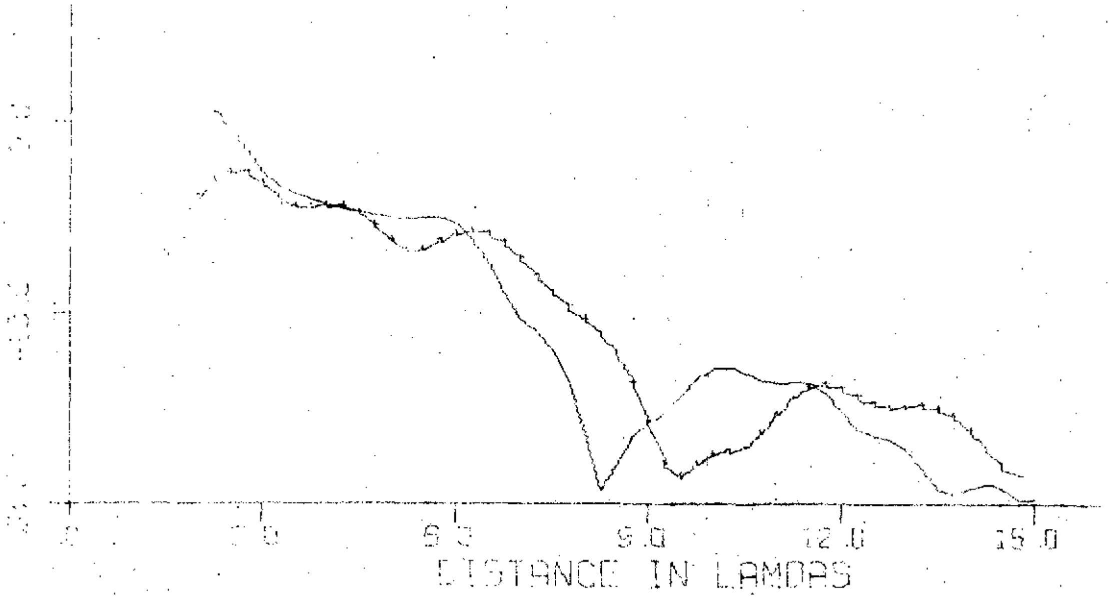


H_ρ (HED)

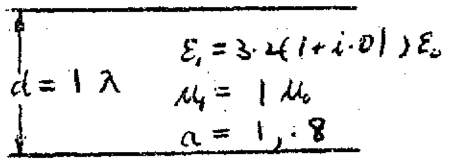


$\varepsilon_1 = 3.4(1 + i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, .8$

$\varepsilon_2 = 6\,(1 + i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, .8$



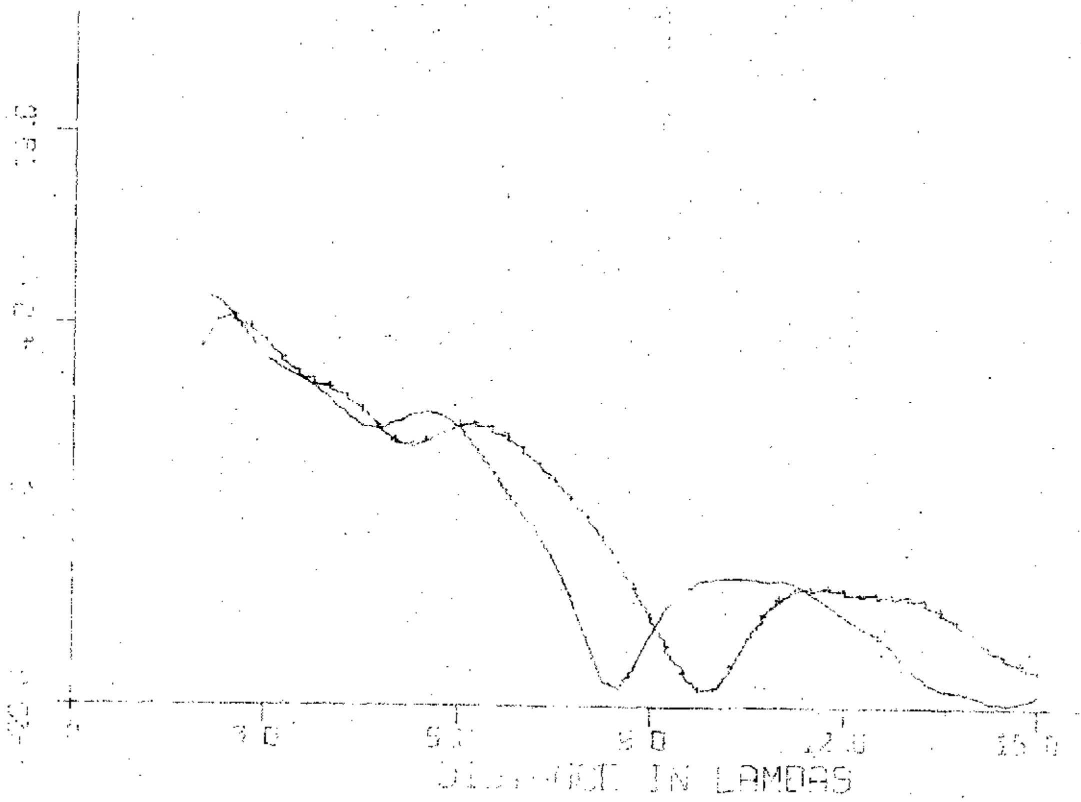
H_z (HED)


$d = 1\ \lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, .8$

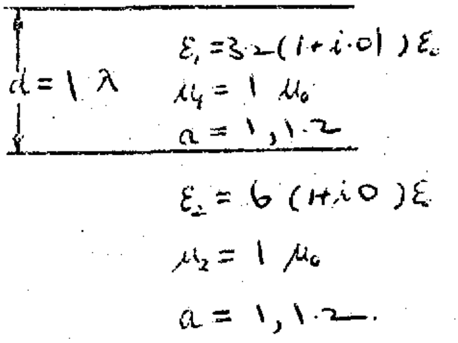
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon_0$

$\mu_2 = 1\ \mu_0$

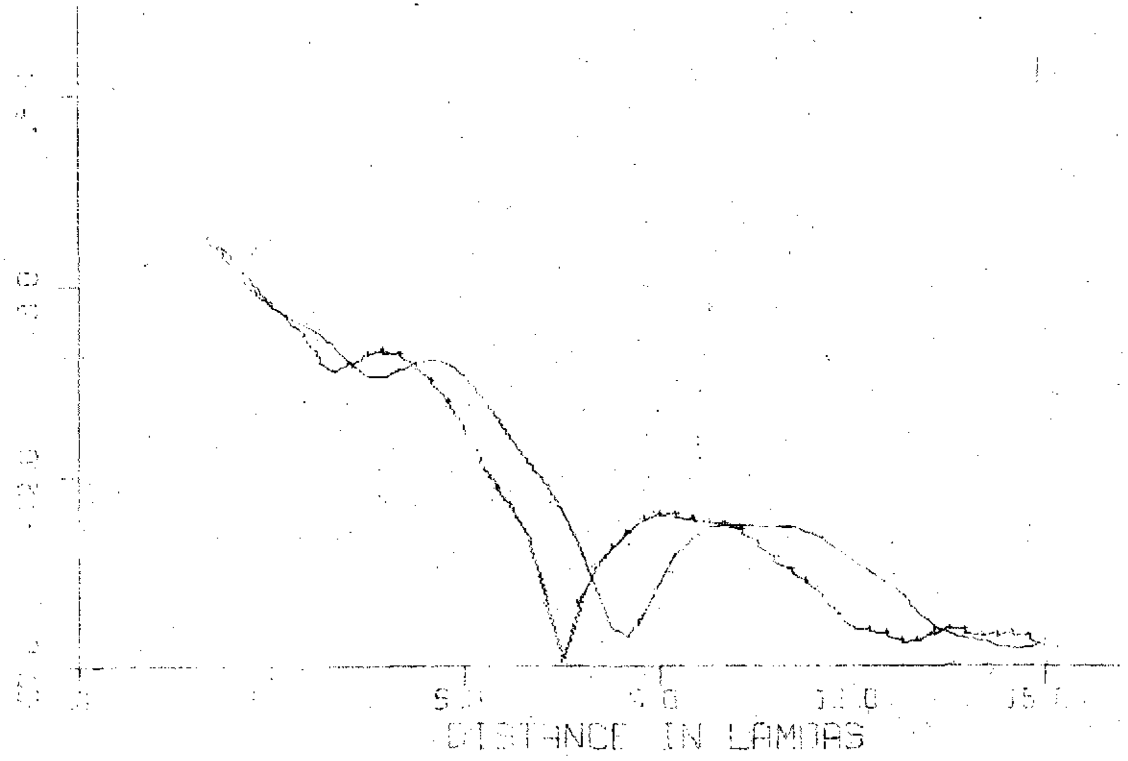
$a = 1, .8$



E_φ (VMD)

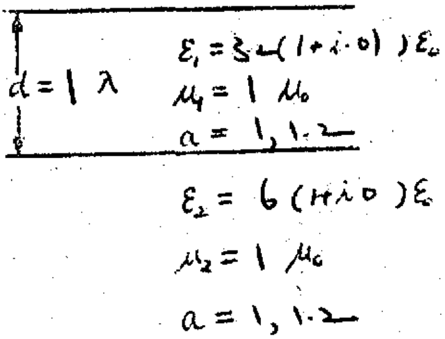


d = 1 λ
ε₁ = 3.2 (1+i·0) ε₀
μ₁ = 1 μ₀
a = 1, 1.2
ε₂ = 6 (1+i0) ε₀
μ₂ = 1 μ₀
a = 1, 1.2.



DISTANCE IN LAMDAS

H_z (VMD)



$d = 1\ \lambda$

$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$

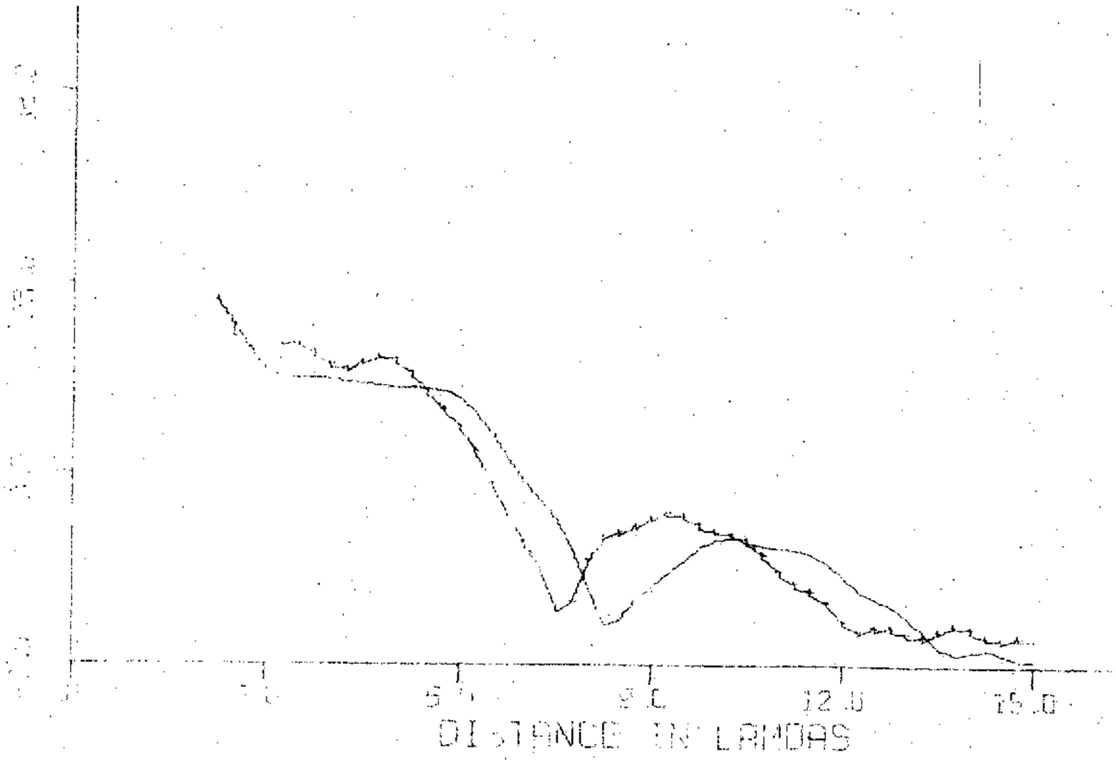
$\mu_1 = 1\ \mu_0$

$a = 1, 1.2$

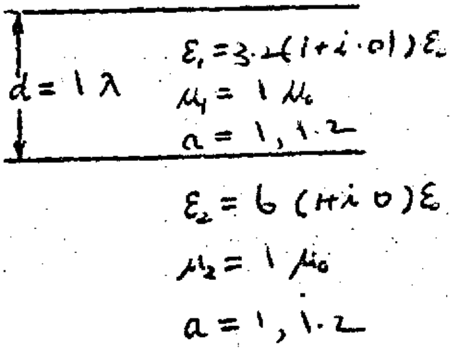
$\varepsilon_2 = 6(1+i0)\varepsilon_0$

$\mu_2 = 1\ \mu_0$

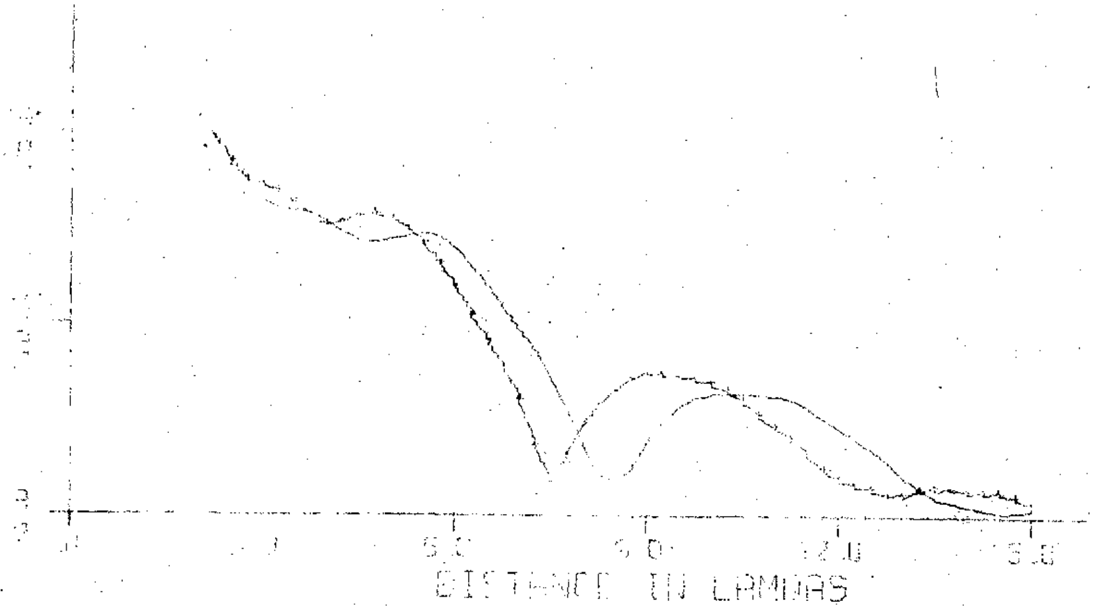
$a = 1, 1.2$



H_γ (VMD)

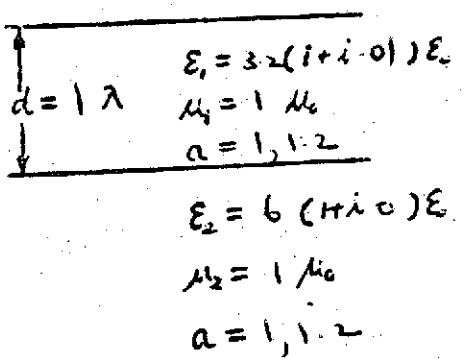


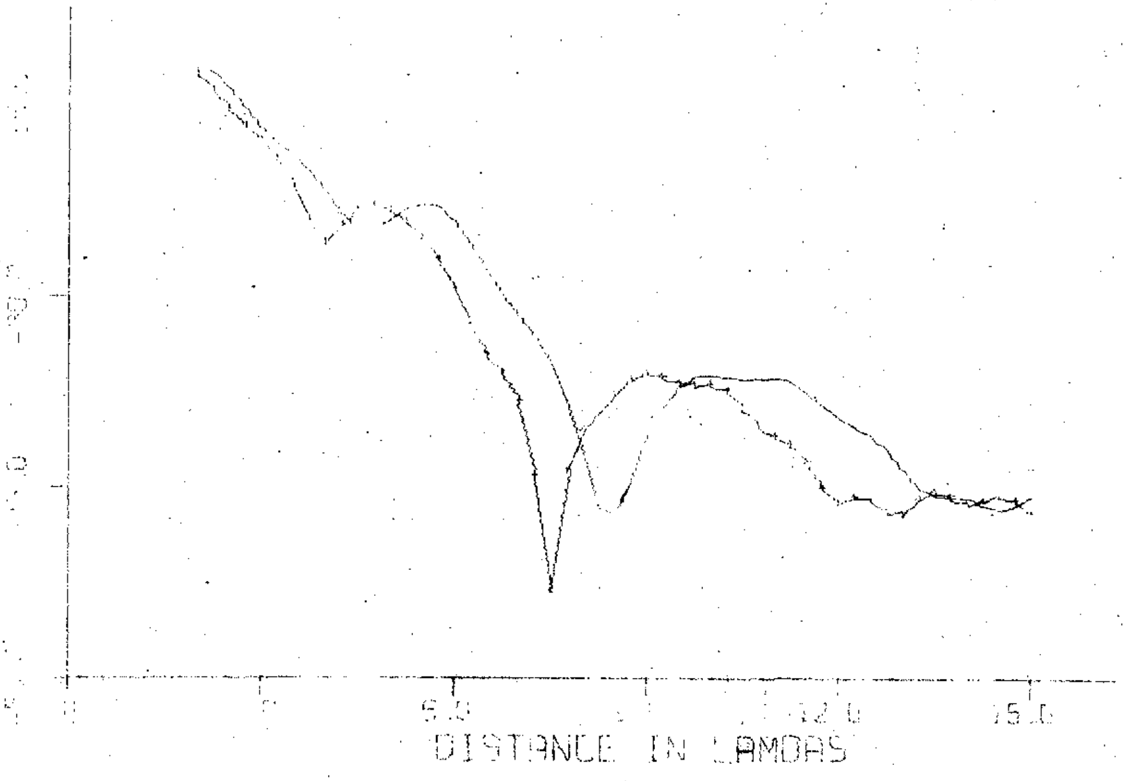
$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i\cdot01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$



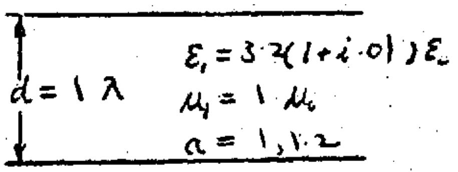
DISTANCE IN LAMDAS

Eφ (HED)


d = 1 λ
ε₁ = 3.2(1+i·01) ε₀
μ₁ = 1 μ₀
a = 1, 1.2
ε₂ = 6 (1+i 0) ε₀
μ₂ = 1 μ₀
a = 1, 1.2


0
6.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)



$d = 1\ \lambda$

$\varepsilon_1 = 3.2(1+i\cdot 0)\,\varepsilon_0$

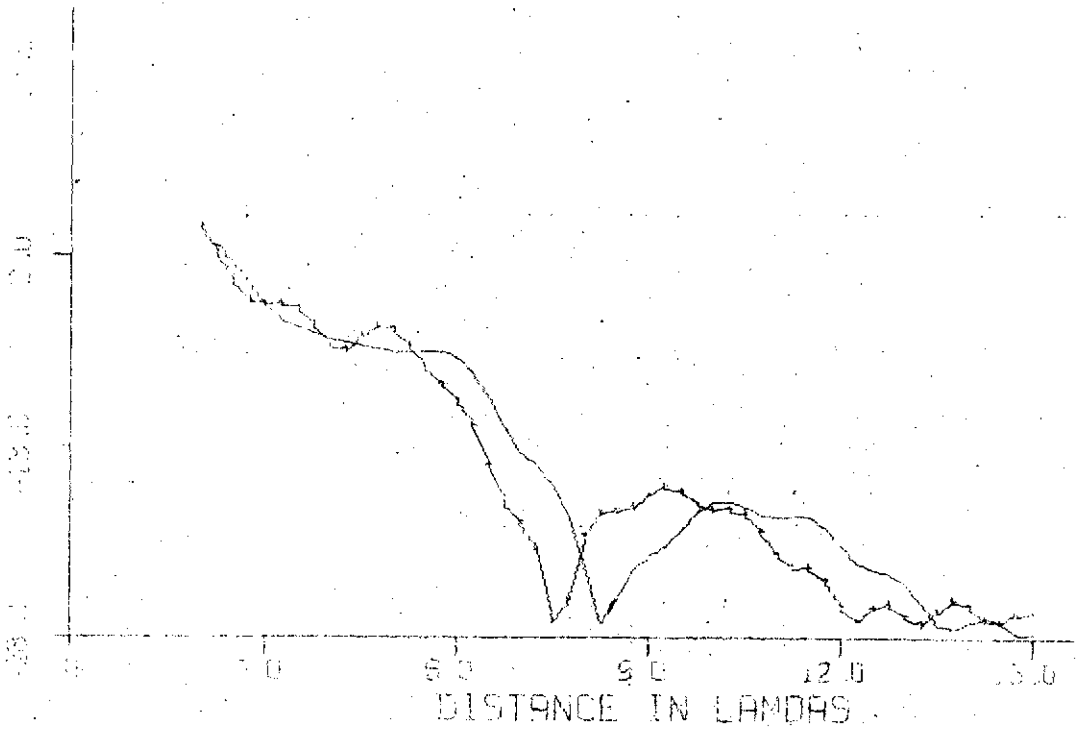
$\mu_1 = 1\ \mu_0$

$a = 1, 1.2$

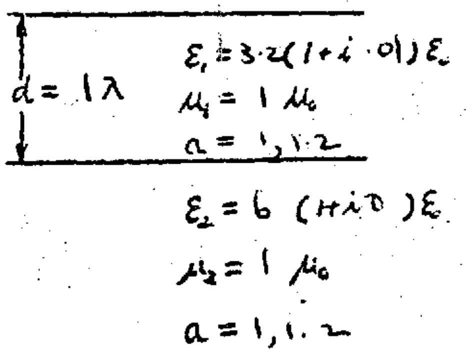
$\varepsilon_2 = 6\,(1+i0\,)\,\varepsilon_0$

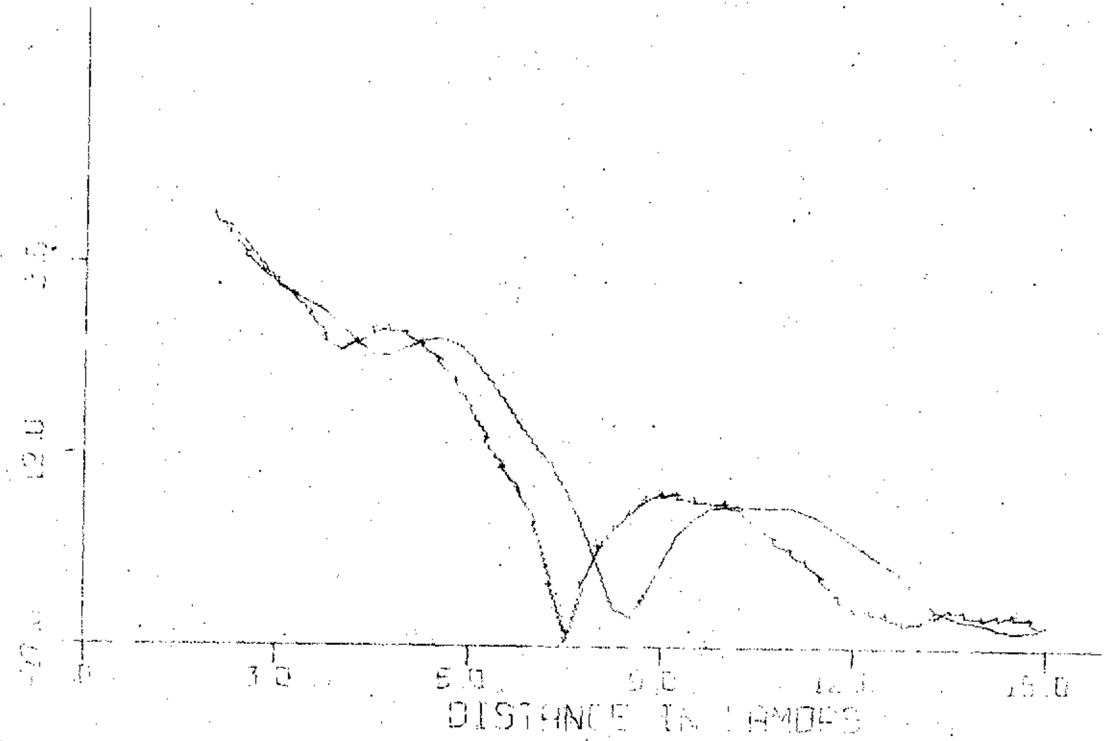
$\mu_2 = 1\ \mu_0$

$a = 1, 1.2$

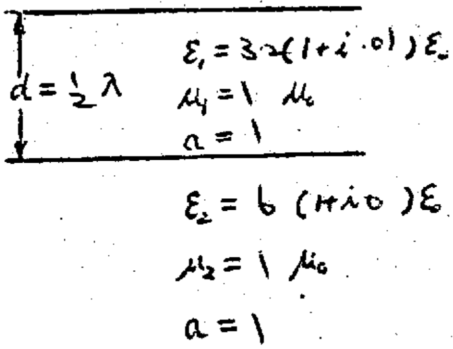


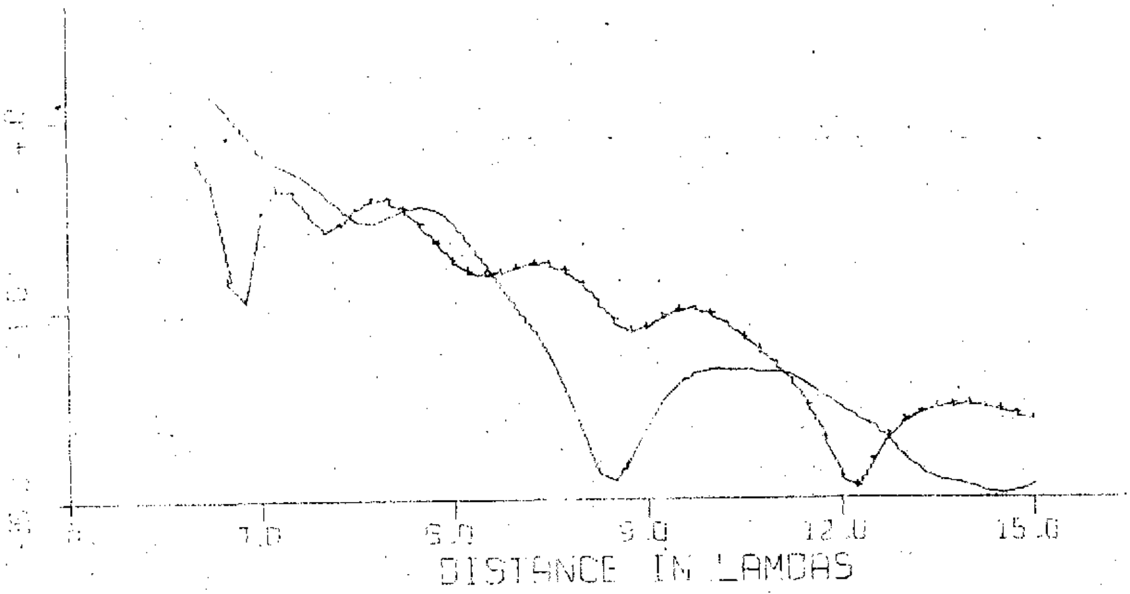
H_z (HED).


d = .1λ
ε₁ = 3.2(1+i .01)ε₀
μ₁ = 1 μ₀
a = 1, 1.2
ε₂ = 6 (1+i0)ε₀
μ₂ = 1 μ₀
a = 1, 1.2

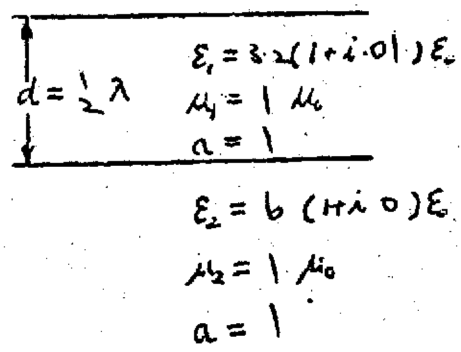

12.0
3.0
6.0
9.0
15.0
DISTANCE IN LAMDAS

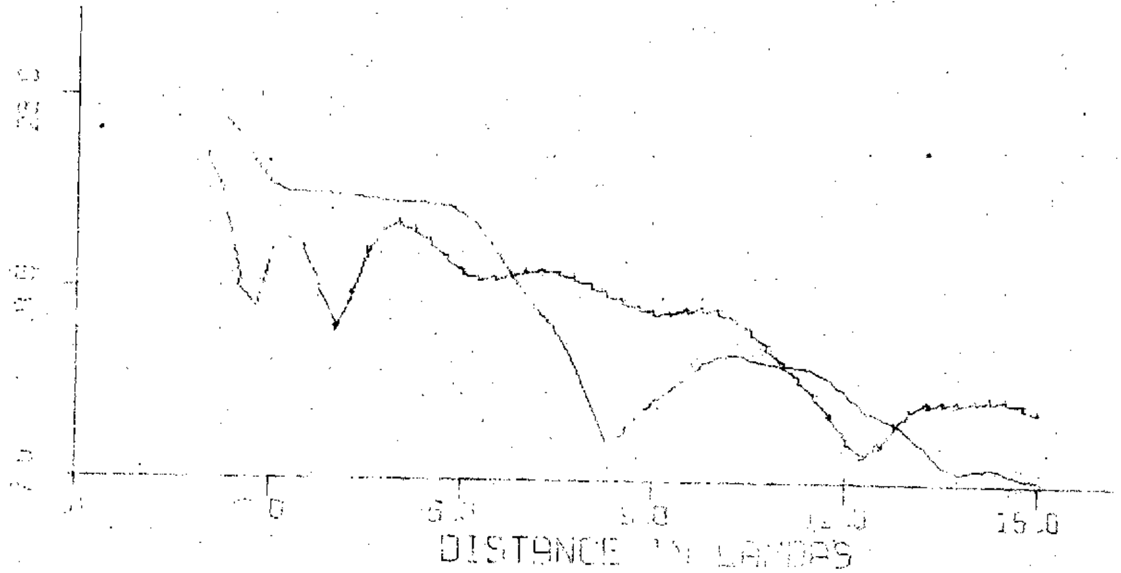
Eφ (VMD)


d = ½ λ
ε₁ = 3.2(1+i·.01) ε₀
μ₁ = 1 μ₀
a = 1
ε₂ = 6 (1+i.0) ε₀
μ₂ = 1 μ₀
a = 1

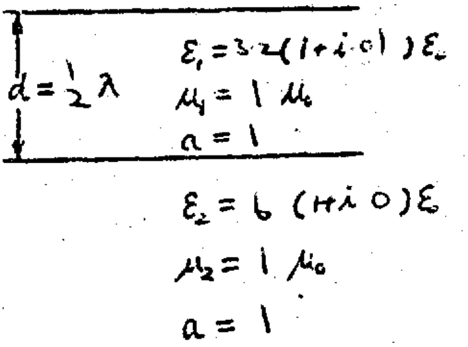

0.
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

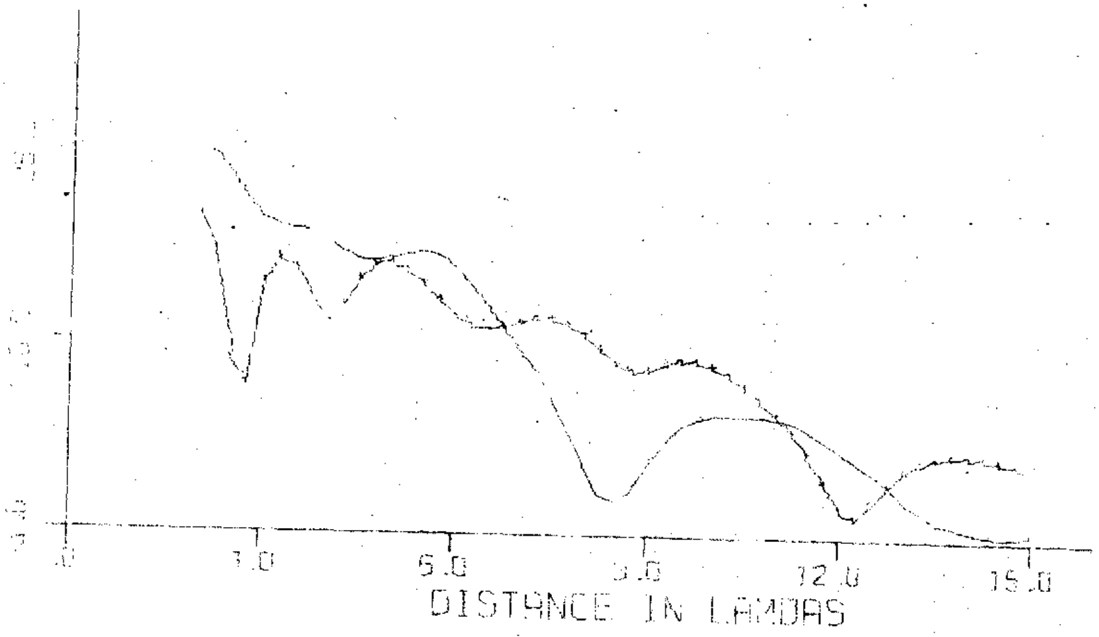
Hg (VMD)


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.2(1 + i\,.01)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1 + i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

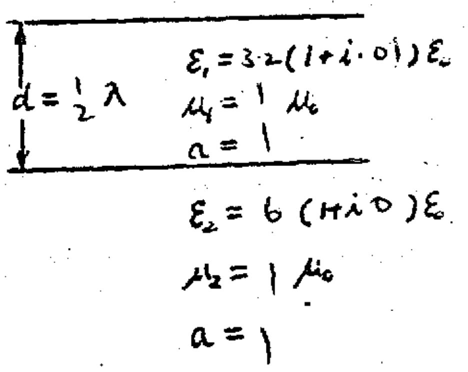

15.0
DISTANCE IN LAMDAS

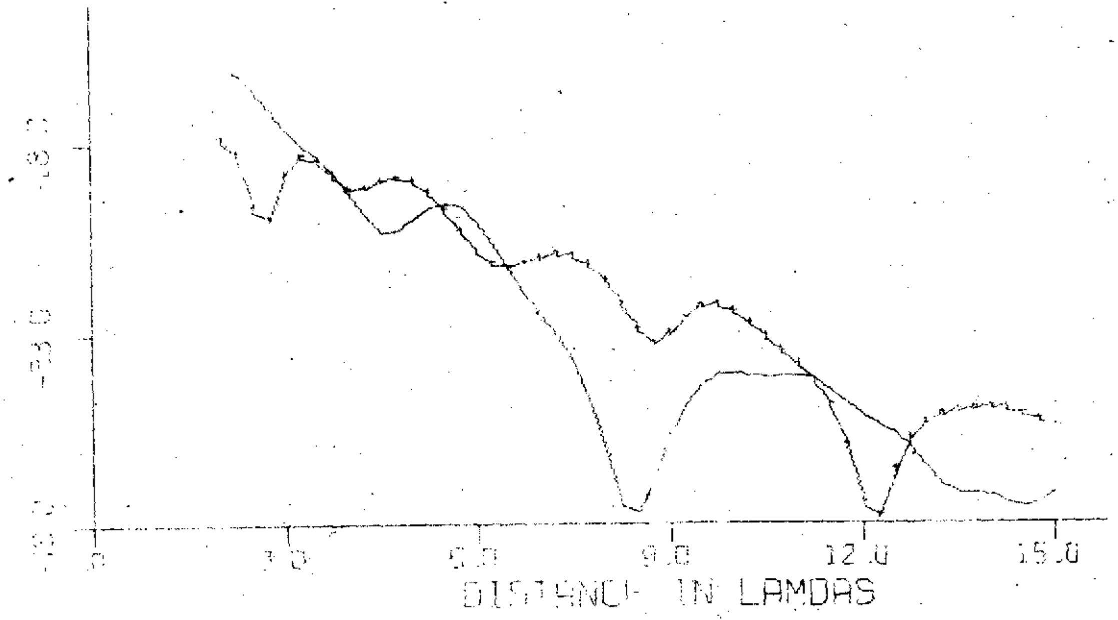
H_z (VMD)


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.2(1+i\,0)\,\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

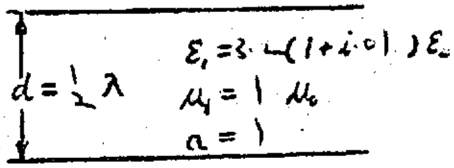

.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (HED)


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


-18.0
-33.0
-48.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)



$d = \frac{1}{2}\lambda$

$\varepsilon_1 = 3.4(1+i\cdot 0)\varepsilon_0$

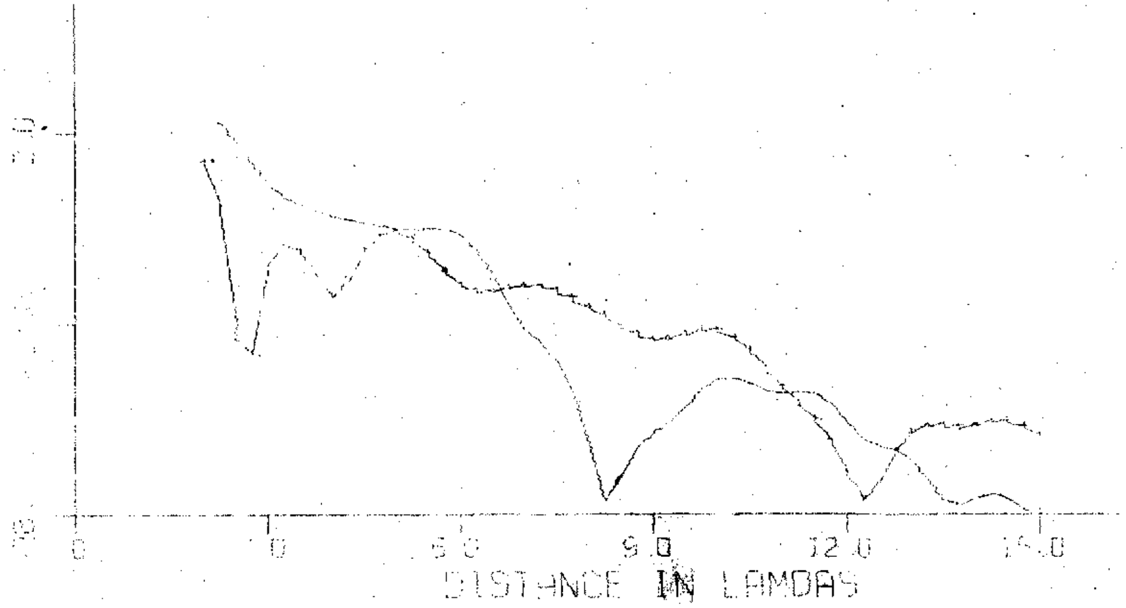
$\mu_1 = 1\ \mu_0$

$a = 1$

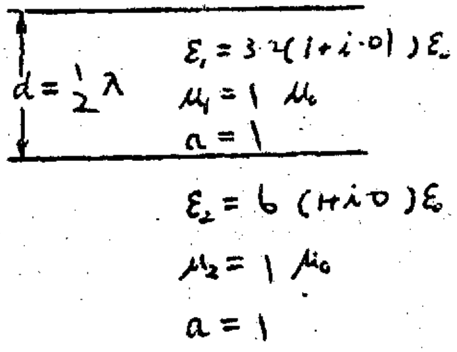
$\varepsilon_2 = 6\ (1+i0)\varepsilon_0$

$\mu_2 = 1\ \mu_0$

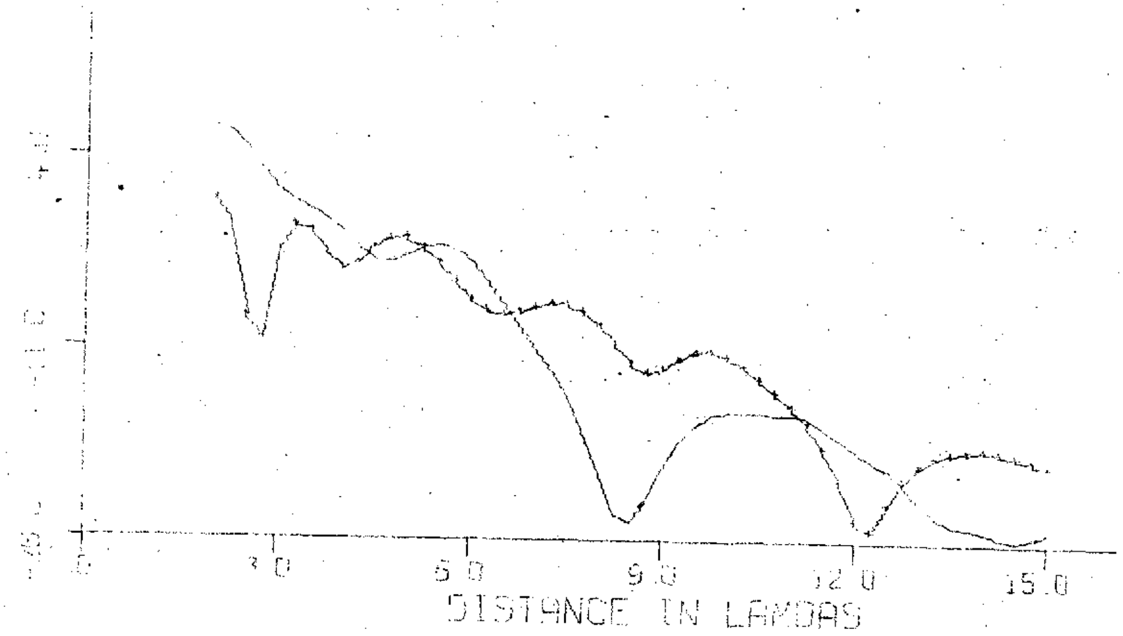
$a = 1$



H_z (HED)

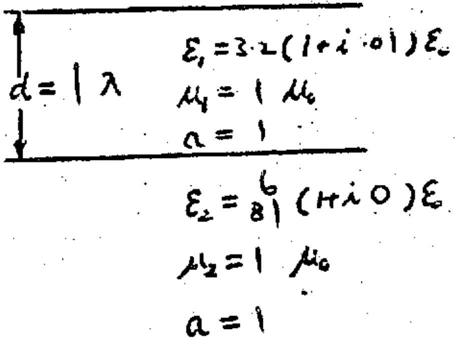


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.4(1+i\cdot 0)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i0)\,\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$



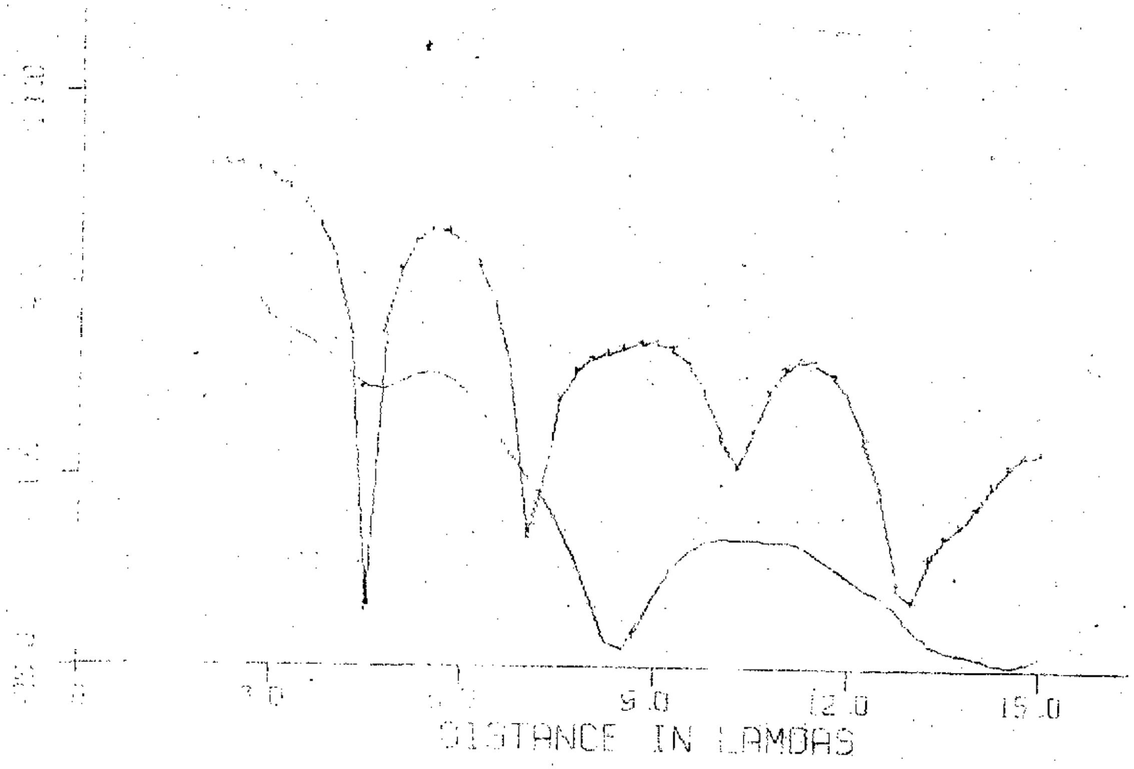
-10.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (VMD)

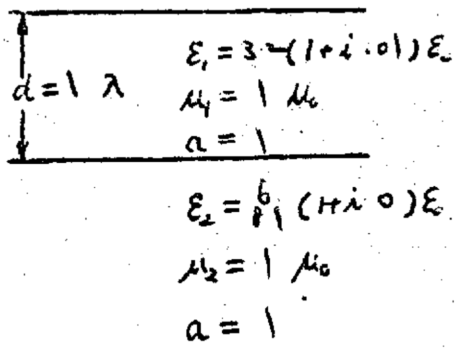


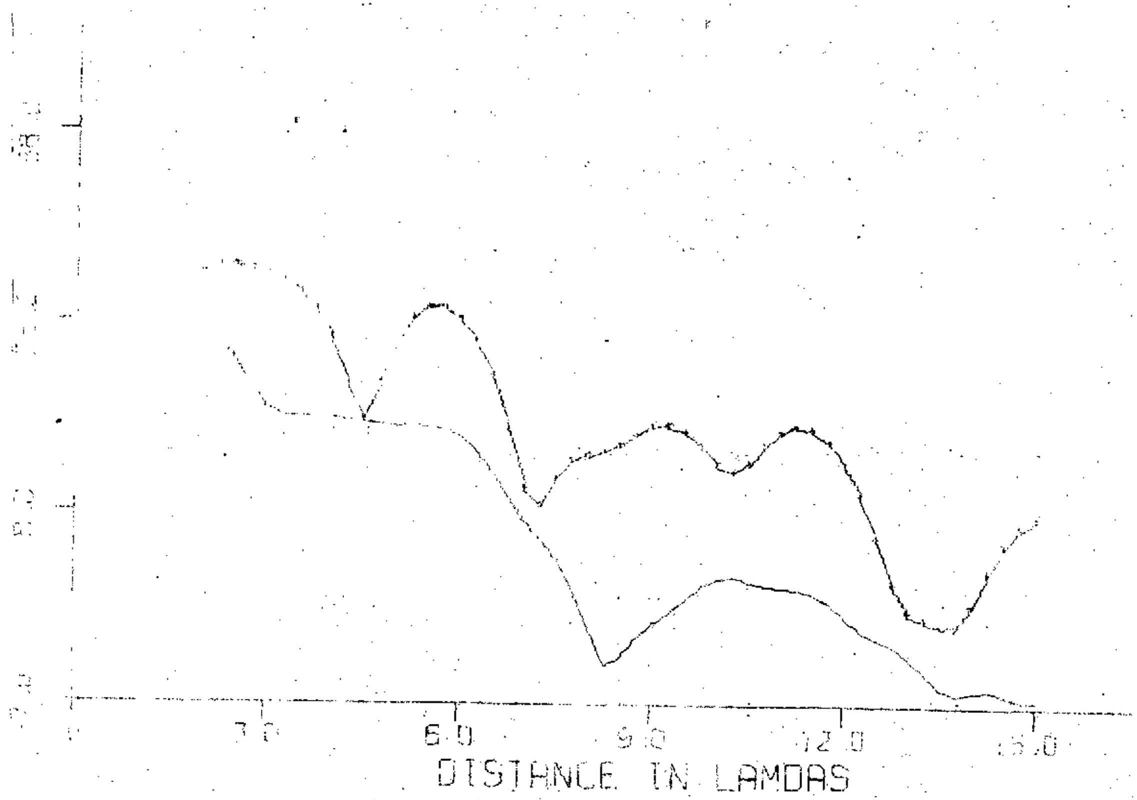
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$

$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

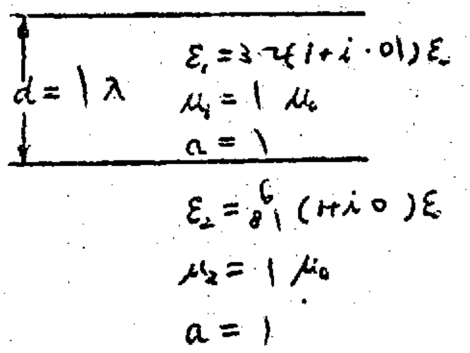


H_z (VMD)

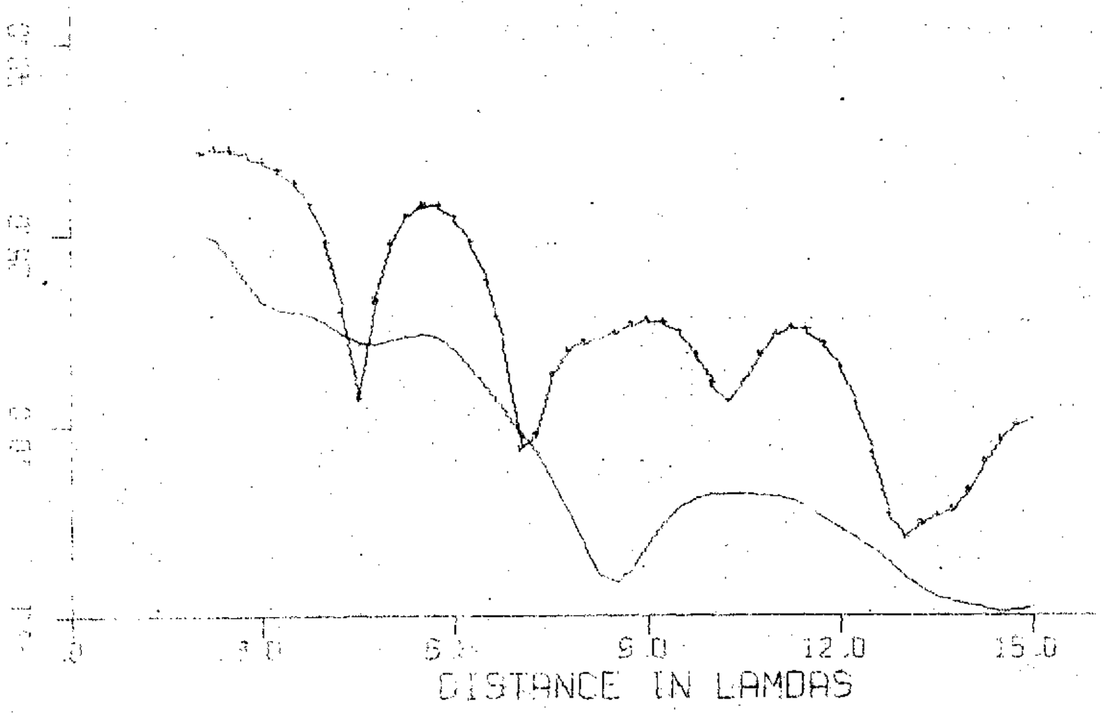

$d = 1\ \lambda$
$\varepsilon_1 = 3.4(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (VMD)

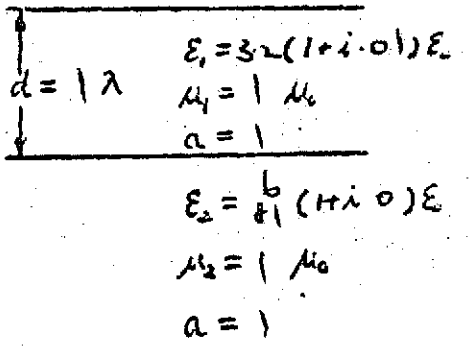


$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{8}1\,(1+i\,0\,)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

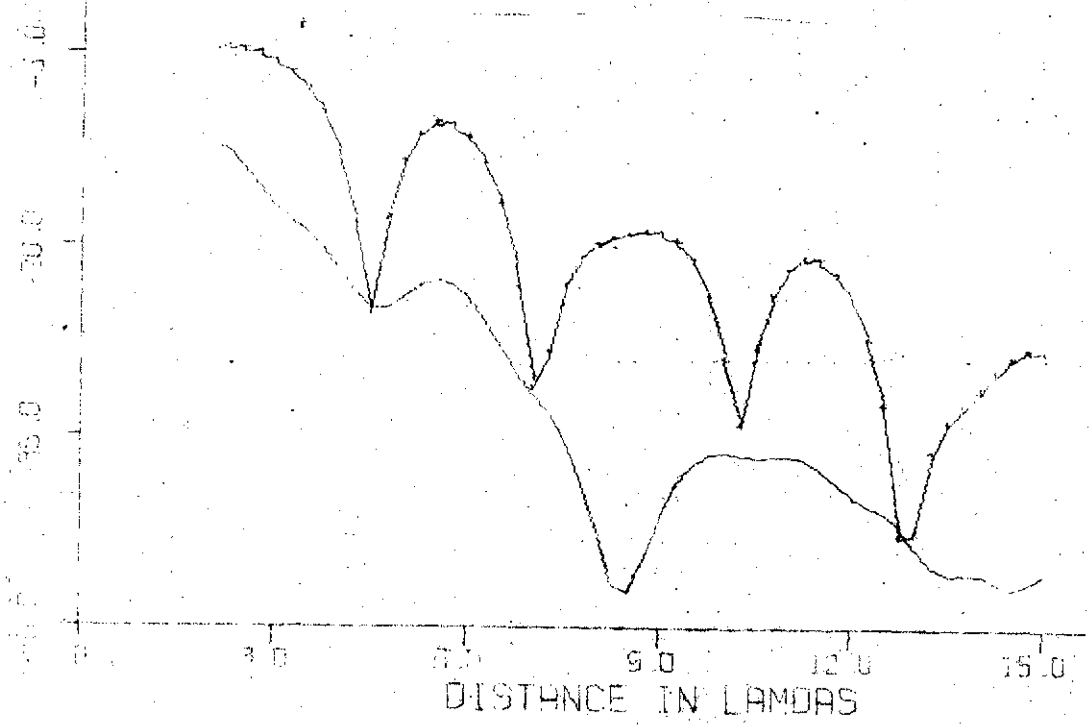


.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_φ (HED)

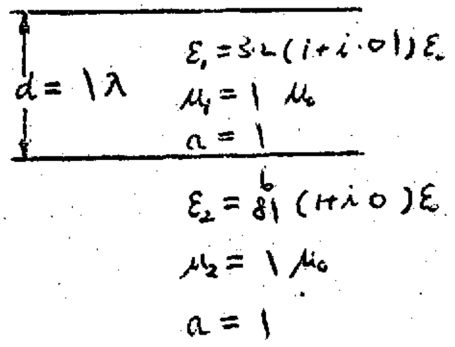


$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0.1)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{b}{81}(1+i\ 0)\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$

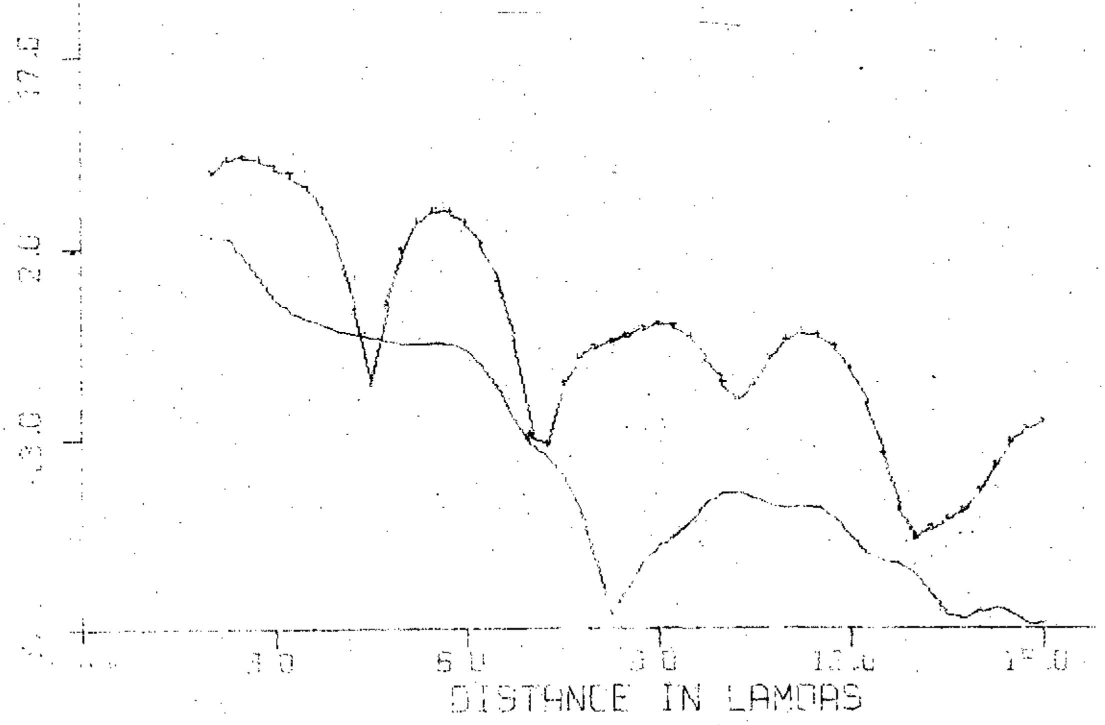


-5.0
20.0
35.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_ρ (HED)

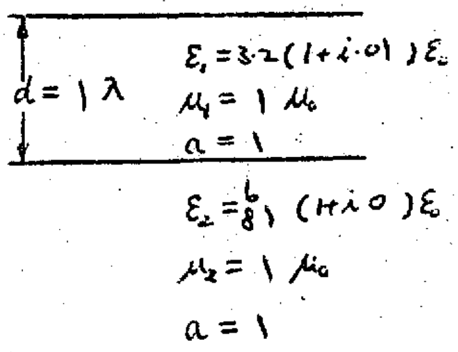


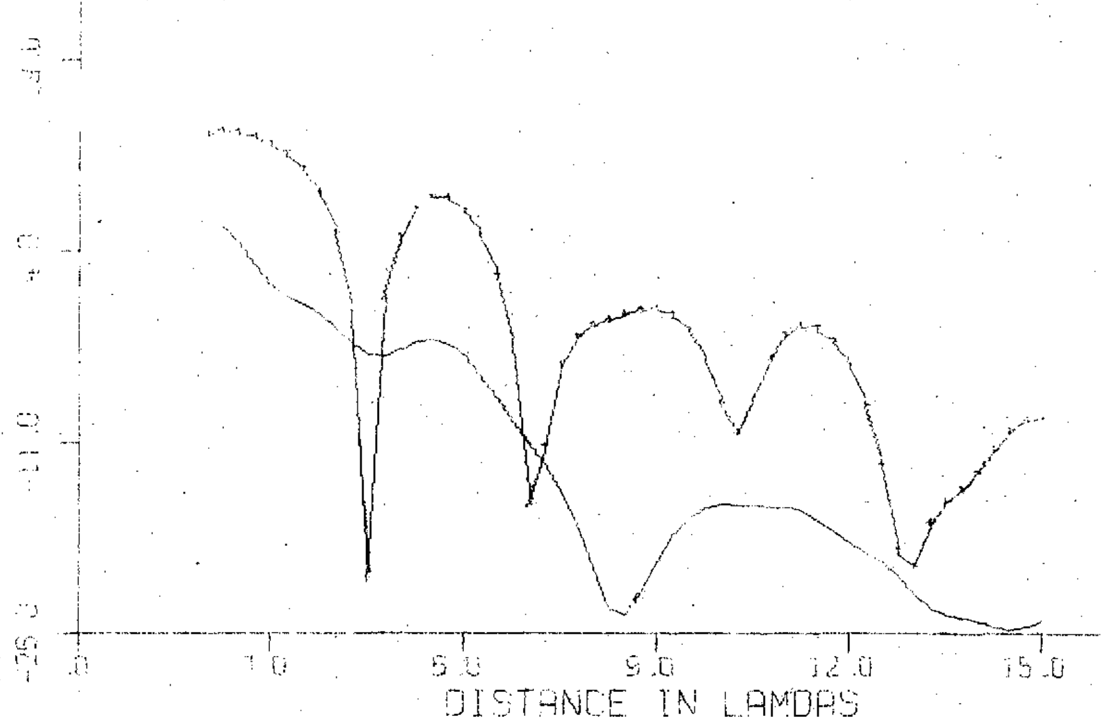
$d = 1\lambda$
$\varepsilon_1 = 3.2(1 + i \cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 81(1 + i\,0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$



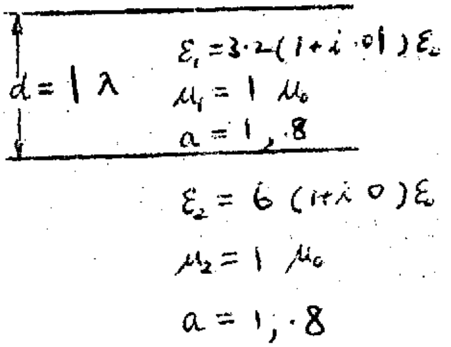
17.5
2.0
-3.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_z (HED)

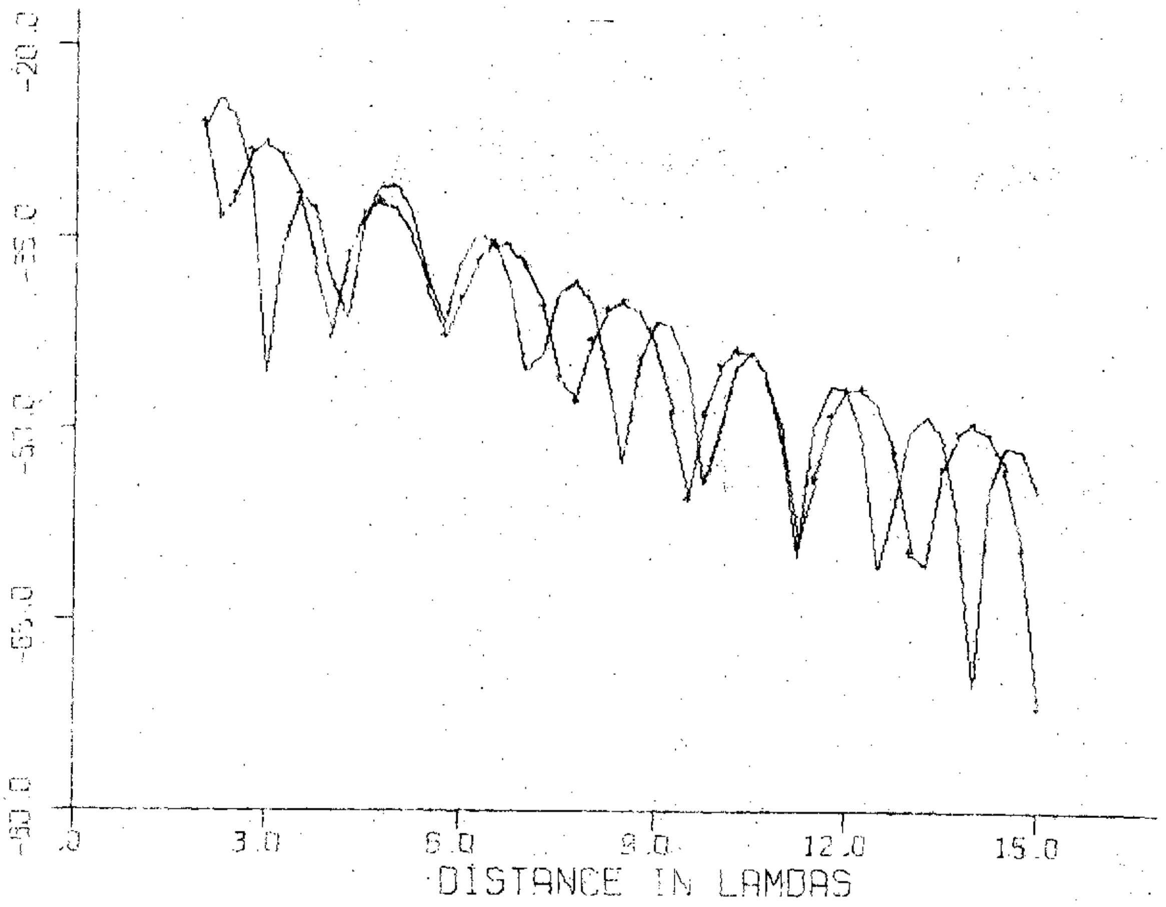

$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = \frac{6}{8}1\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$


19.0
4.0
-11.0
-26.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

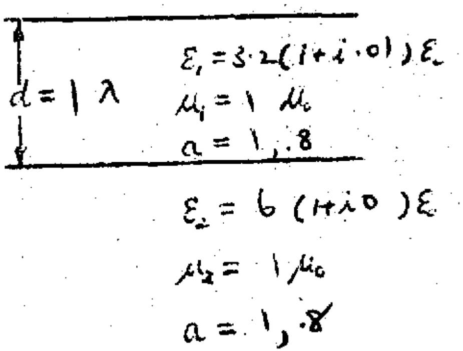


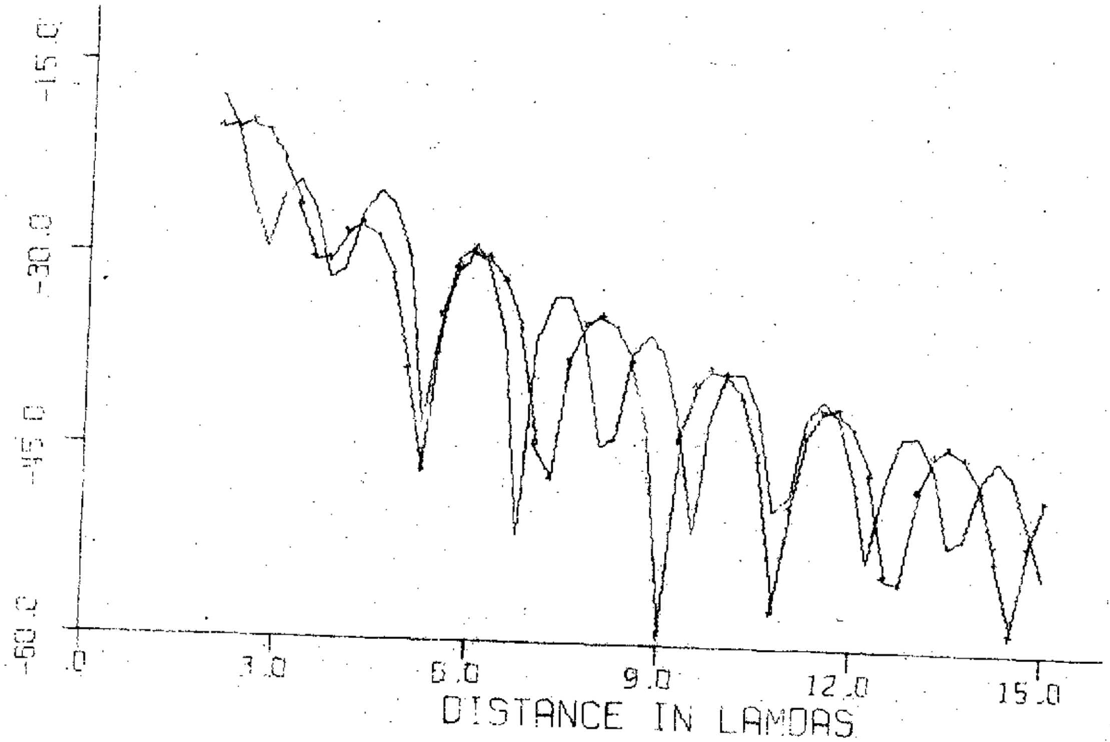
$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, .8$
$\varepsilon_2 = 6\,(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, .8$



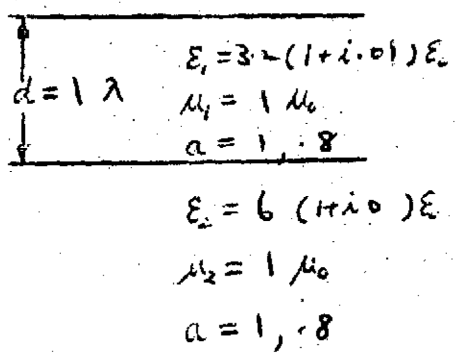
-20.0
-35.0
-50.0
-65.0
-80.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

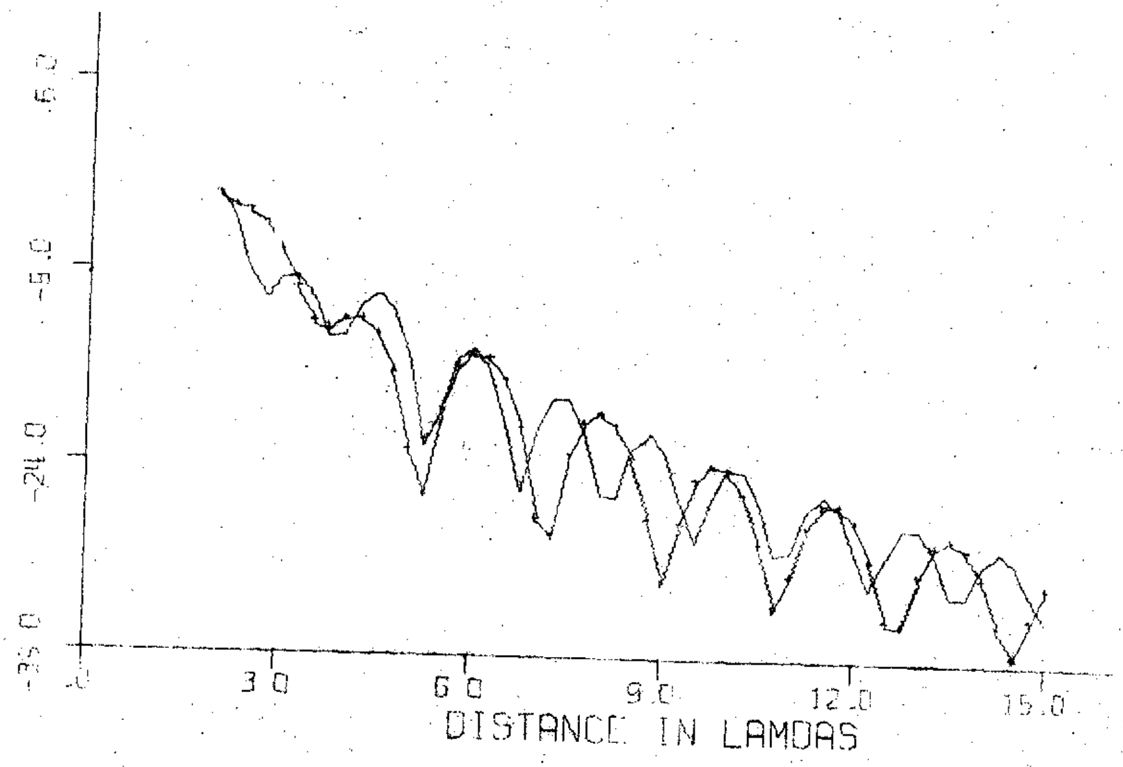
E_z (HED)


d = 1 λ
$\varepsilon_1 = 3.2(1+i\cdot.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
a = 1, .8
$\varepsilon_2 = 6\ (1+i0\ )\varepsilon_0$
$\mu_2 = 1\ \mu_0$
a = 1, .8

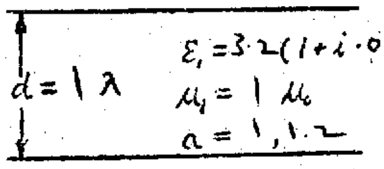

-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

H_φ (HED)


$d = 1\ \lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, .8$
$\varepsilon_2 = 6\ (1+i0\ )\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1, .8$

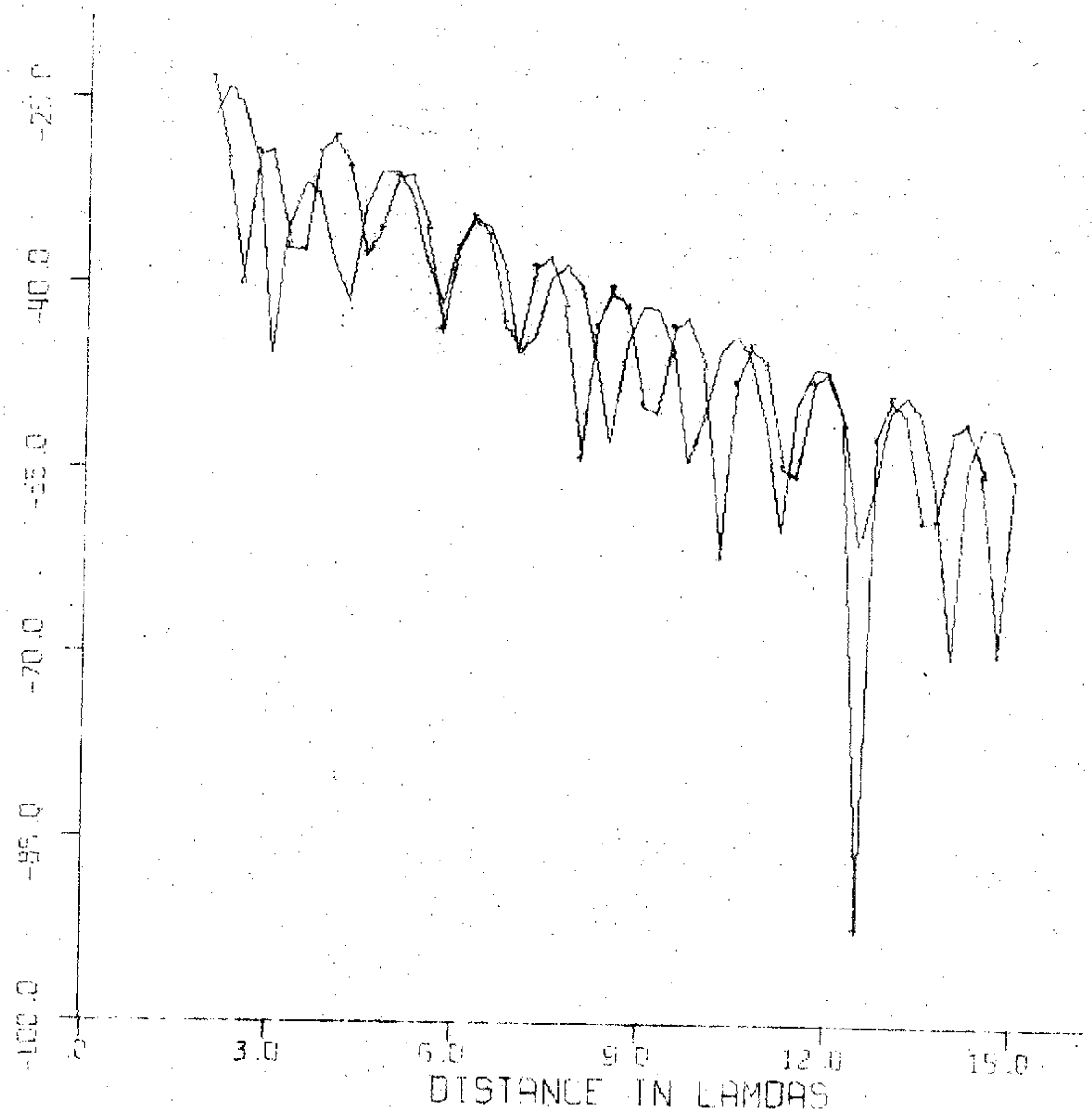

6.0
-9.0
-24.0
-39.0
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

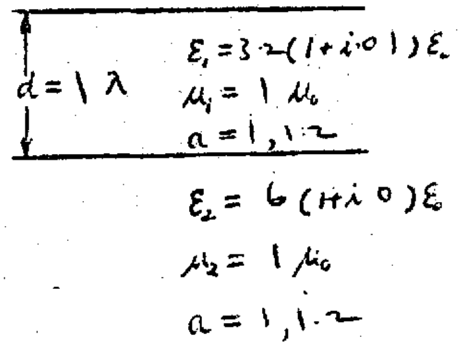


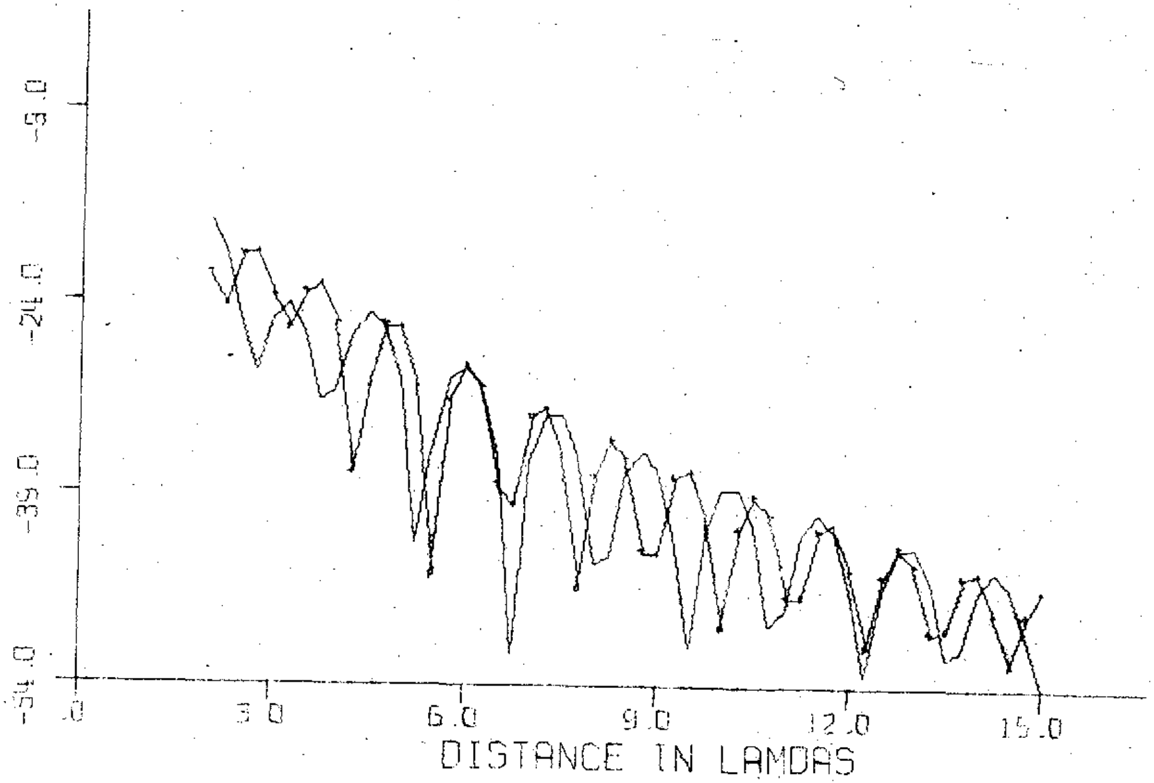
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$

$\varepsilon_2 = 6(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$

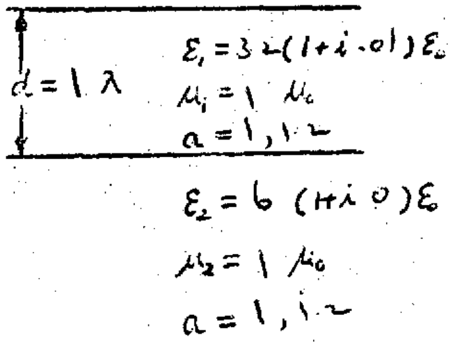


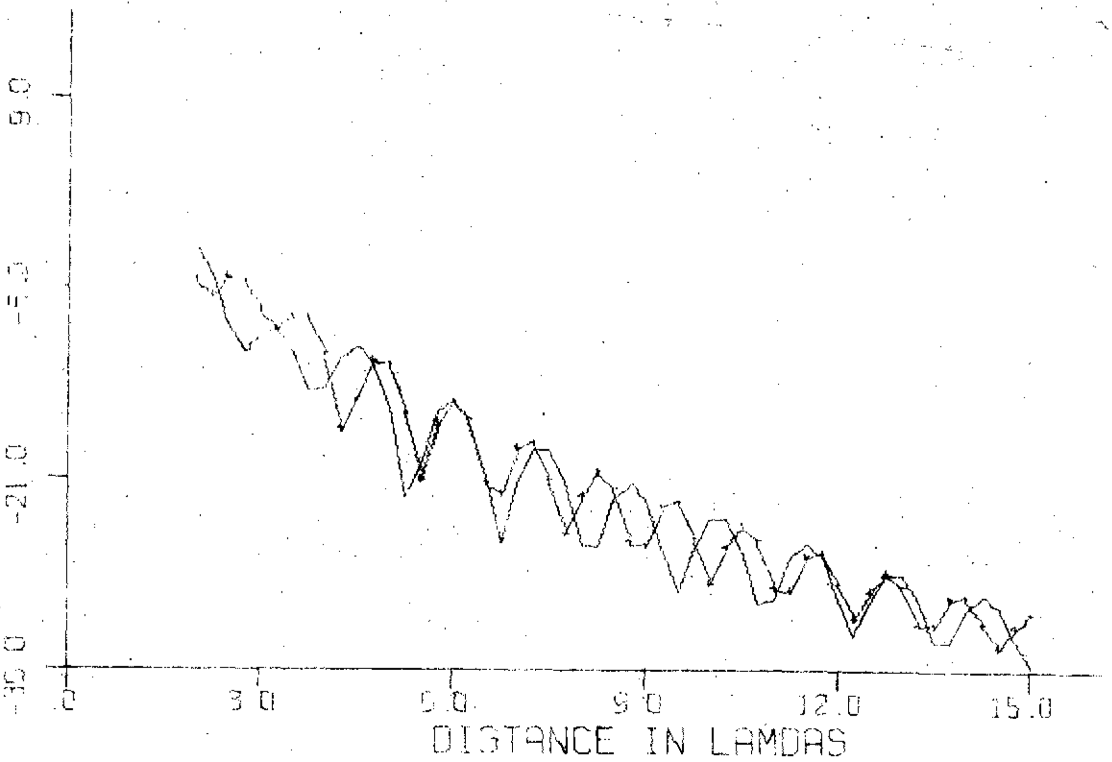
E_z(HED)


$d = 1\,\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1, 1.2$

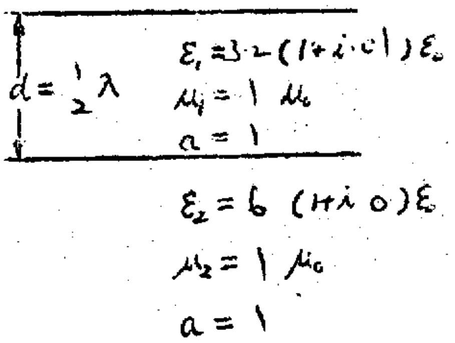

-9.0
-24.0
-39.0
-54.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

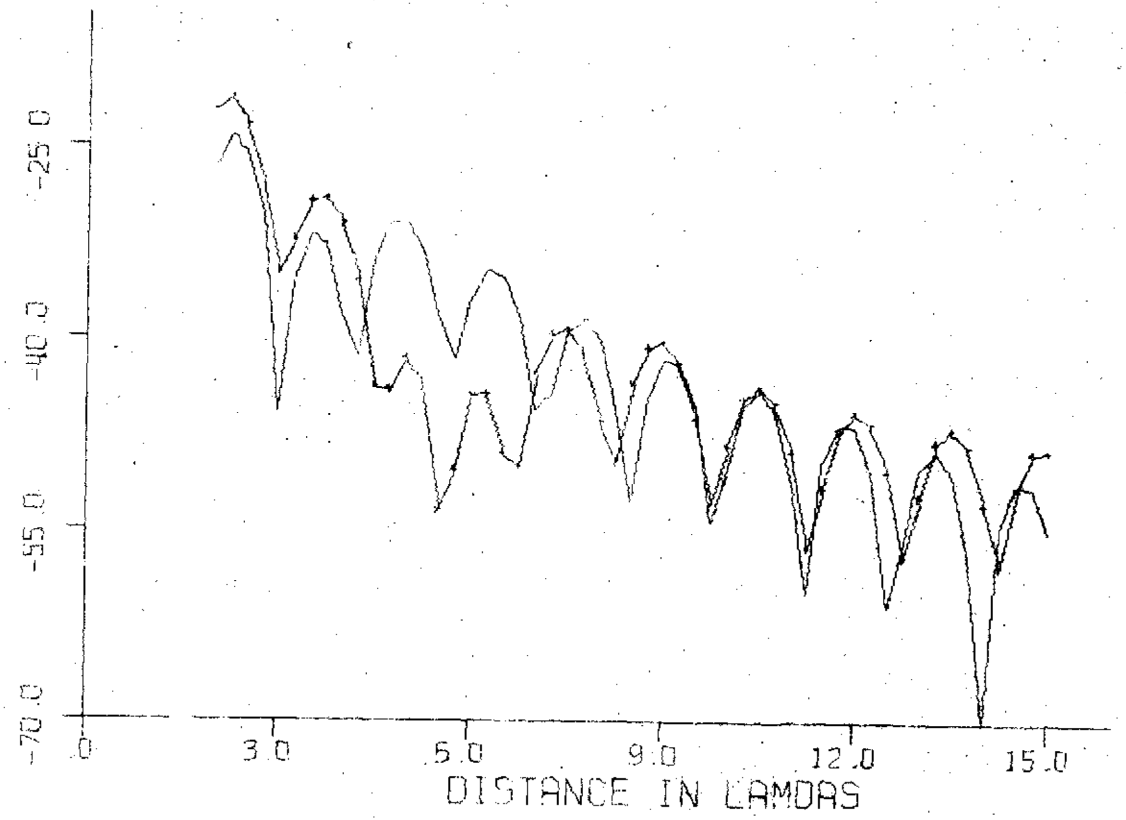
H_φ (HED)


$d = 1\ \lambda$
$\varepsilon_1 = 3.2(1+i\,.01)\,\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1, 1.2$
$\varepsilon_2 = 6\ (1+i\ 0)\,\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1, 1.2$

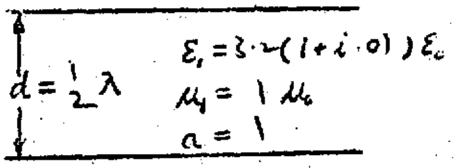

9.0
-6.0
-21.0
-36.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z(HED)


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 01)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = 6\ (1+i\ 0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$


-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)


$d = \frac{1}{2}\lambda$

$\varepsilon_1 = 3.2(1+i\cdot 0)\,\varepsilon_0$

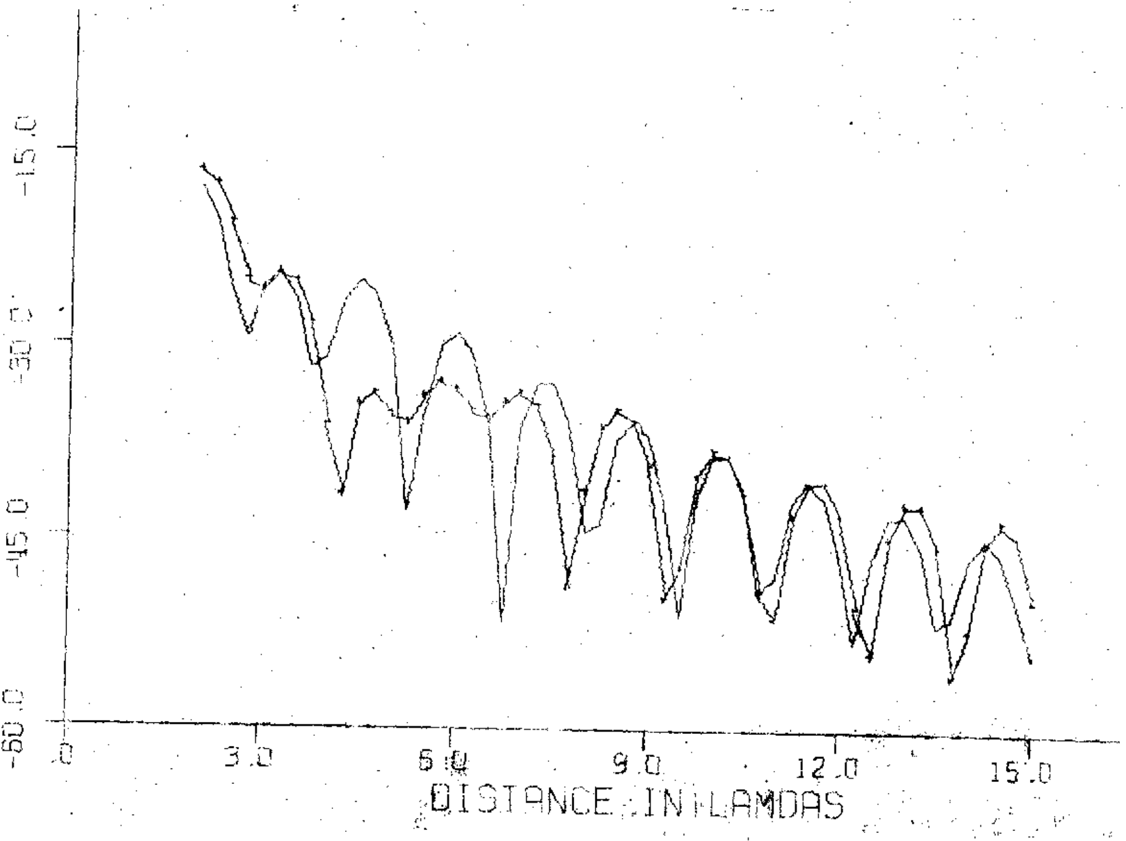
$\mu_1 = 1\,\mu_0$

$a = 1$

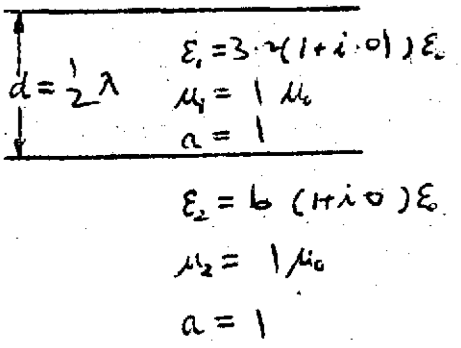
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon$

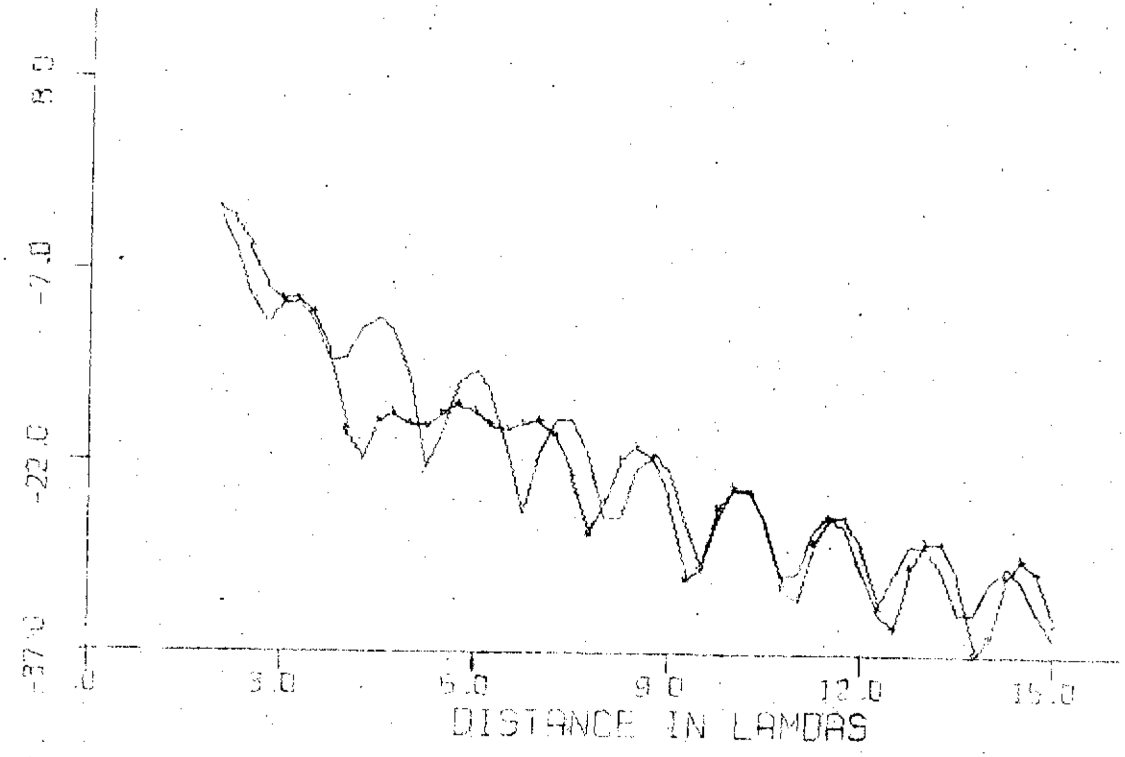
$\mu_2 = 1\,\mu_0$

$a = 1$

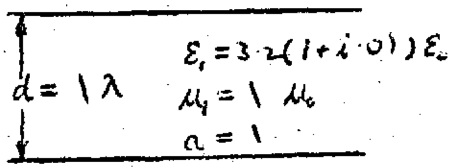


Hφ (HED)


$d = \frac{1}{2}\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0))\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = 6\,(1+i\,0)\,\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$

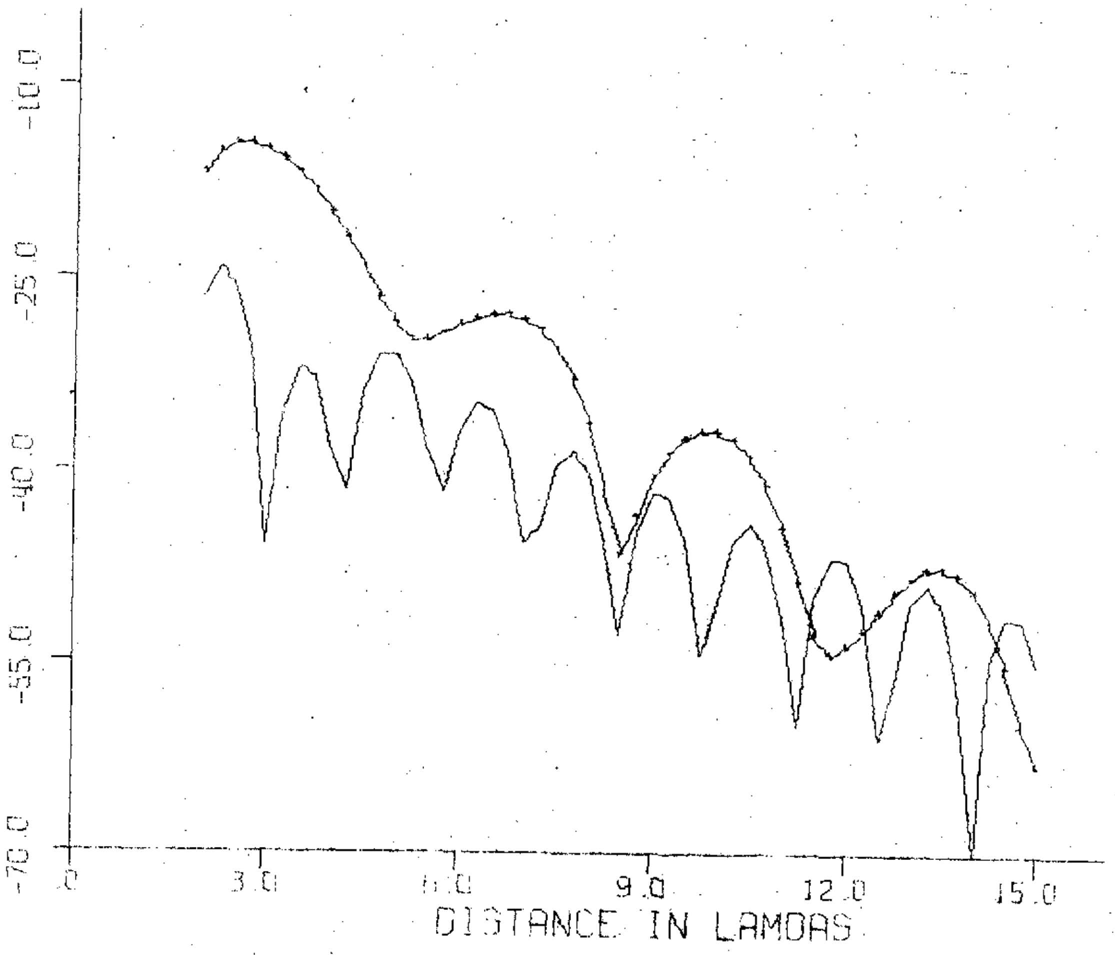

8.0
-7.0
-22.0
-37.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

E_z (HED)

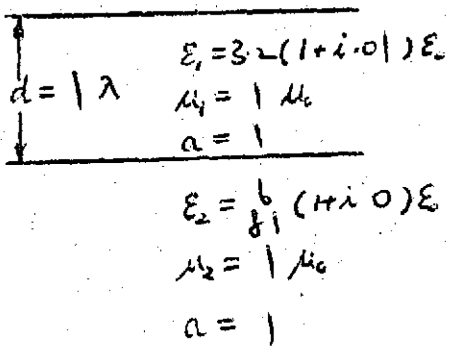


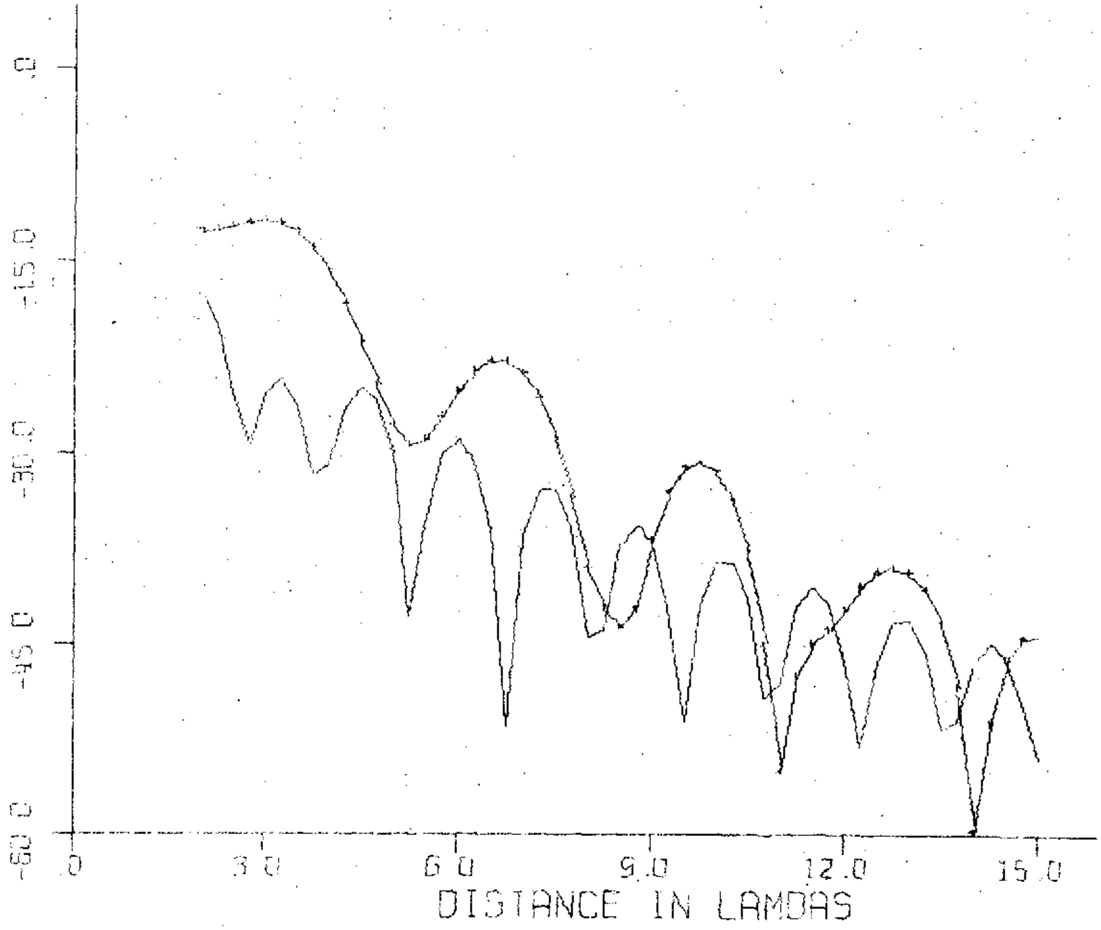
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$

$\varepsilon_2 = \overset{6}{81}(1+i0)\varepsilon_0$
$\mu_2 = 1\ \mu_0$
$a = 1$

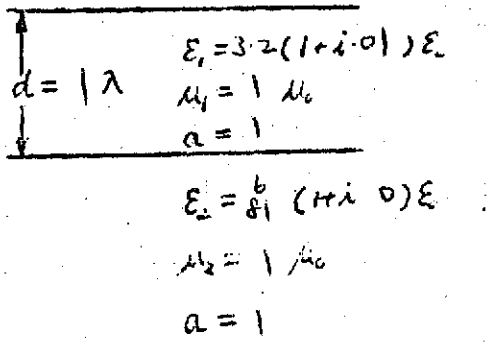


$\overline{E}_z$ (HED)

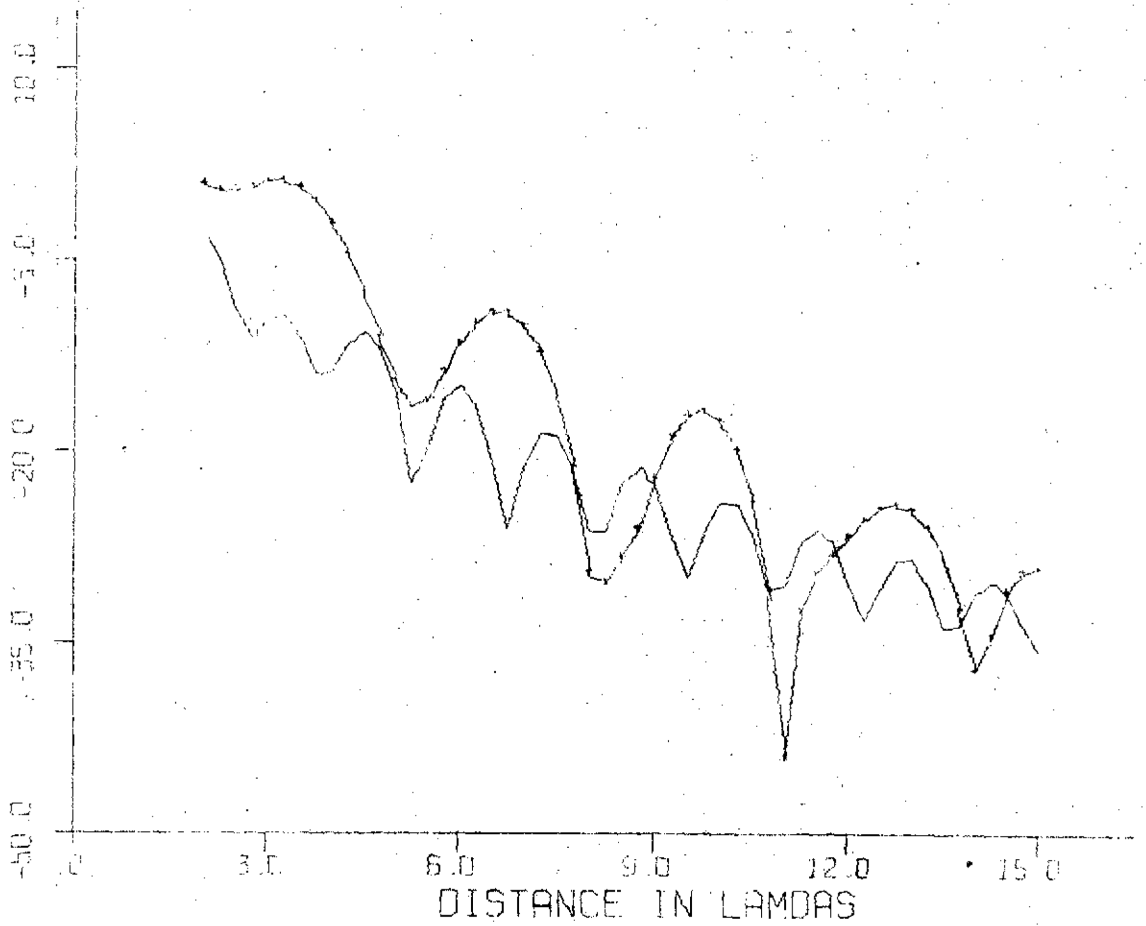

$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i.01)\varepsilon_0$
$\mu_1 = 1\,\mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{81}(1+i\,0)\varepsilon_0$
$\mu_2 = 1\,\mu_0$
$a = 1$



H_ϕ (HED)

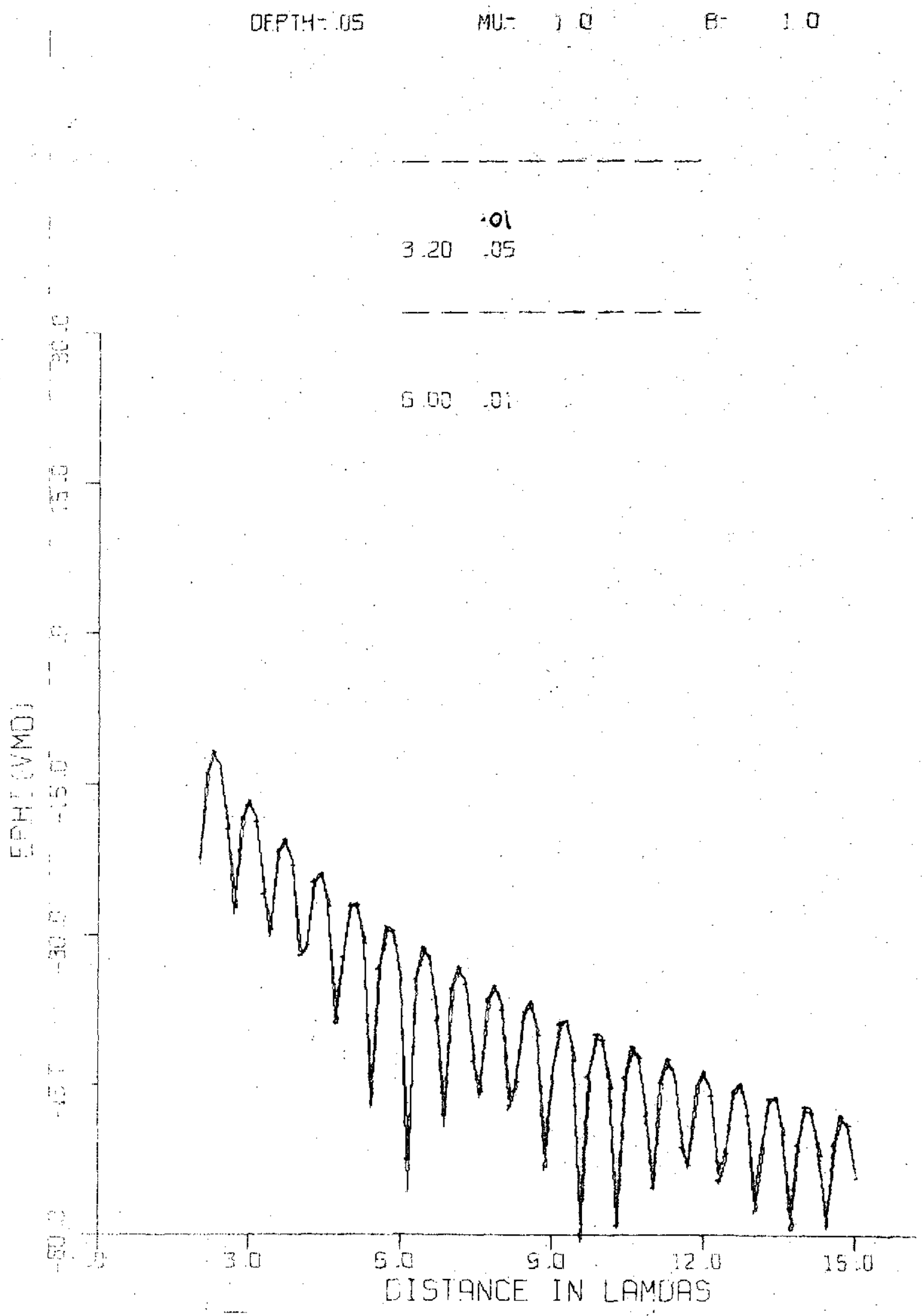


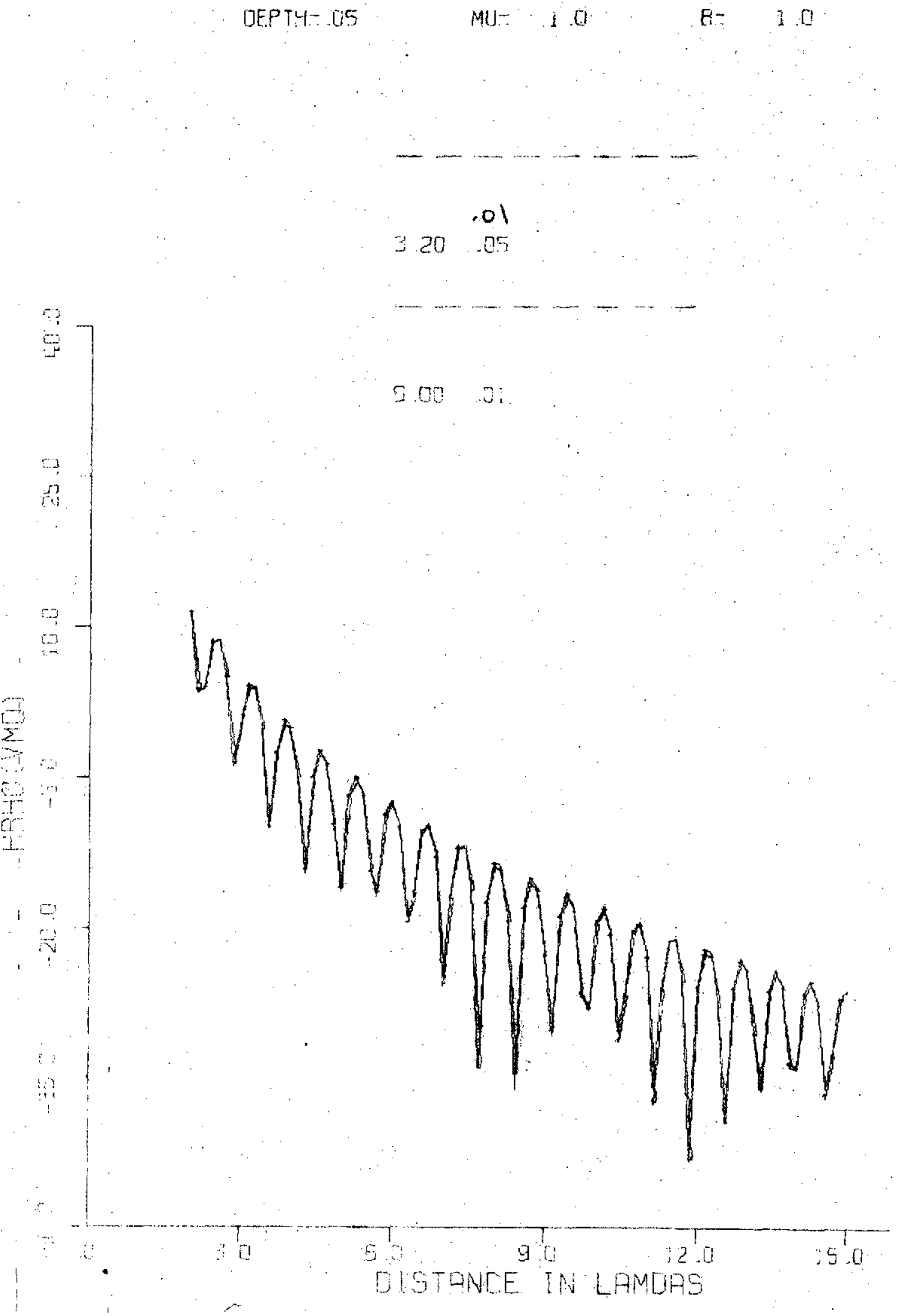
$d = 1\lambda$
$\varepsilon_1 = 3.2(1+i\cdot 0)\varepsilon_0$
$\mu_1 = 1\ \mu_0$
$a = 1$
$\varepsilon_2 = \overset{6}{8}1\ (1+i\ 0)\varepsilon$
$\mu_2 = 1\ \mu_0$
$a = 1$

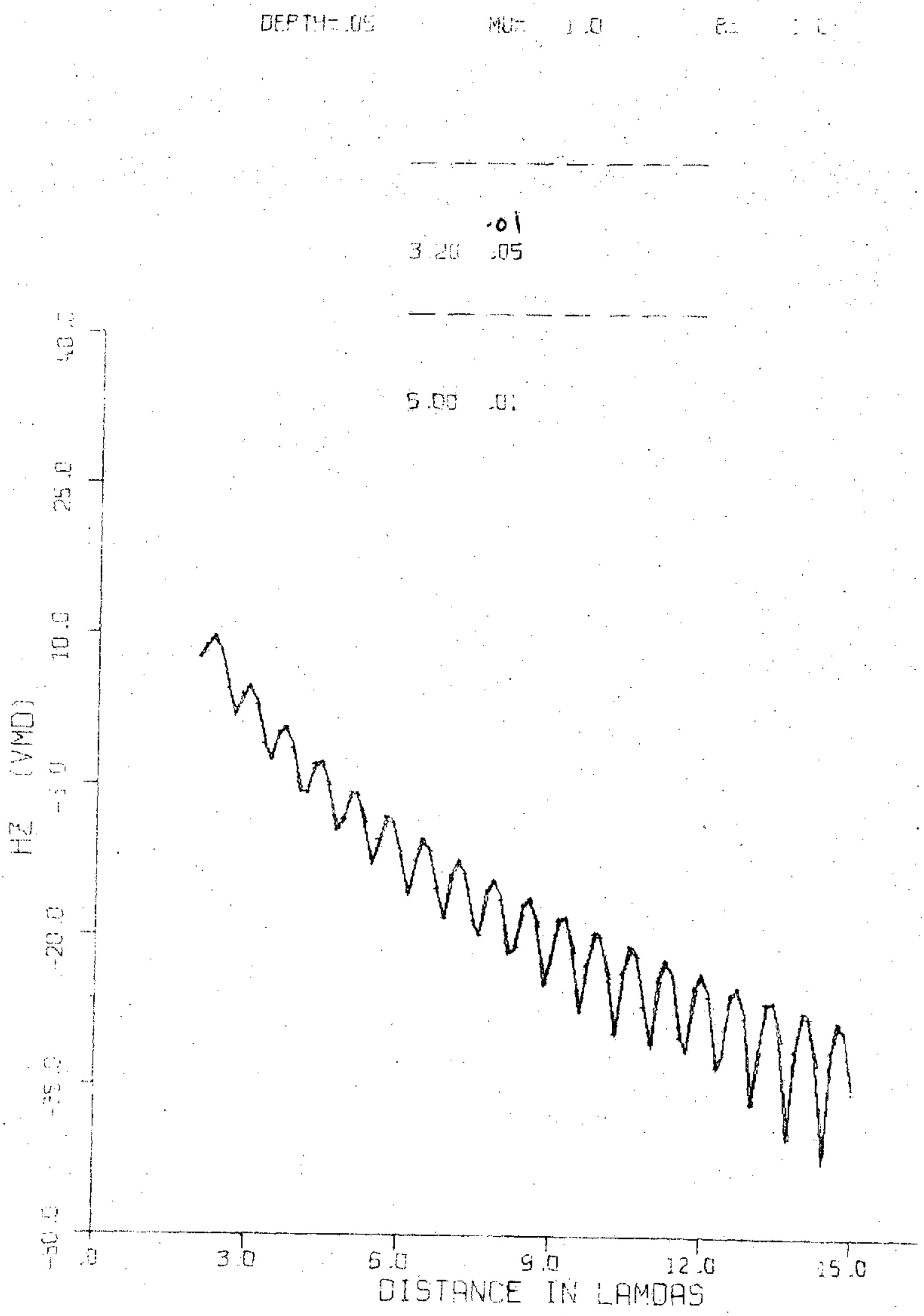


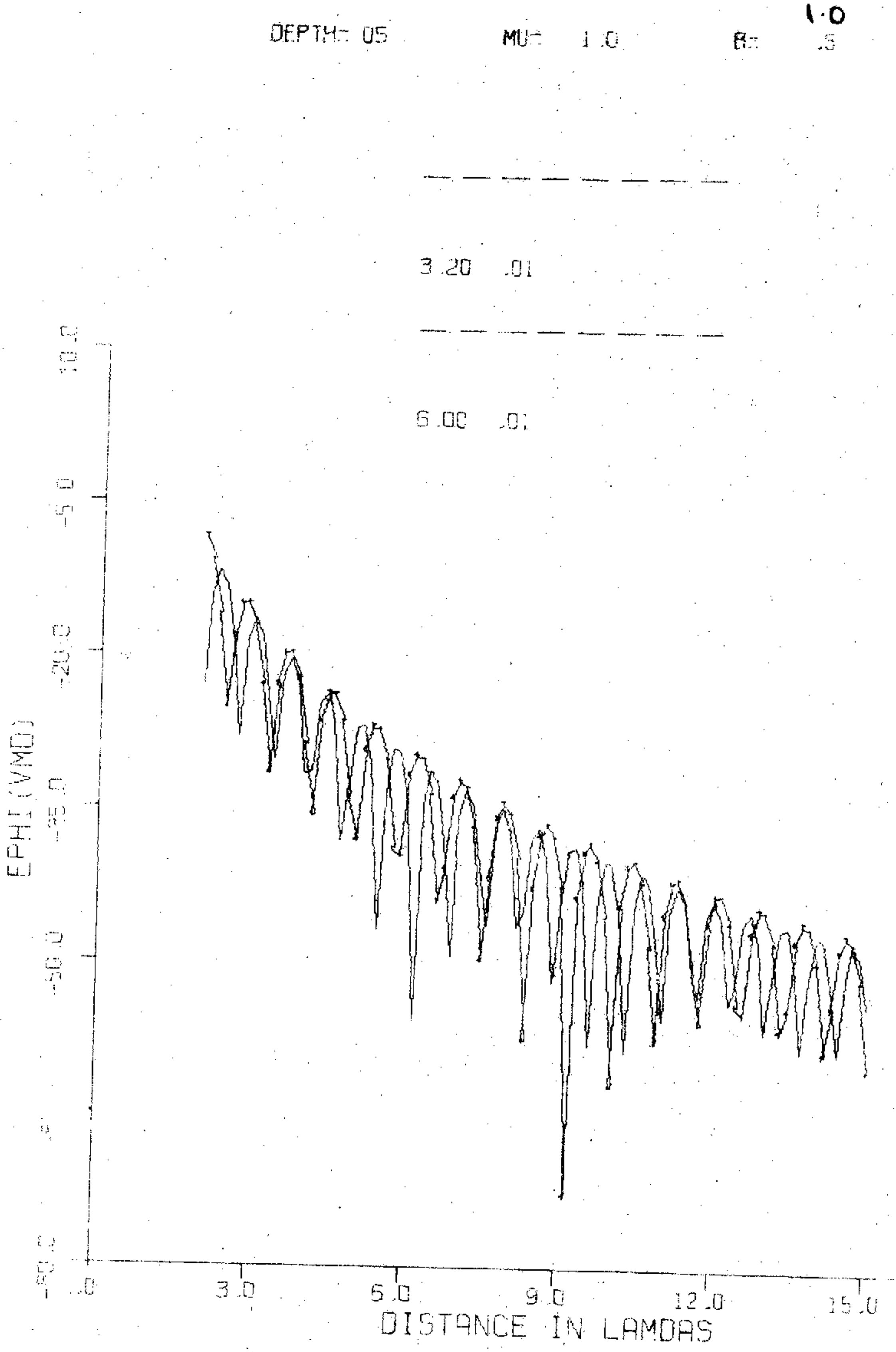
10.0
-5.0
-20.0
-35.0
-50.0
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

6.1


DEPTH=.05
MU= 1.0
B= 1.0
.01
3.20 .05
6.00 .01
30.0
15.0
0
-15.0
-30.0
-45.0
-60.0
EPHI (VMO)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

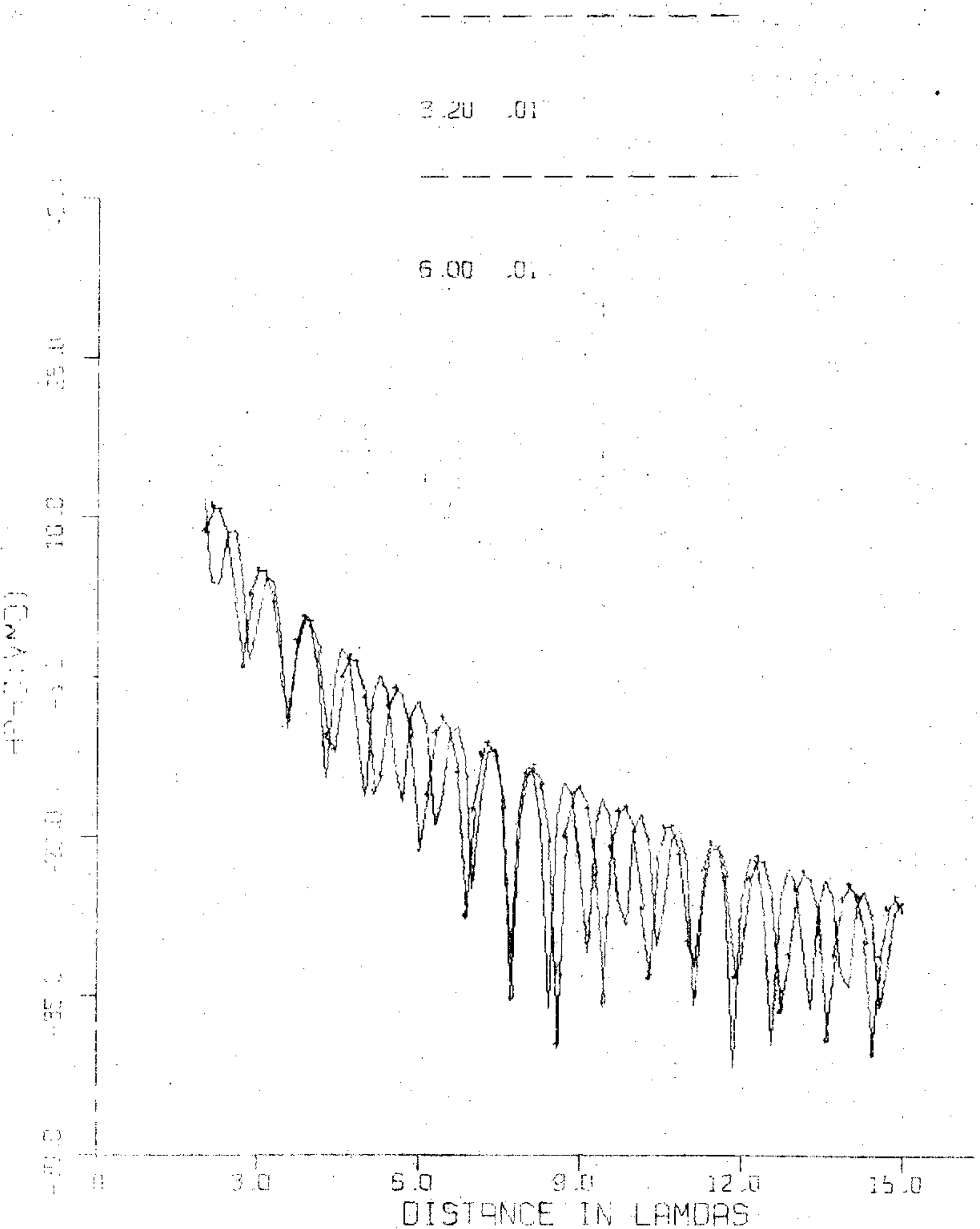

DEPTH=.05
MU= 1.0
B= 1.0
3.20 .05
5.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HRHO(VMO)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
B= 1.0
.01
3.20 .05
5.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HZ (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


1·0
DEPTH= 05
MU= 1.0
B= .5
3.20 .01
6.00 .01
10.0
-5.0
-20.0
-35.0
-50.0
EPHI (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

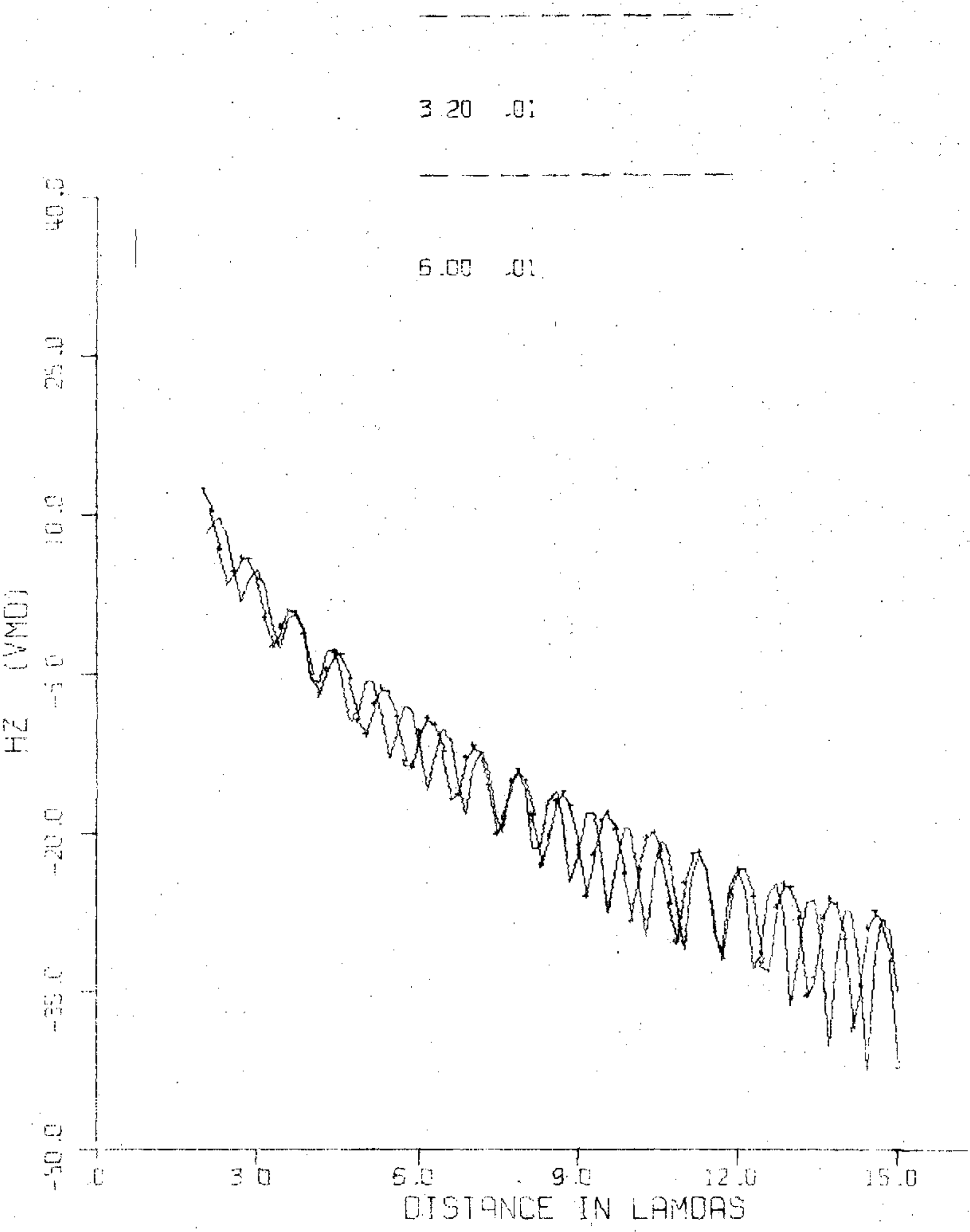
1.0

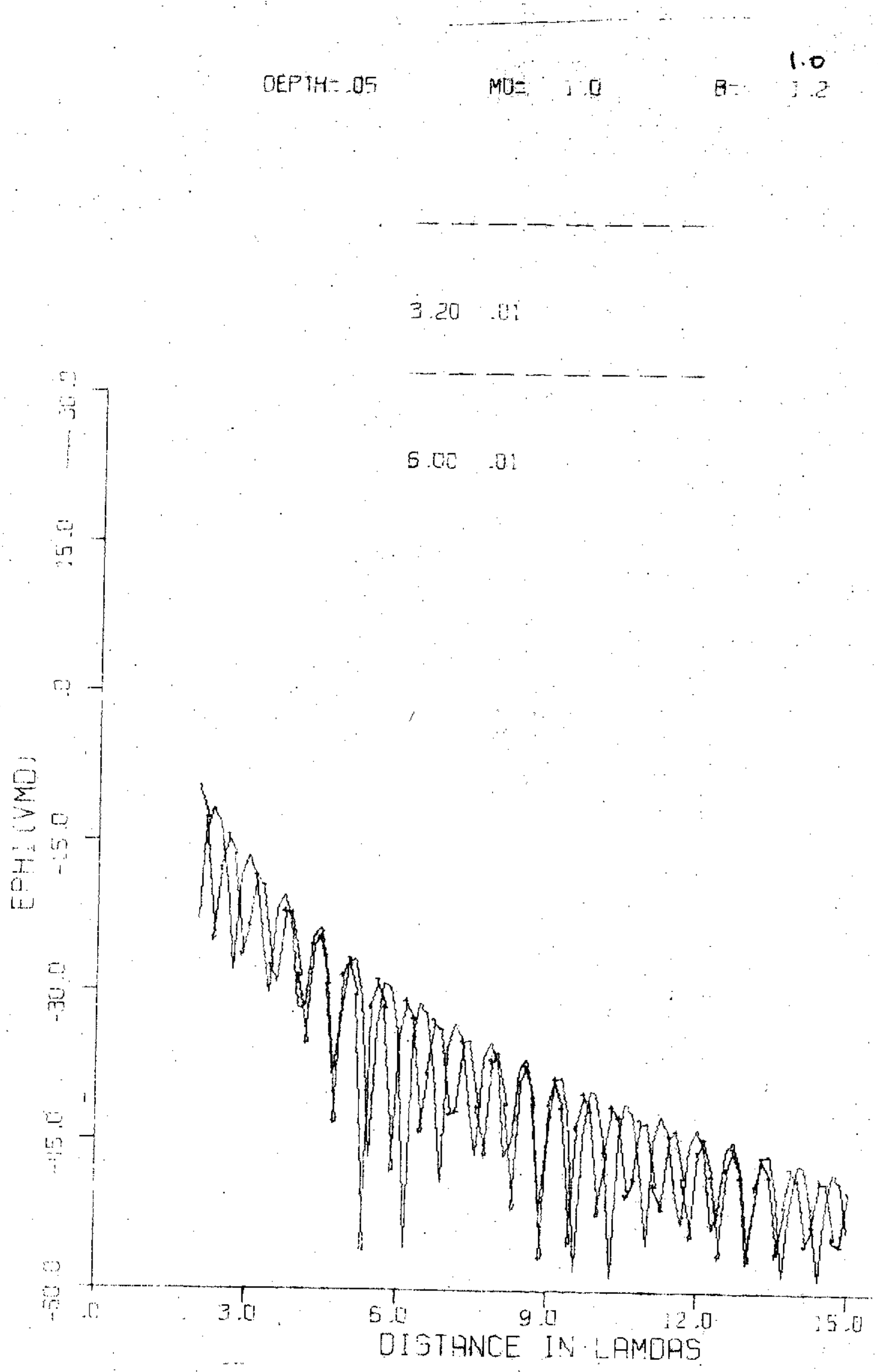
DEPTH= 05 MU= 1.0 B= .9



1.0

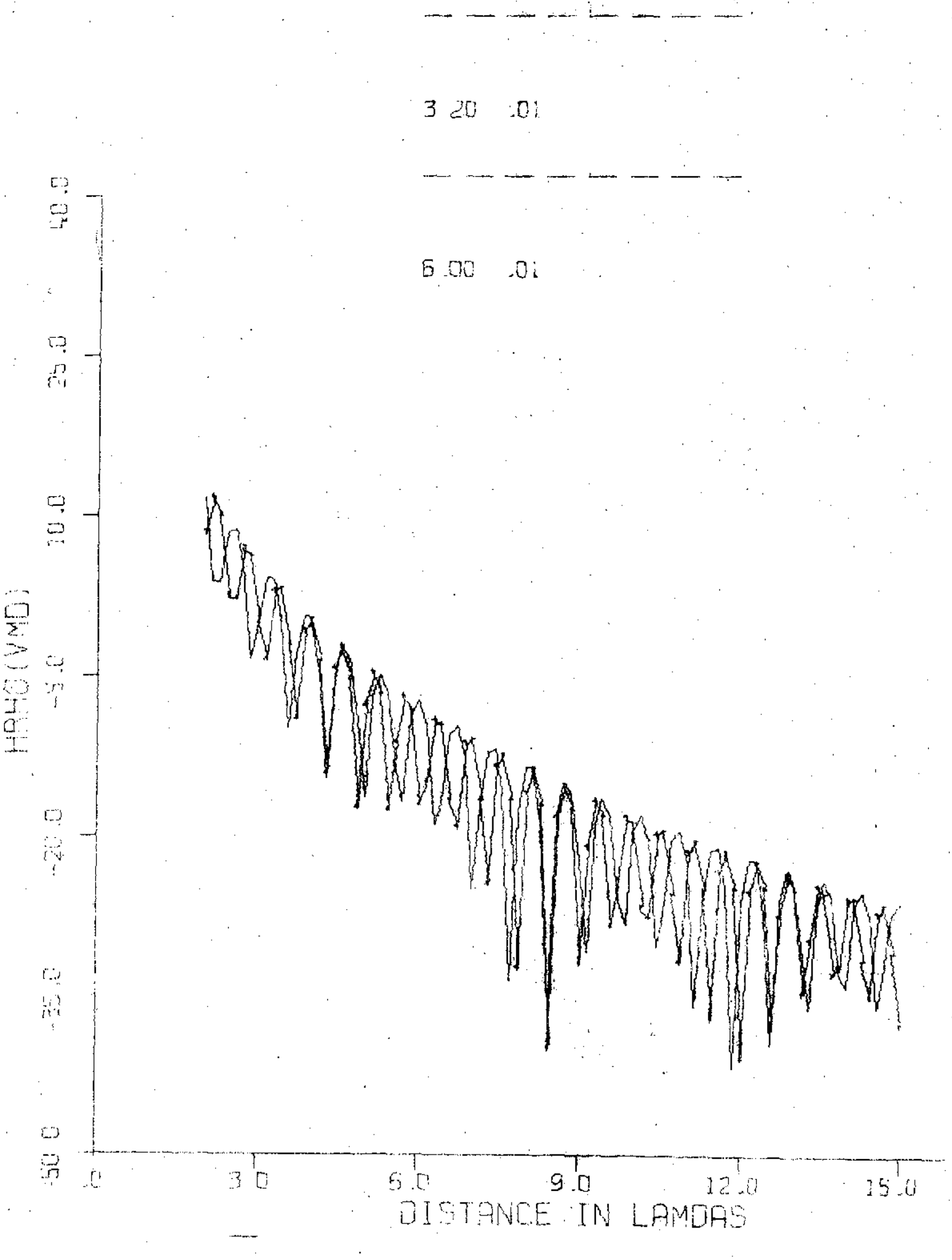
DEPTH=.05 MU= 1.0 B= [illegible]




DEPTH=.05
MU= 1.0
B= 1.2
1.0
3.20 .01
6.00 .01
EPHI(VMD)
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

1·0

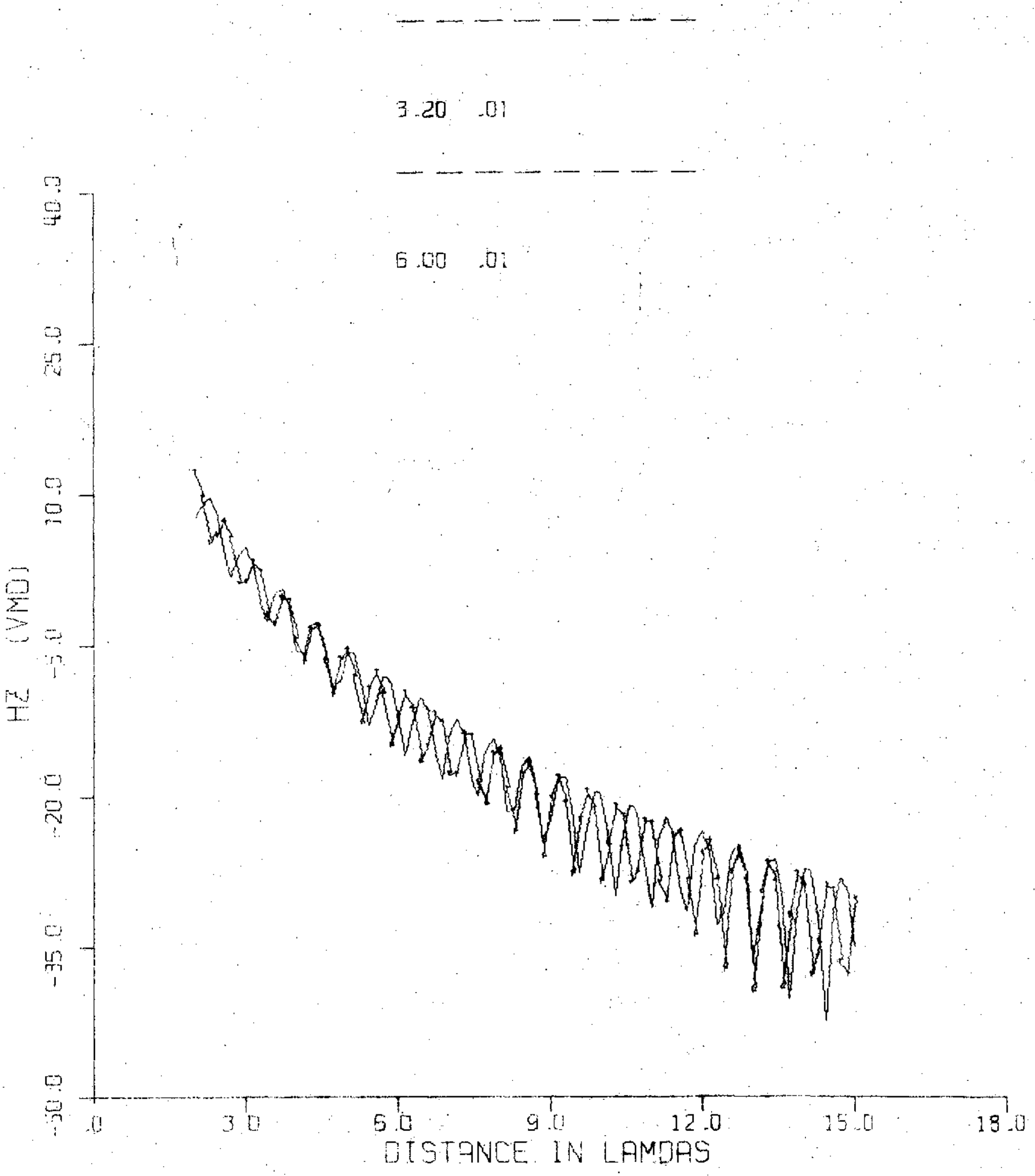
DEPTH=.05 MU= 1.0 B= 1.2



6.9

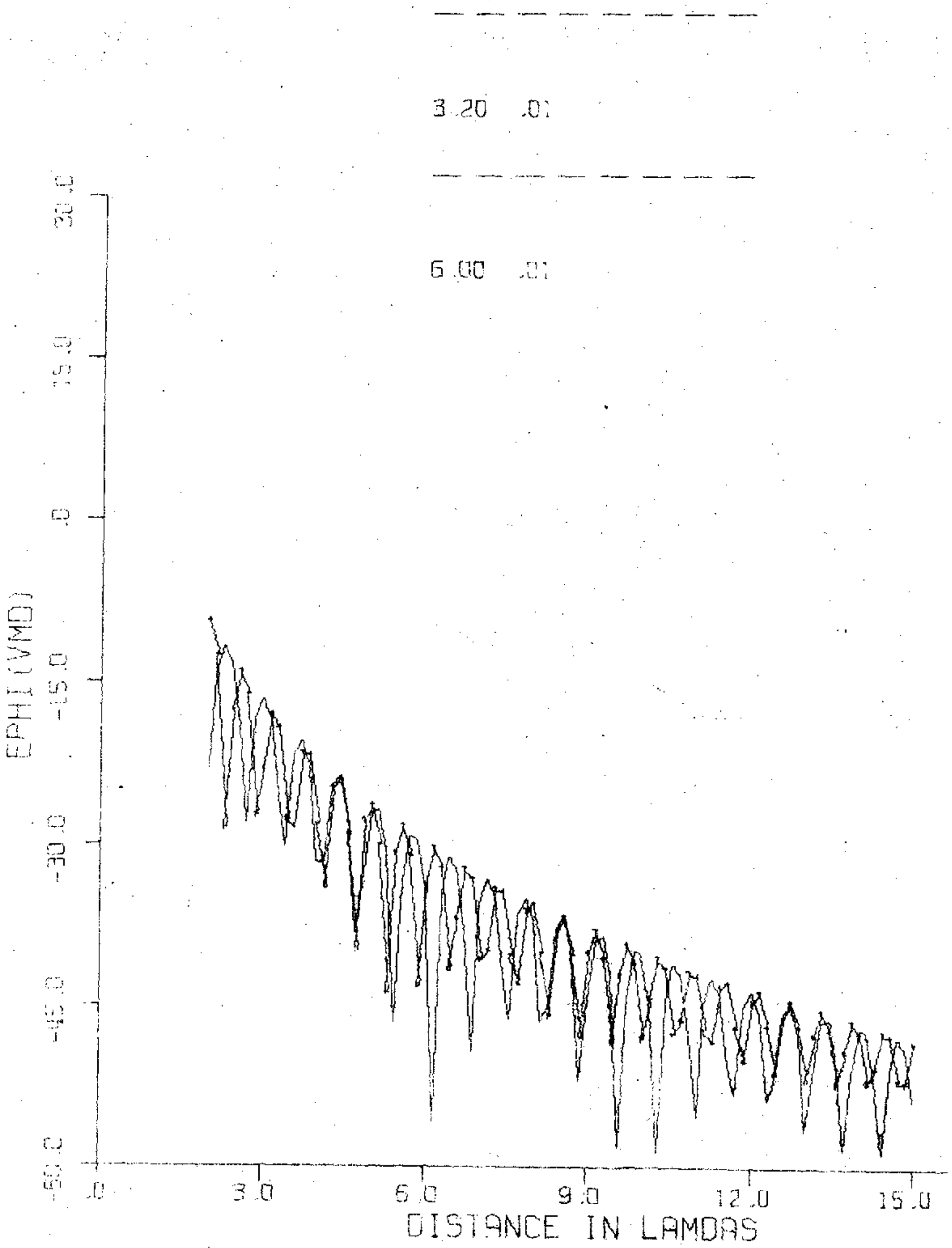
1.0

DEPTH=.05 MU= 1.0 B= 1.2



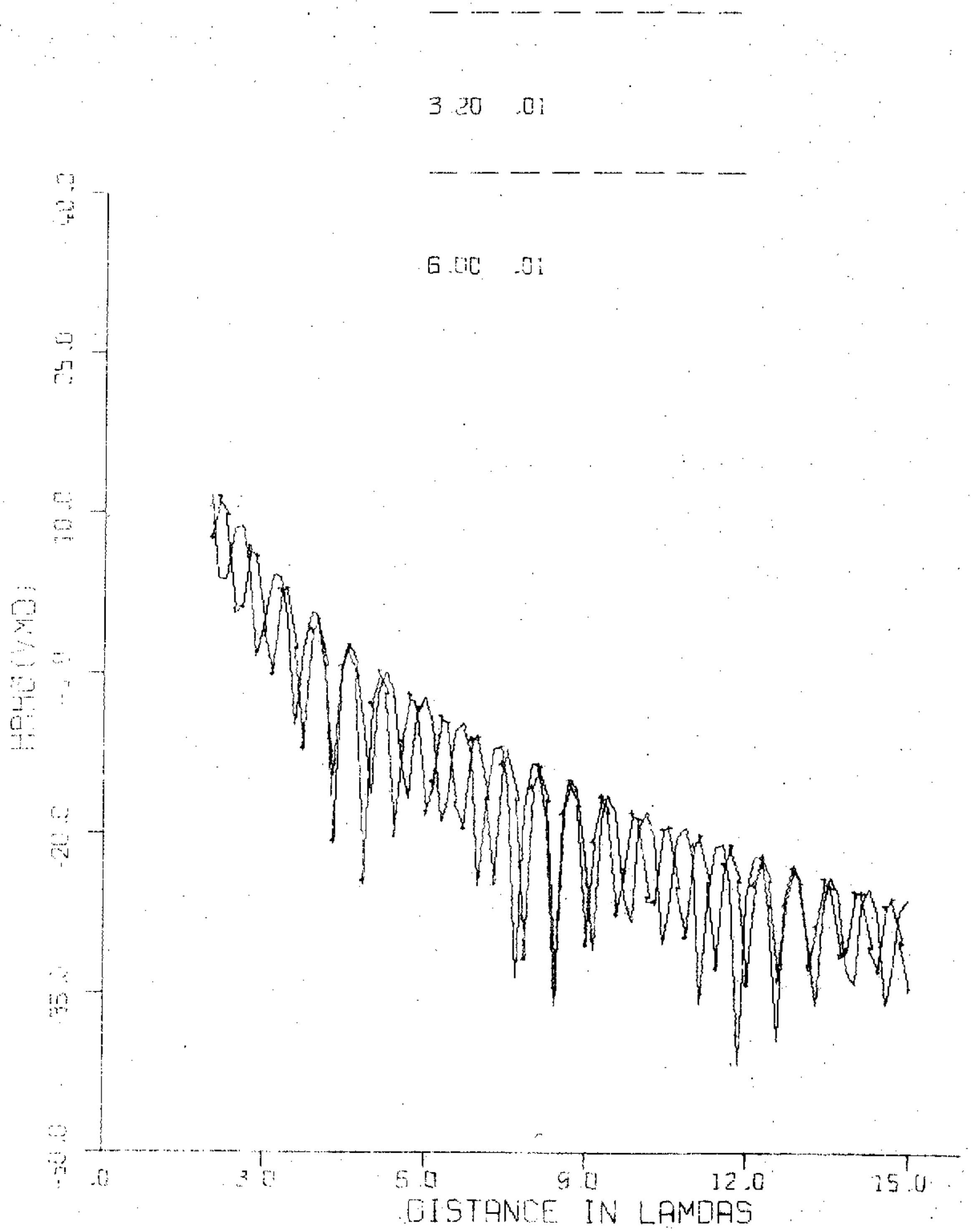
1.0

DEPTH=.05 MU= 1.2 B= 1.0



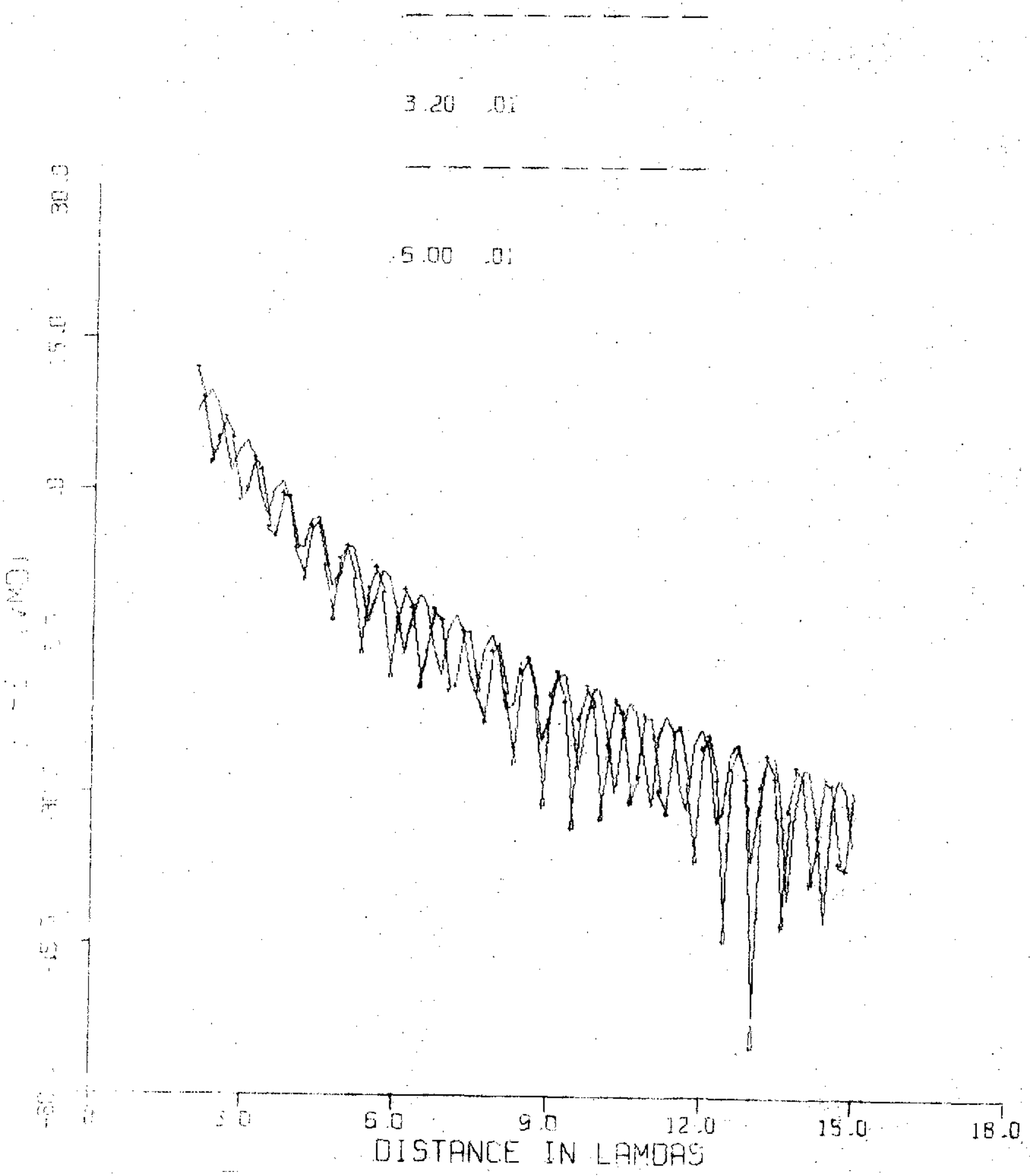
1.0

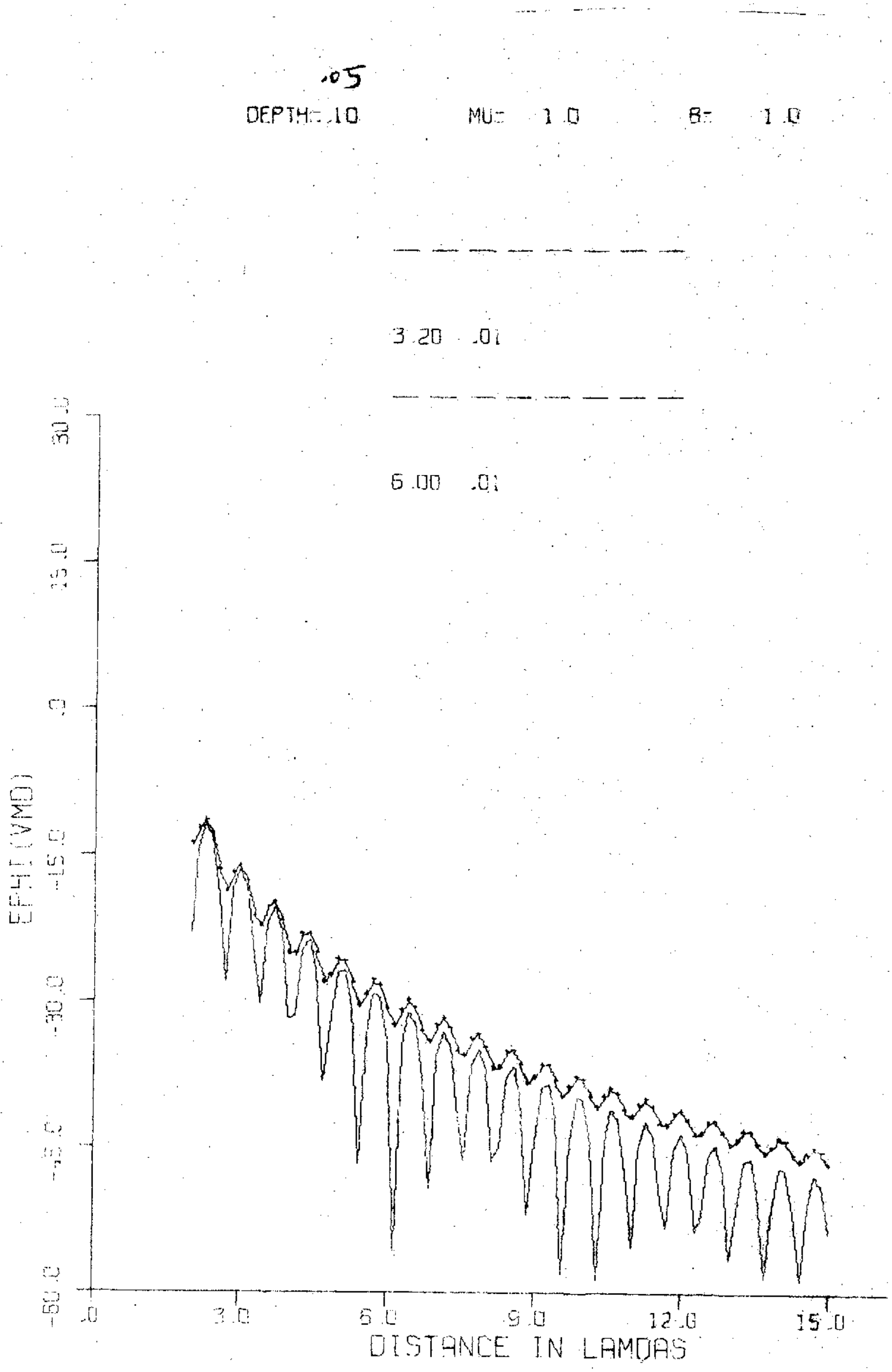
DEPTH= .05   MU= 1.2   B= 1.0

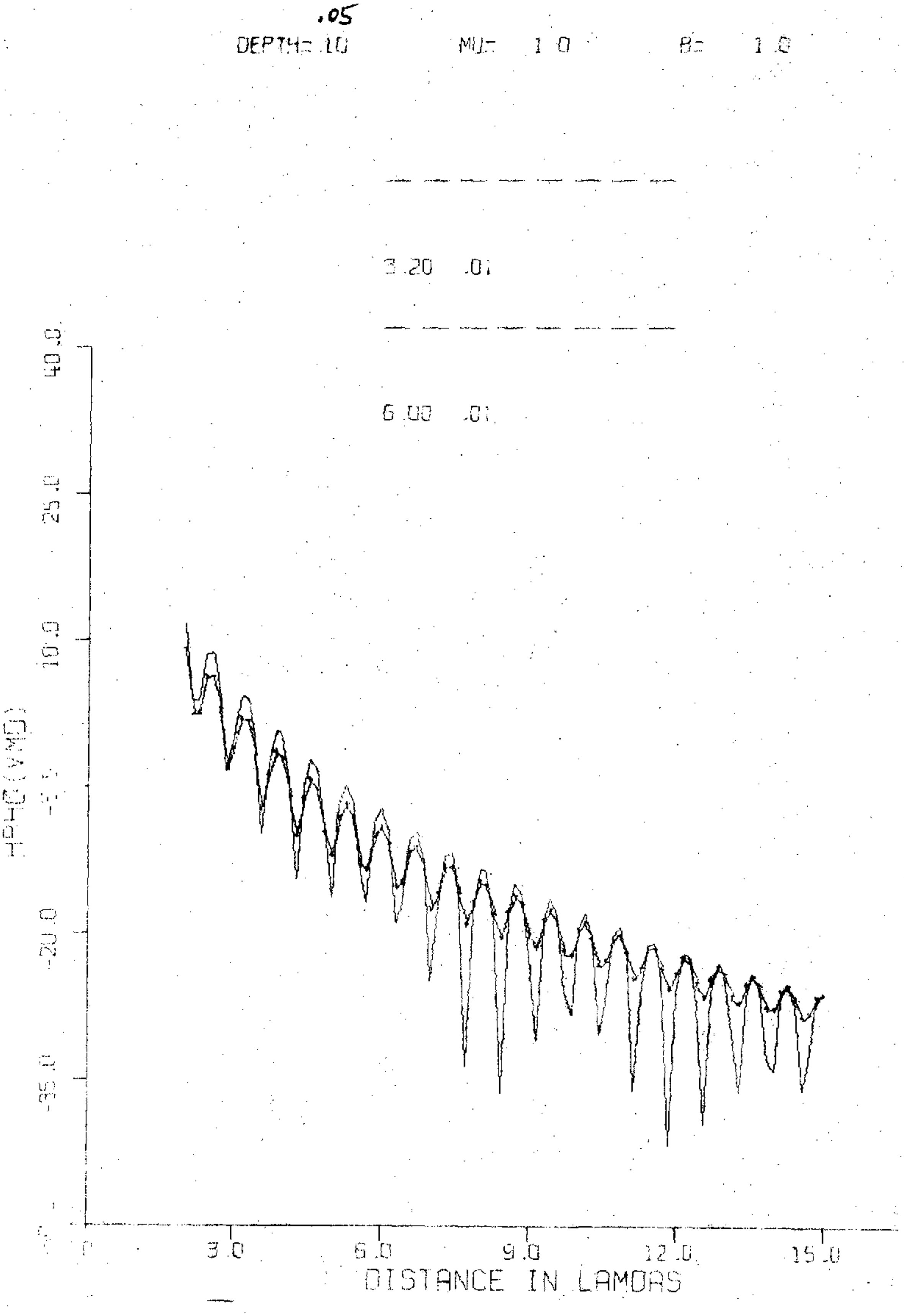


1.0

DEPTH: .05 MU= 1.2 B= 1.0

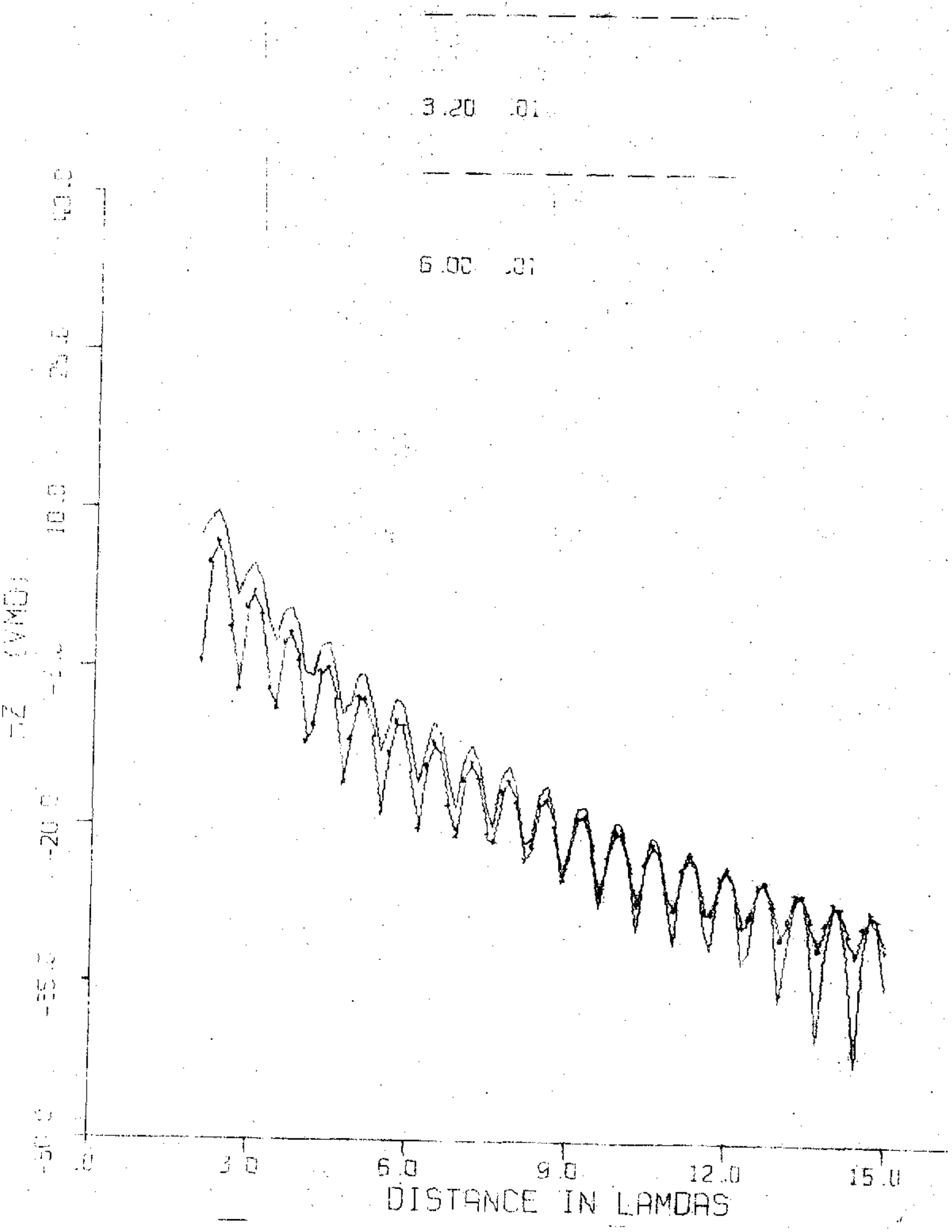


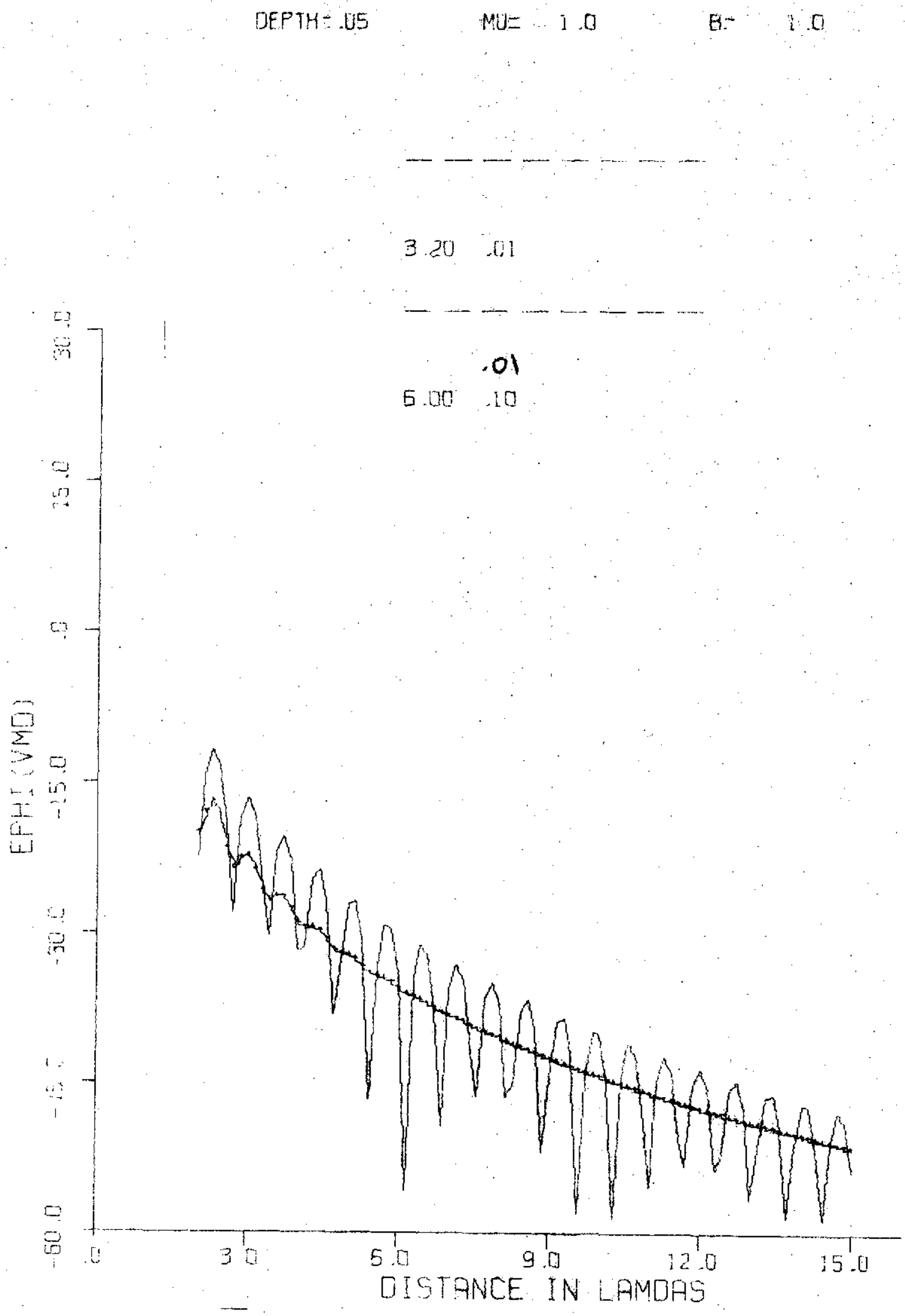

.05
DEPTH=.10
MU= 1.0
B= 1.0
3.20 .01
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
EPHI (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

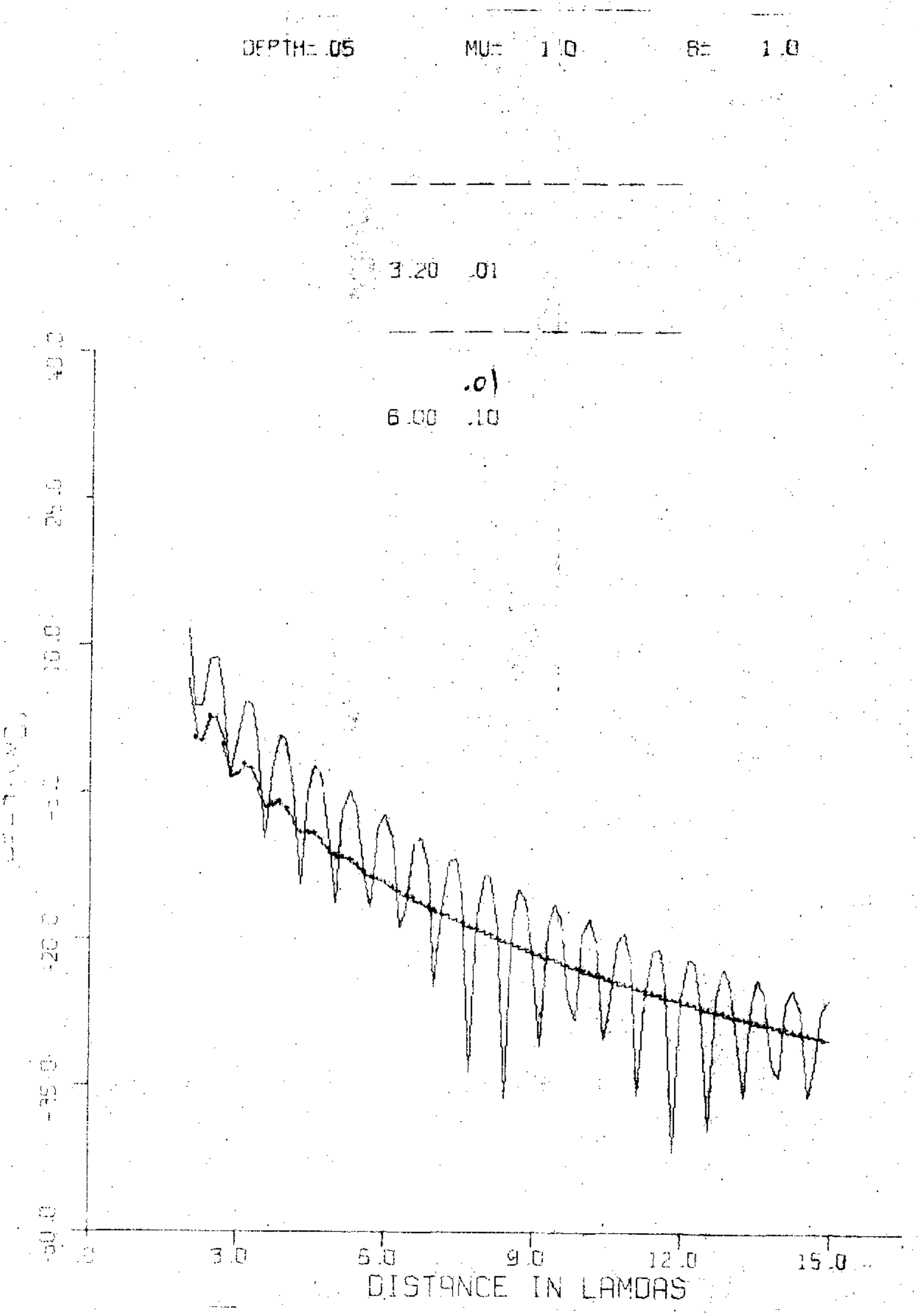

.05
DEPTH= .10
MU= 1.0
B= 1.0
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-PHI0(V/M0)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

.05

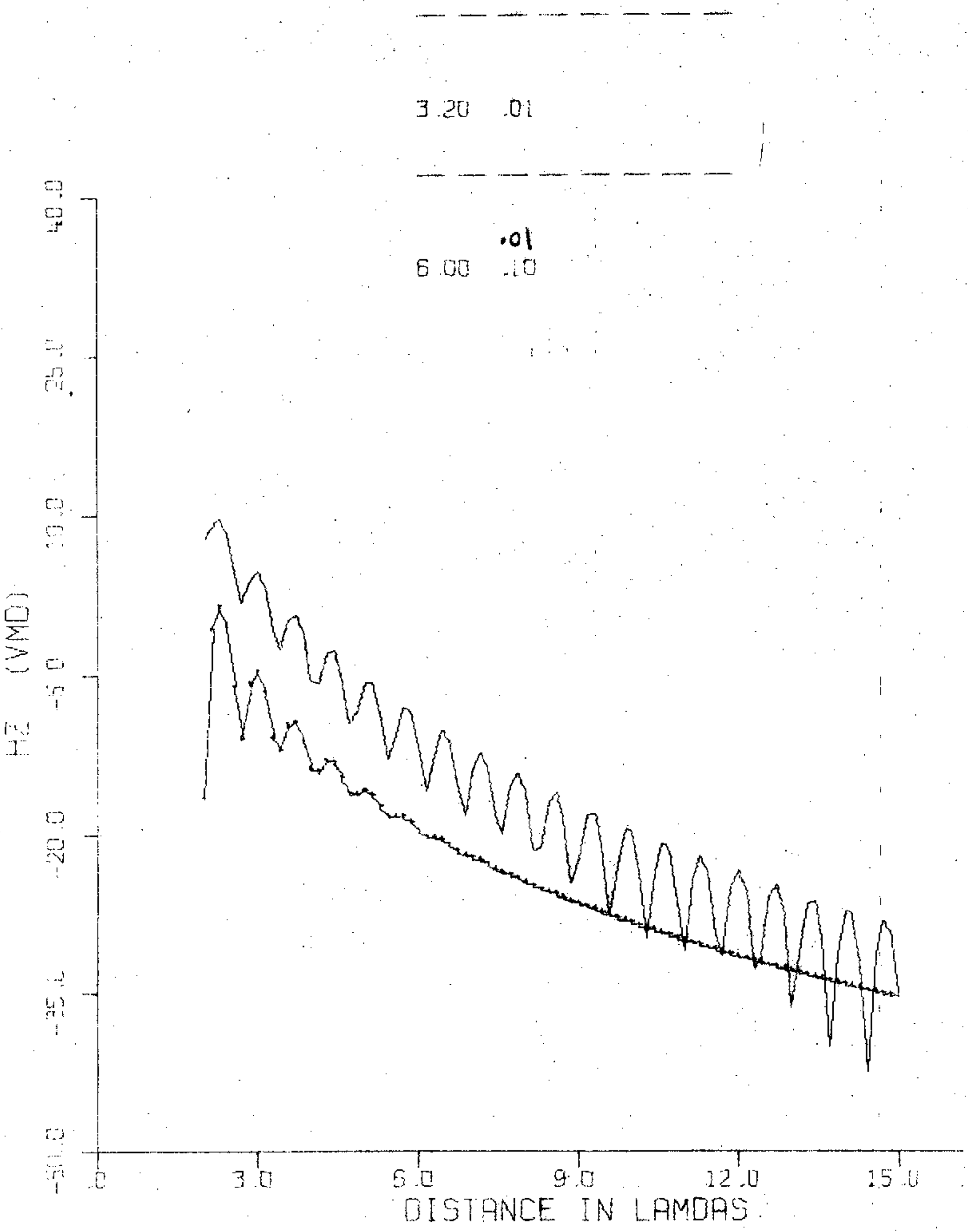
DEPTH=.10 , MU= 1.0 B= 1.0



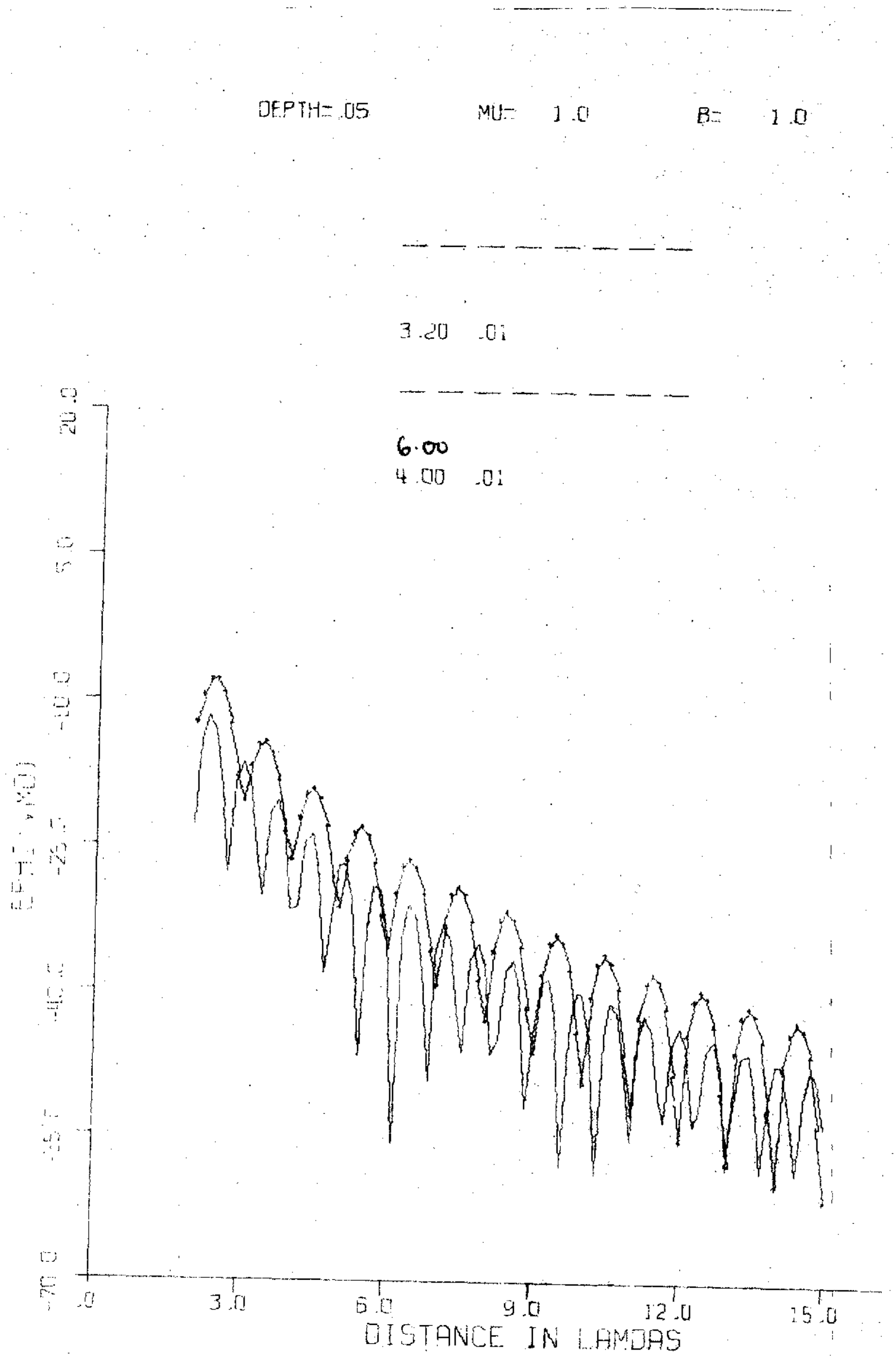

DEPTH=.05
MUE= 1.0
B= 1.0
3.20 .01
.01
6.00 .10
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
EPHI(VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

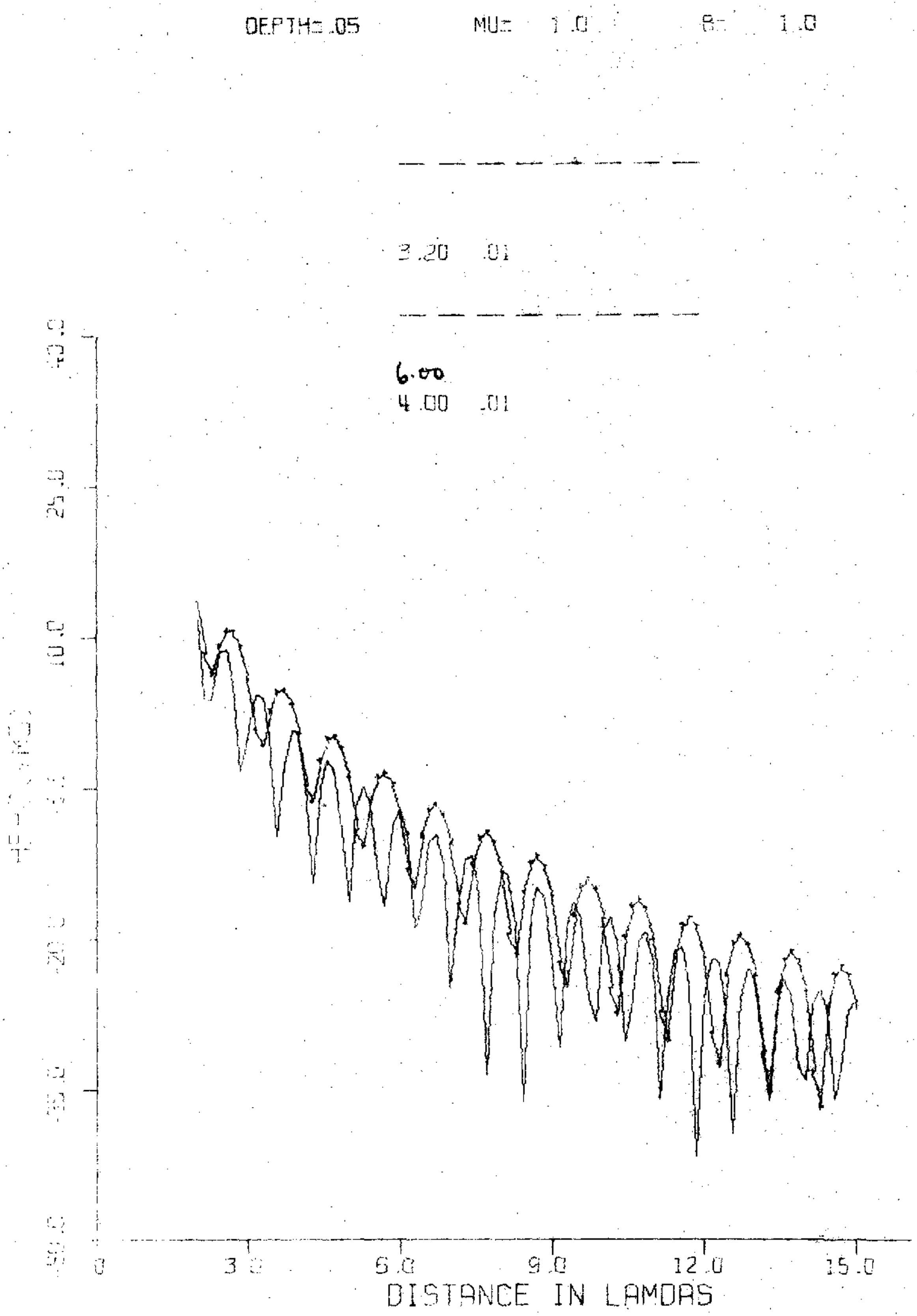

DEPTH= .05
MU= 1.0
B= 1.0
3.20 .01
.01
6.00 .10
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

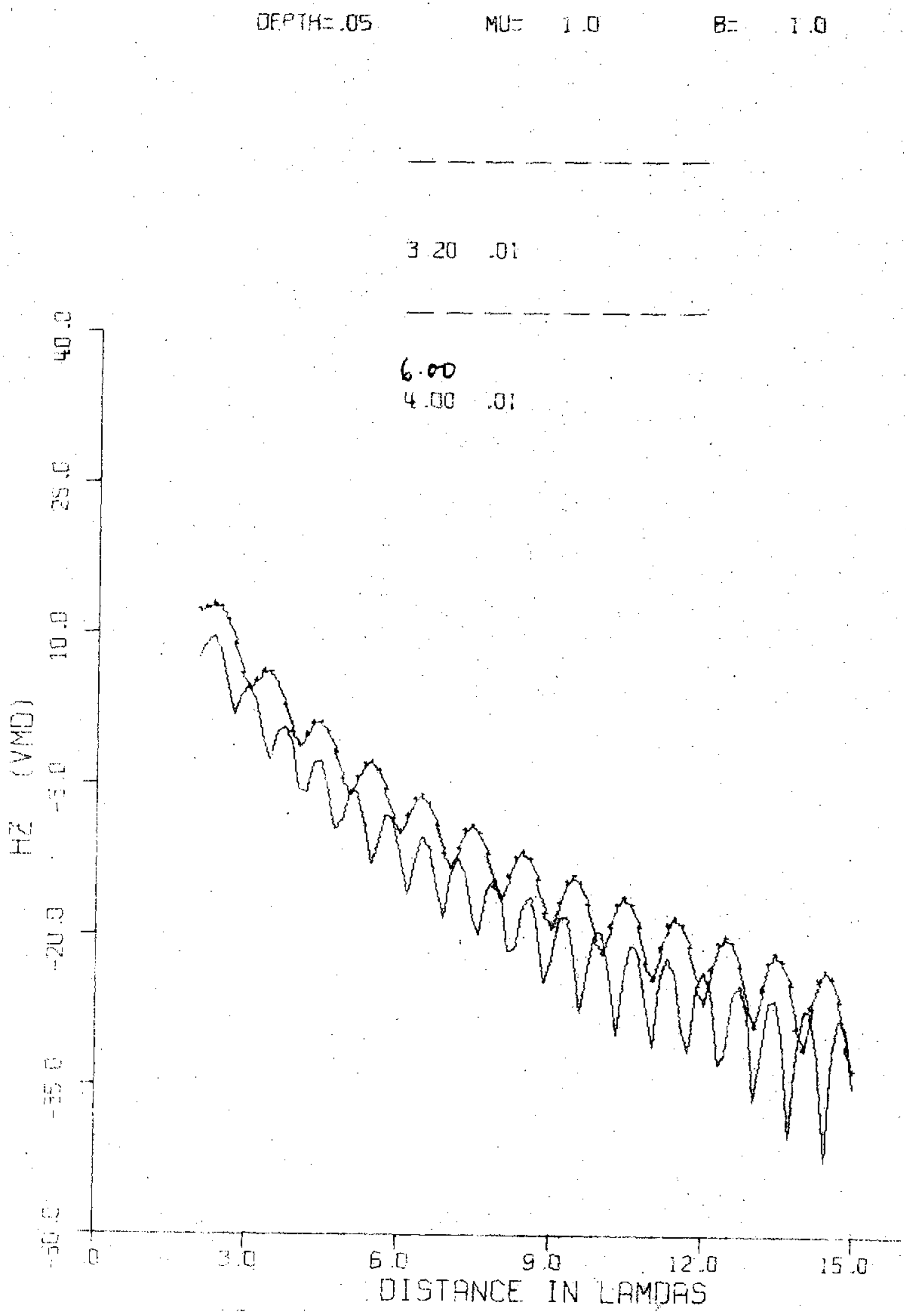
DEPTH=.05 MU= 1.0 R= 1.0

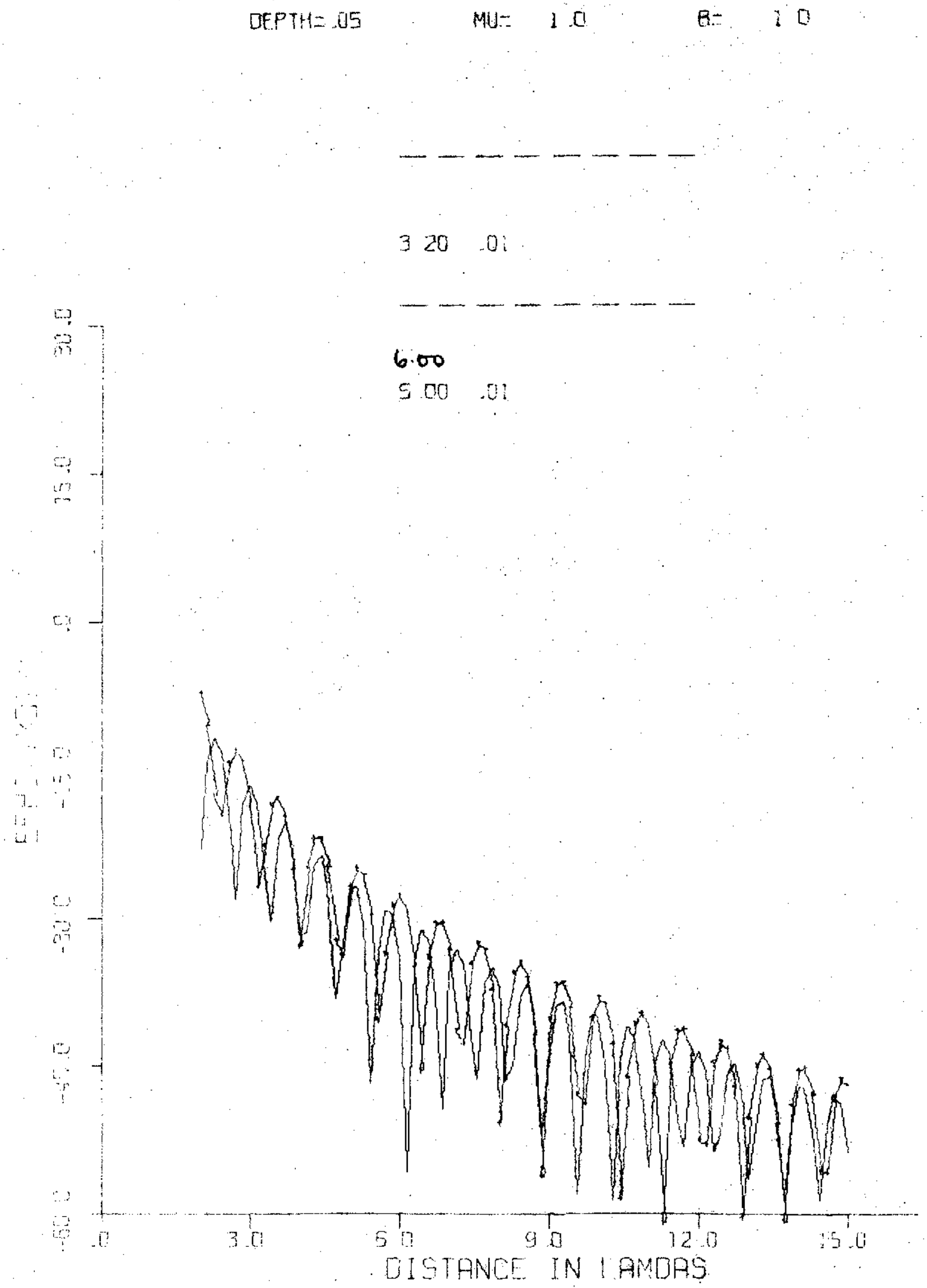


F-4

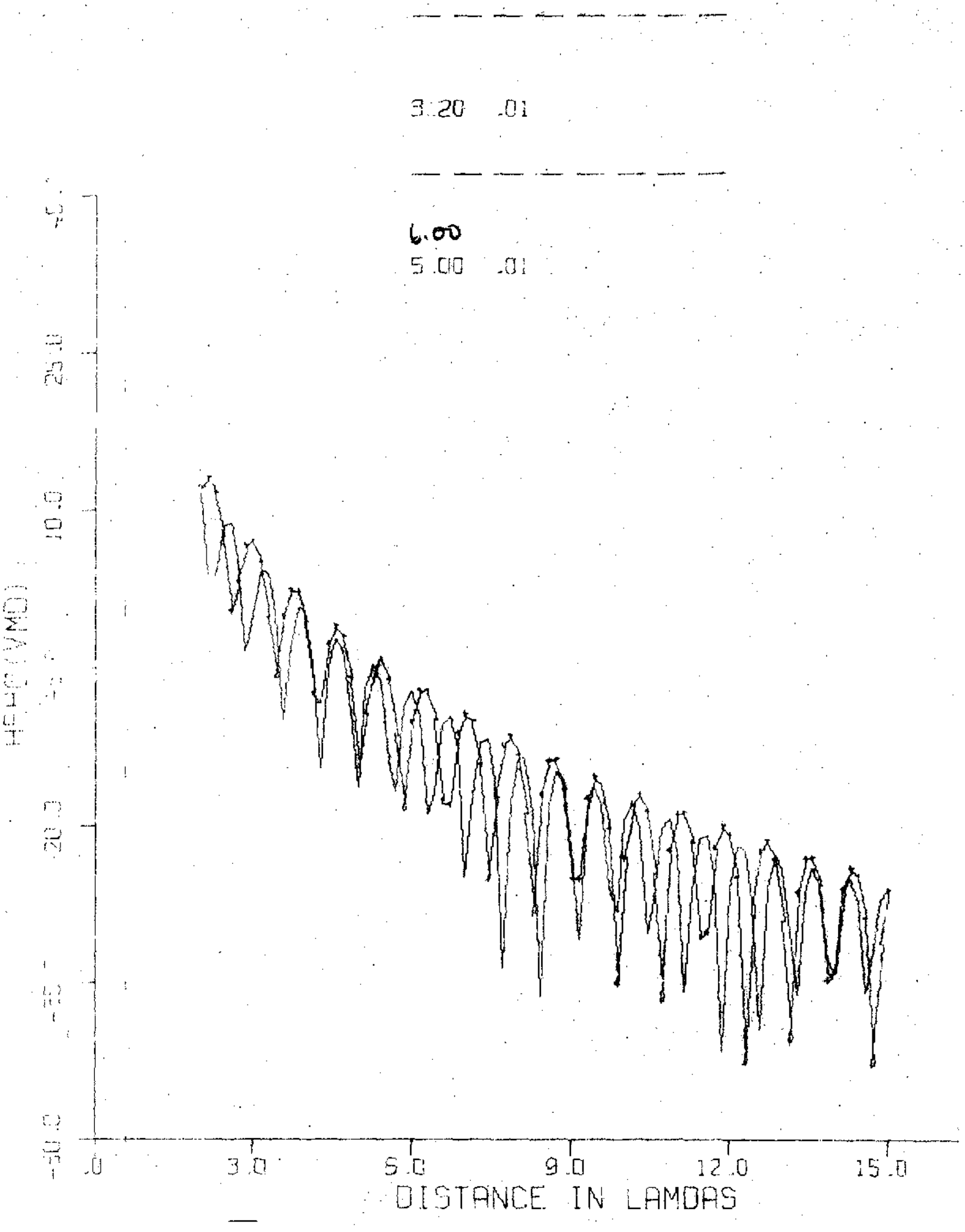

DEPTH= .05
MU= 1.0
B= 1.0
3.20 .01
6.00
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EFIELD (XDB)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

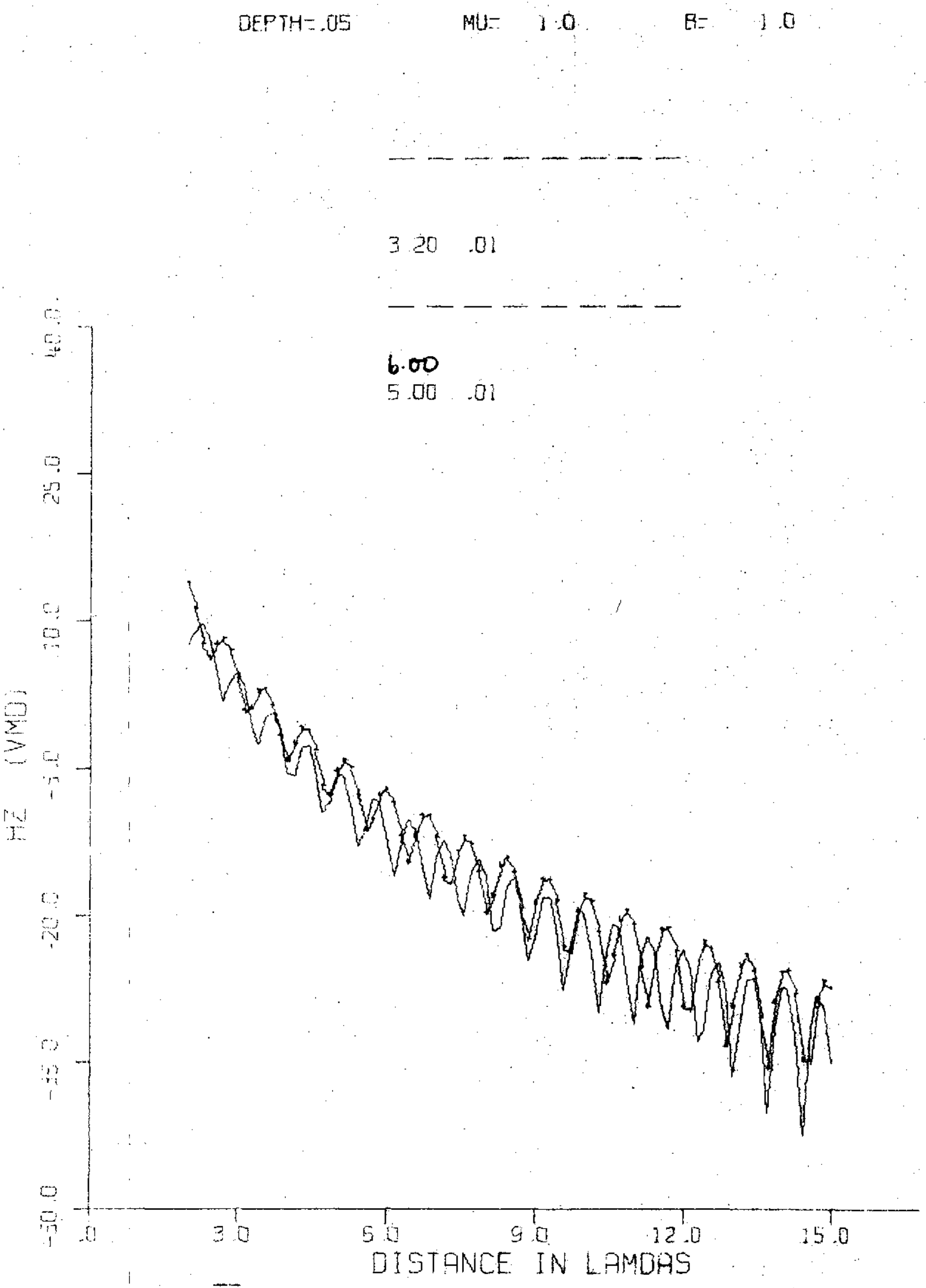

DEPTH=.05
MU= 1.0
B= 1.0
3.20 .01
6.00
4.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
B= 1.0
3.20 .01
6.00
4.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HZ (VMD)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
B= 1.0
3.20 .01
6.00
5.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

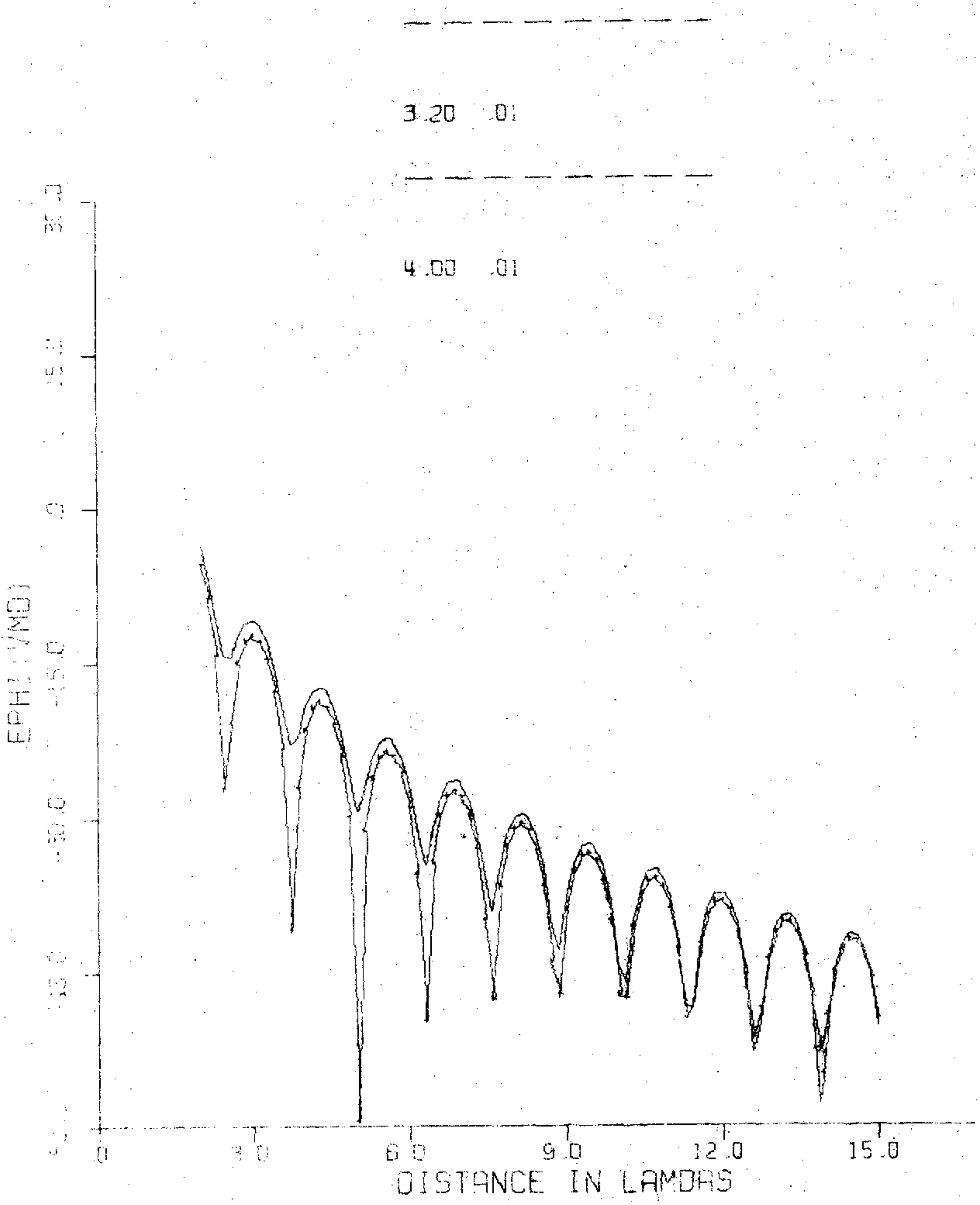
DEPTH=.05 MU= 1.0 R= 1.0




DEPTH=.05
MU= 1.0
B= 1.0
3.20 .01
6.00
5.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HZ (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

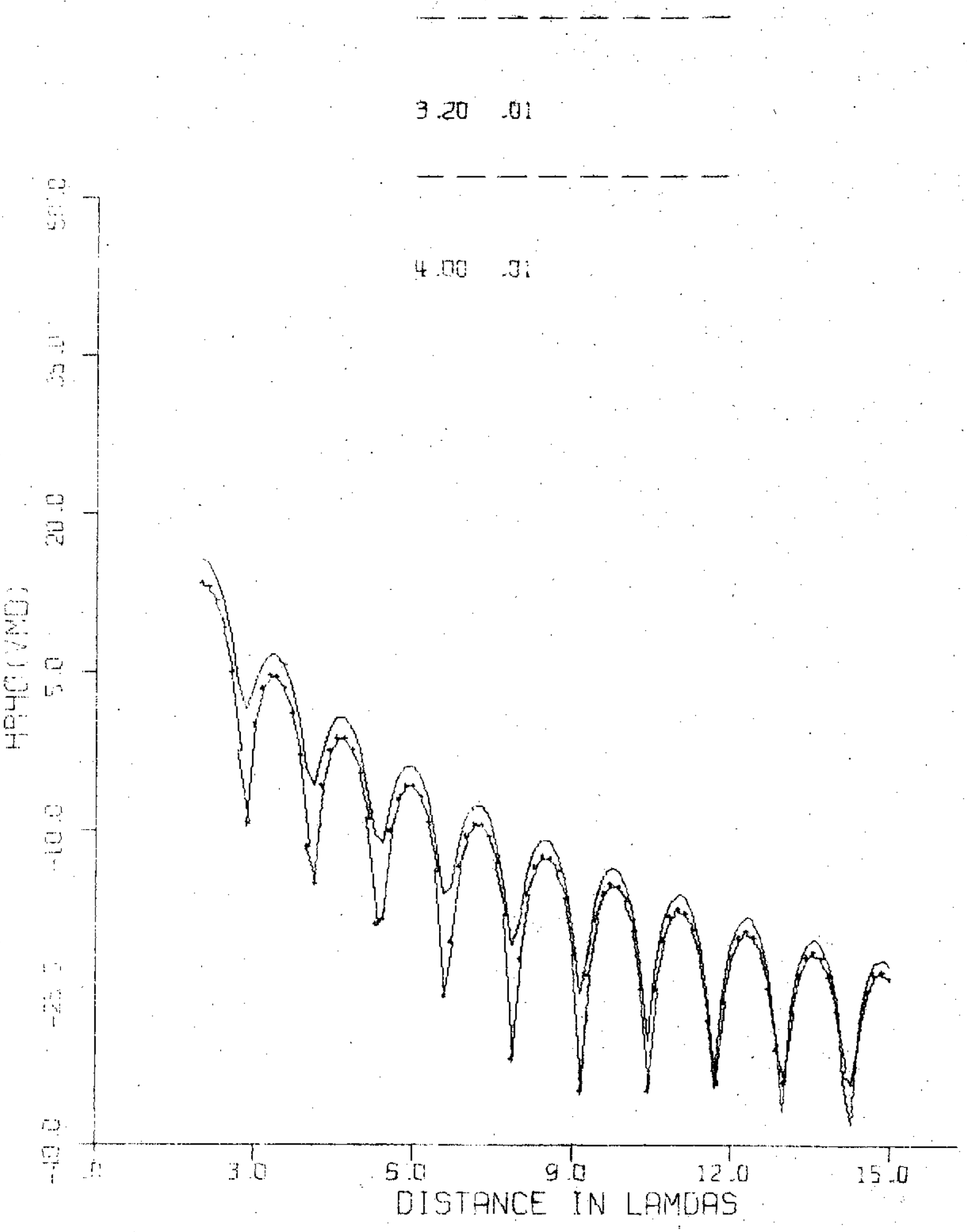
.05

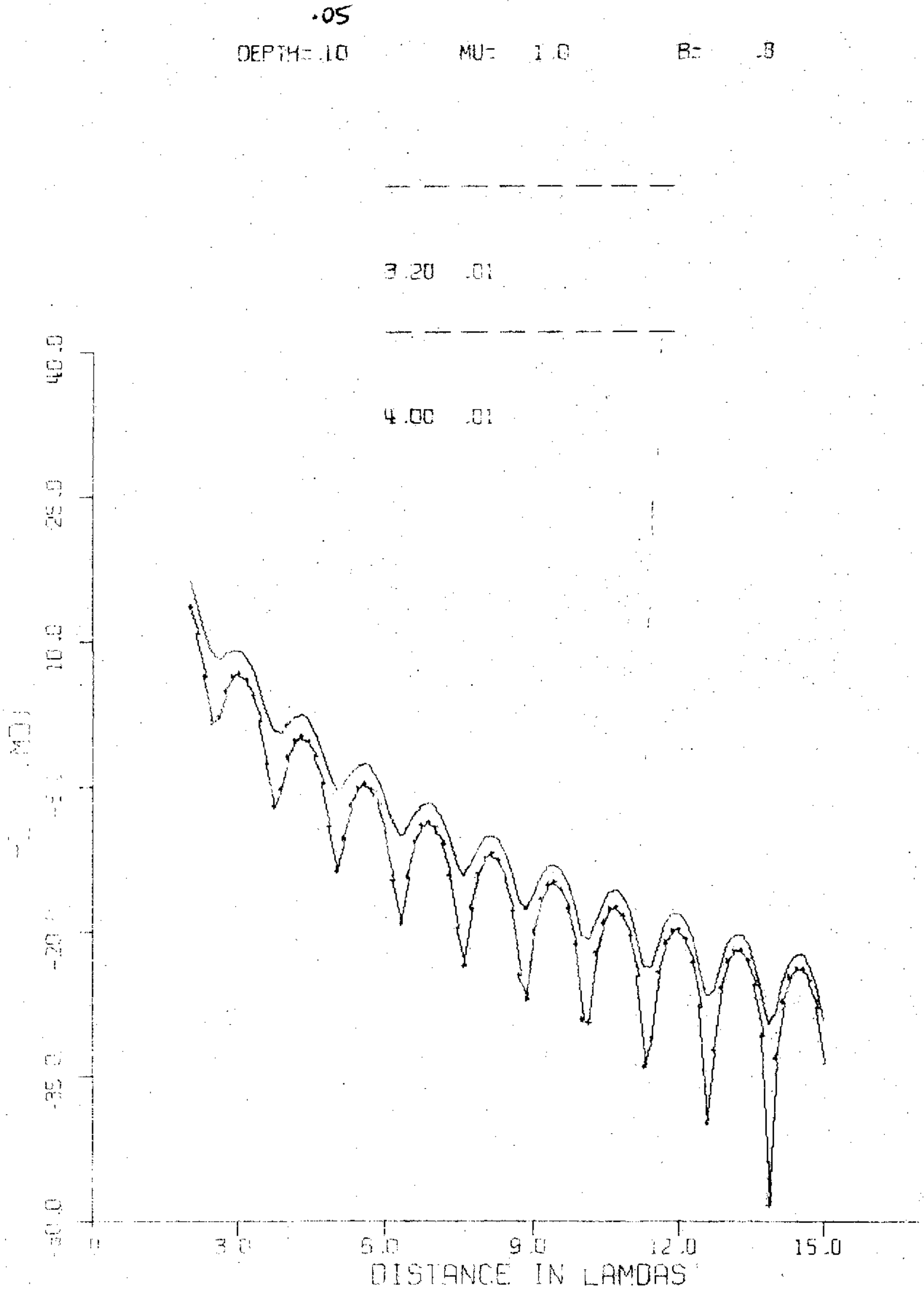
DEPTH= .10 MU= 1.0 B= .8

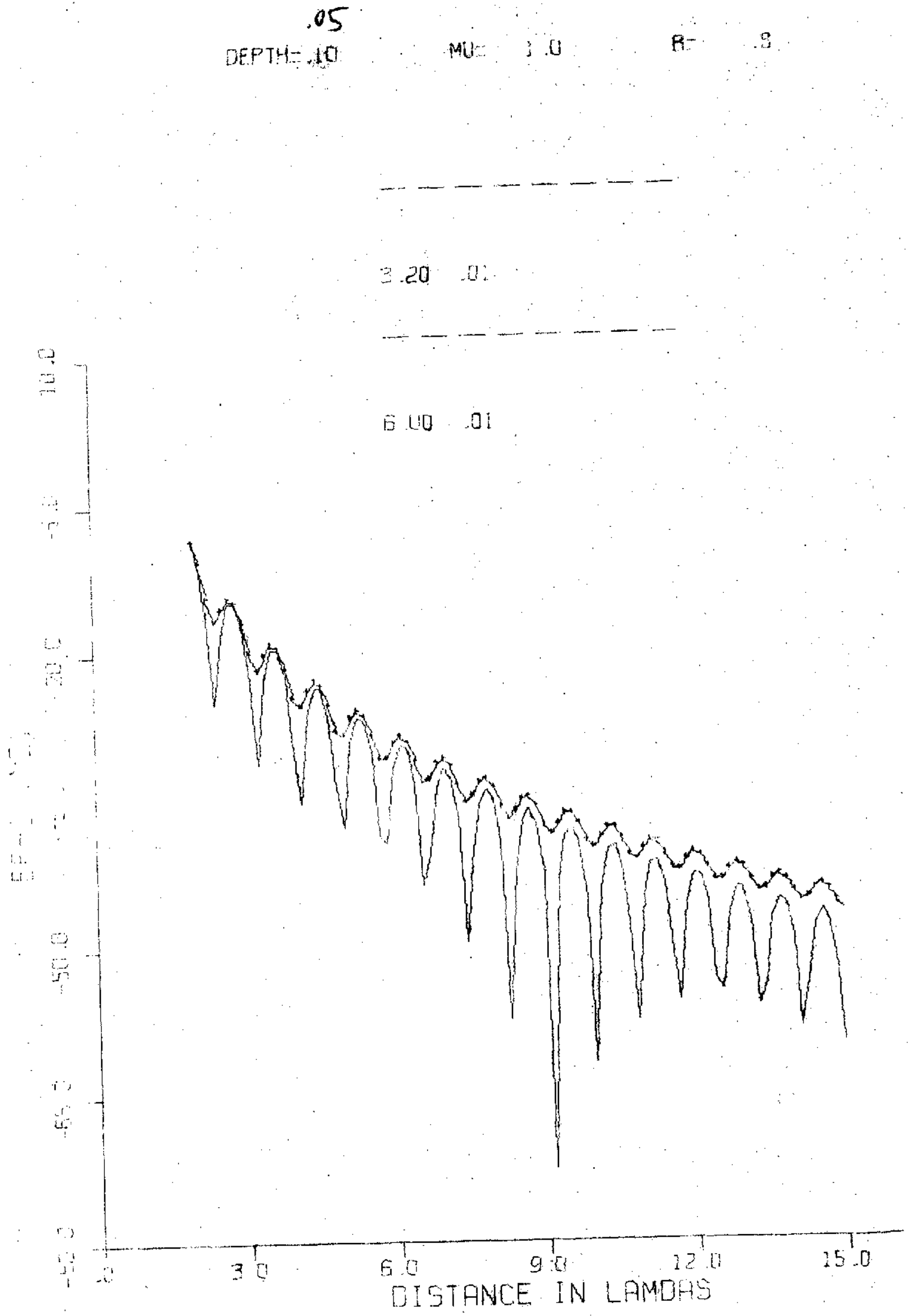


.05

DEPTH= .10 MU= 1.0 B= .9

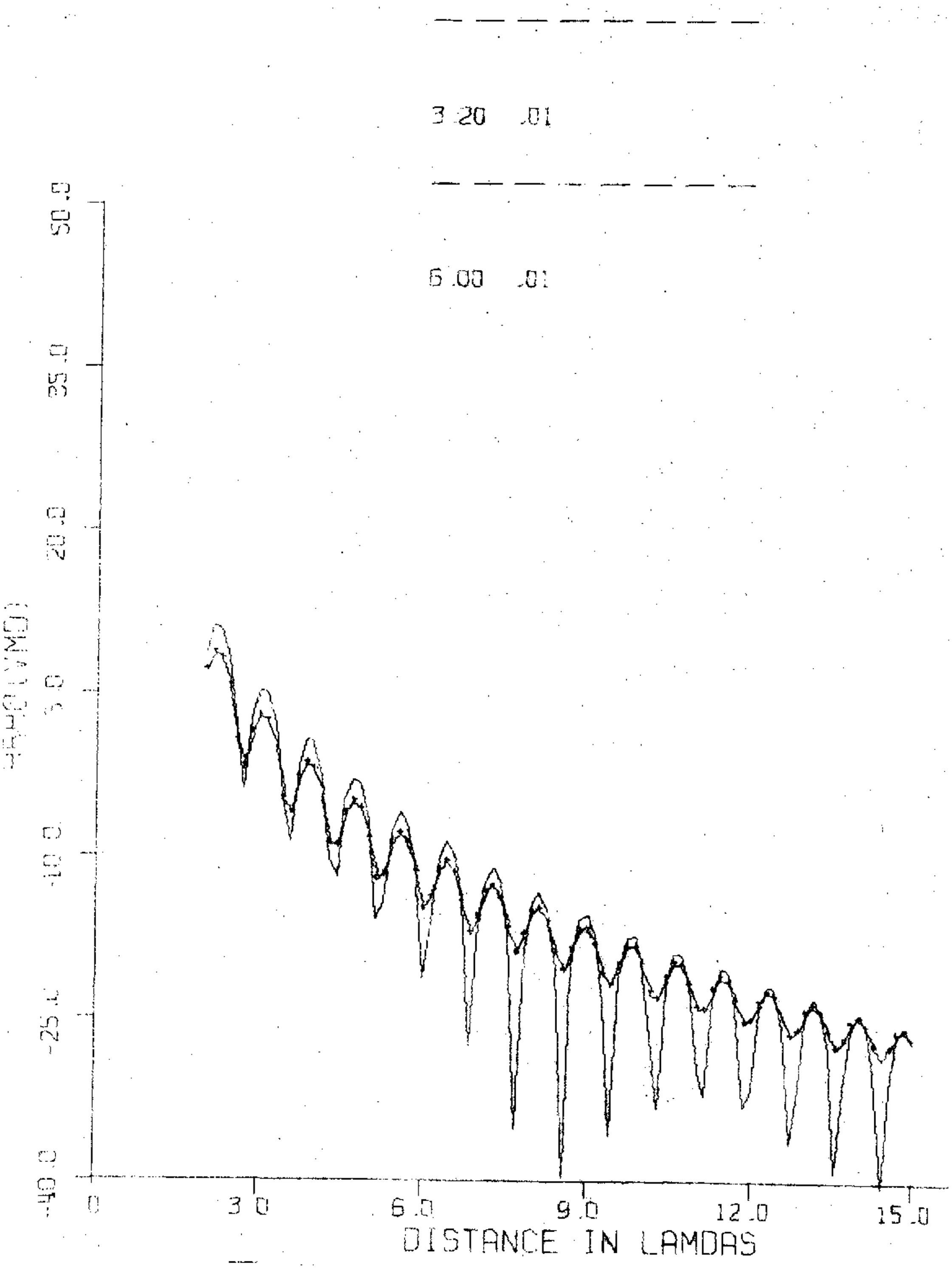



.05
DEPTH=.10
MU= 1.0
B= .8
3.20 .01
4.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


.05
DEPTH= .10
MU= 3.0
R= .8
3.20 .01
6.00 .01
10.0
-5.0
-20.0
-35.0
-50.0
-65.0
-80.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

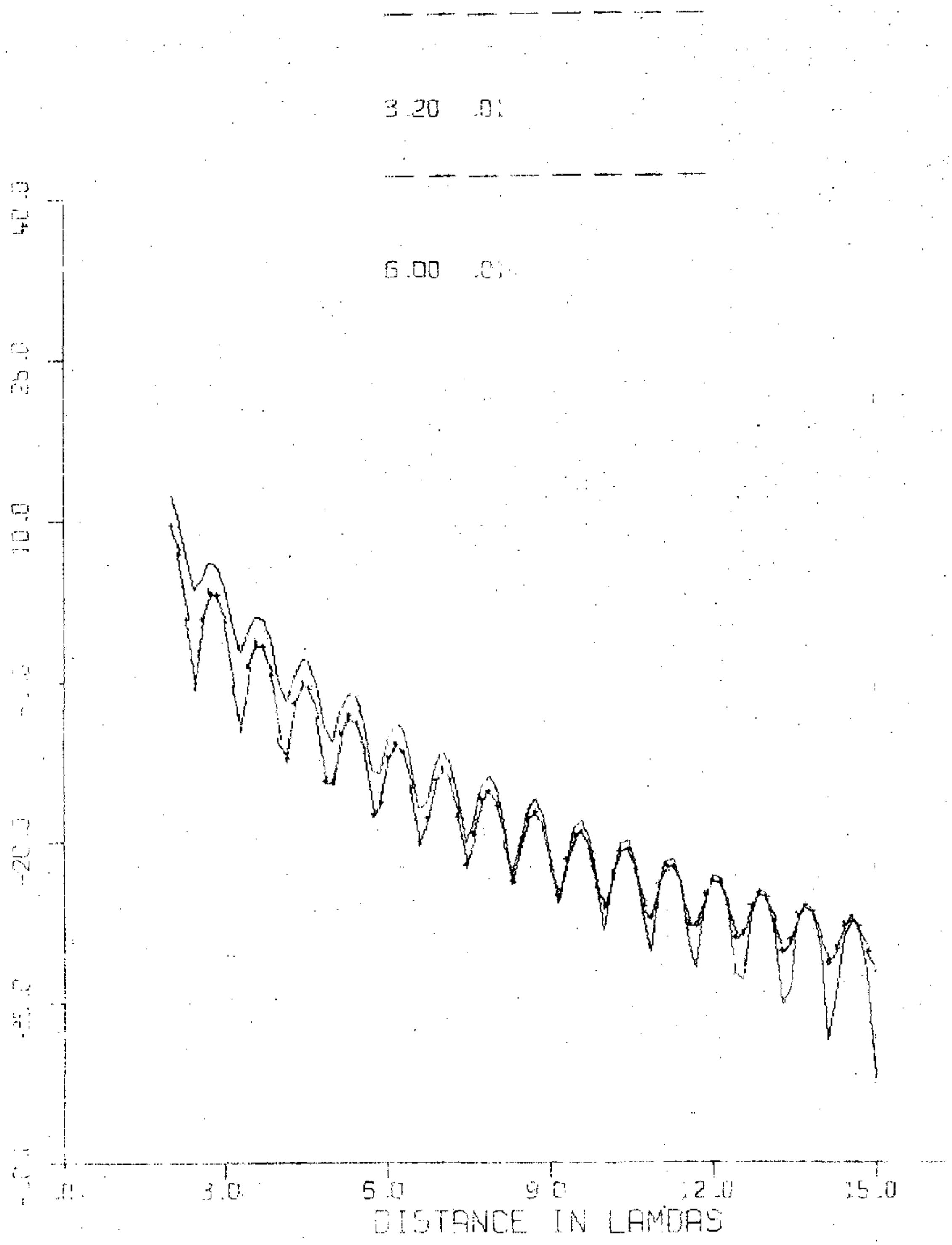
.05

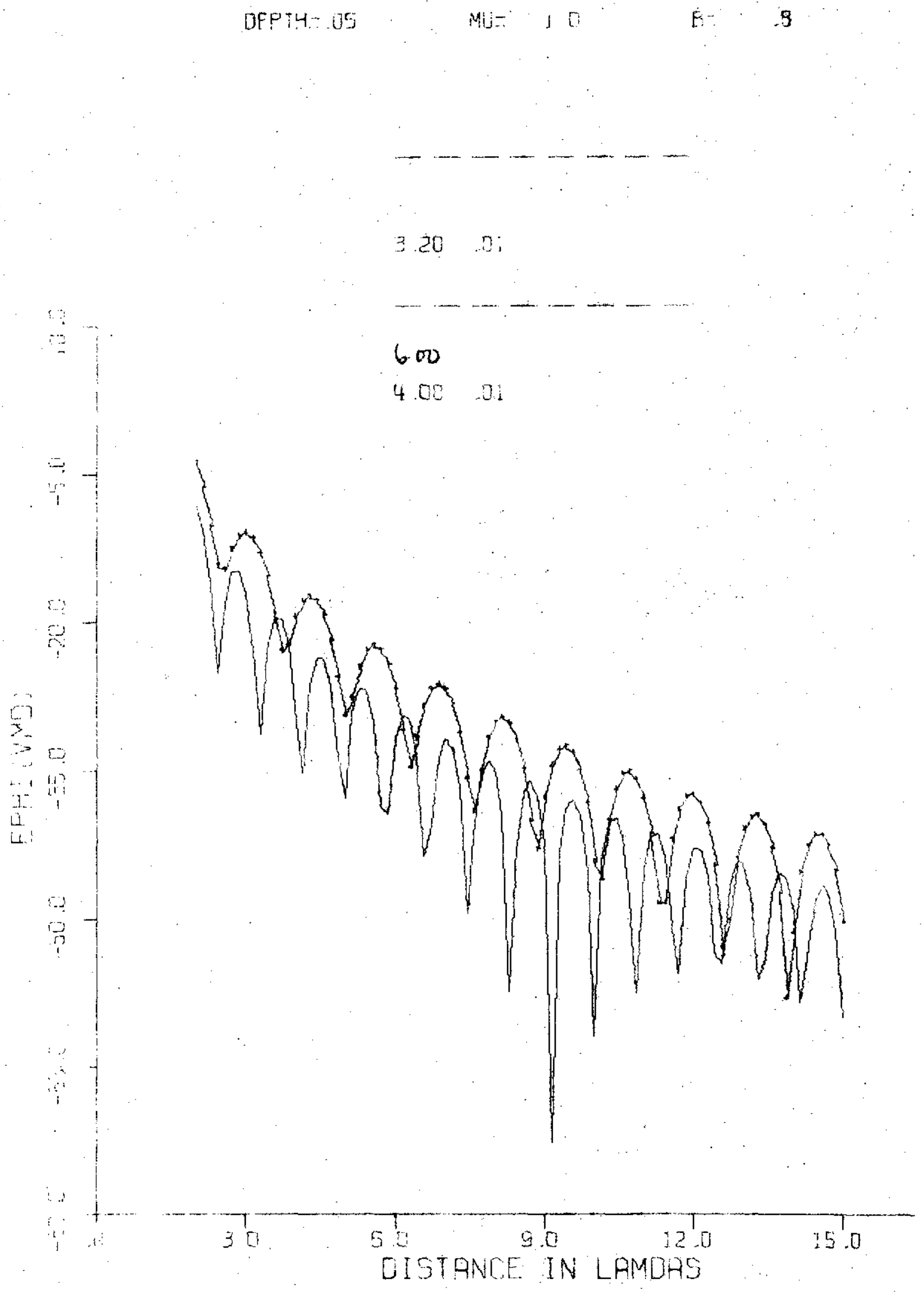
DEPTH=.10 MU= 1.0 B= .8

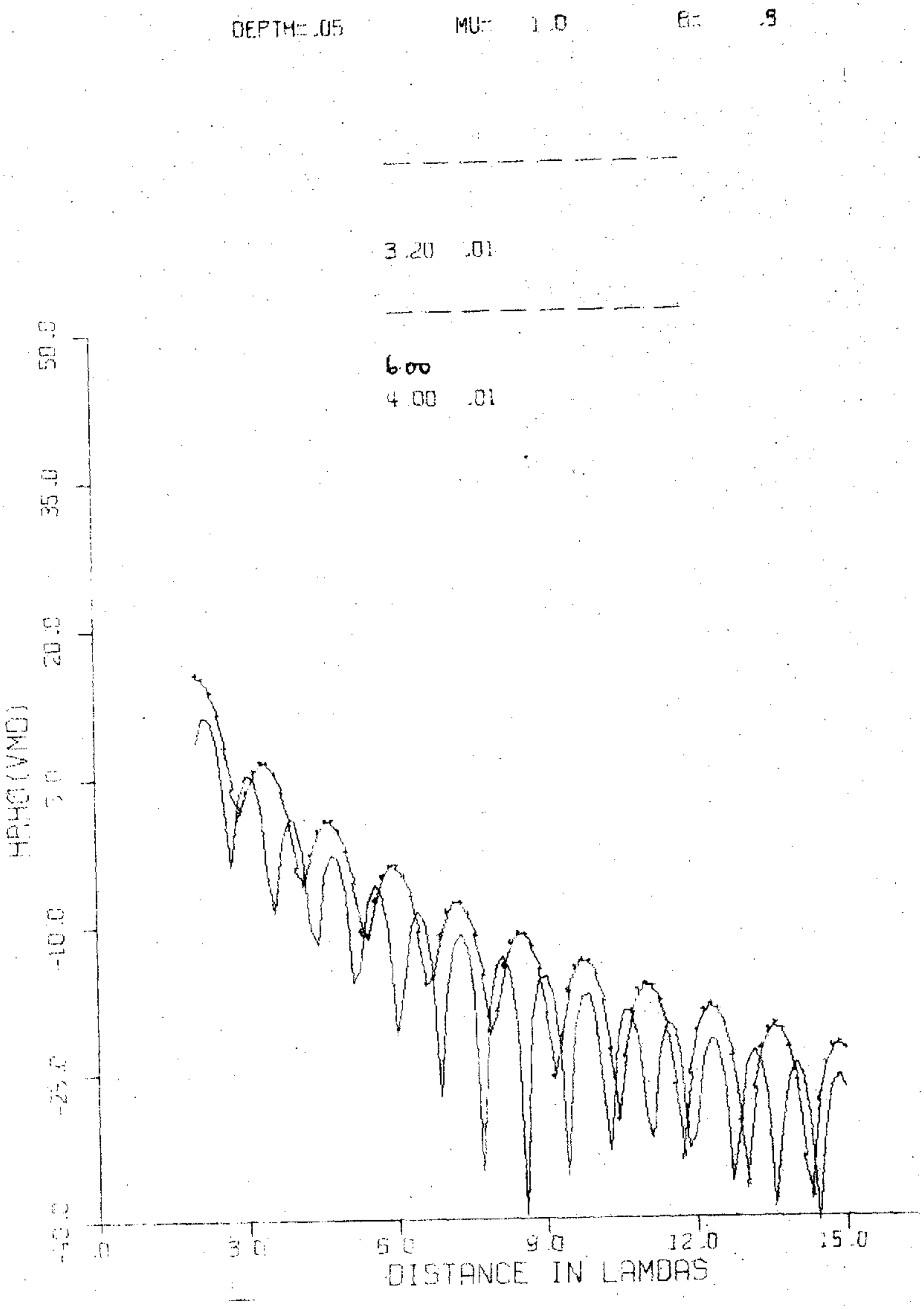


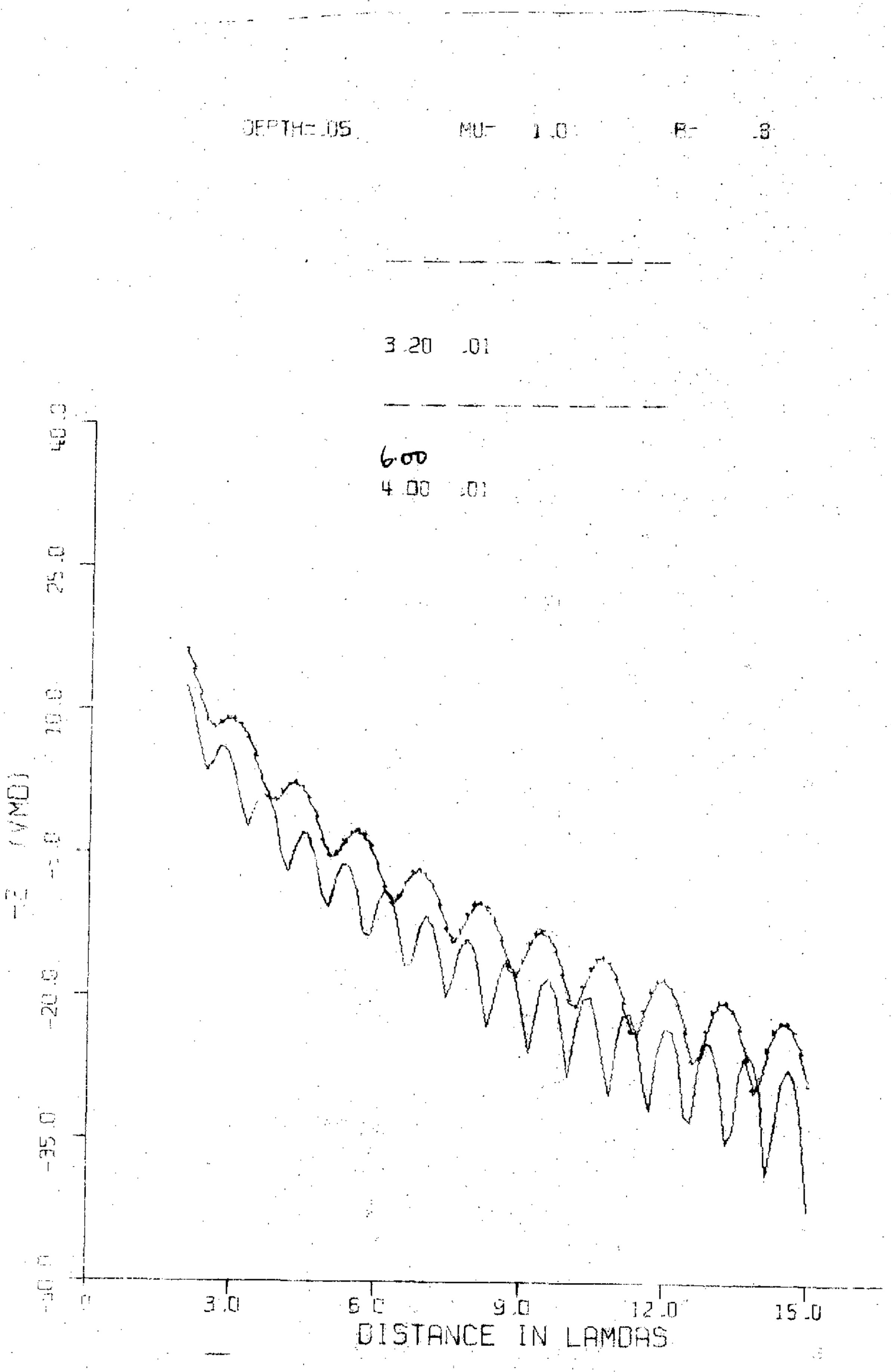
.05

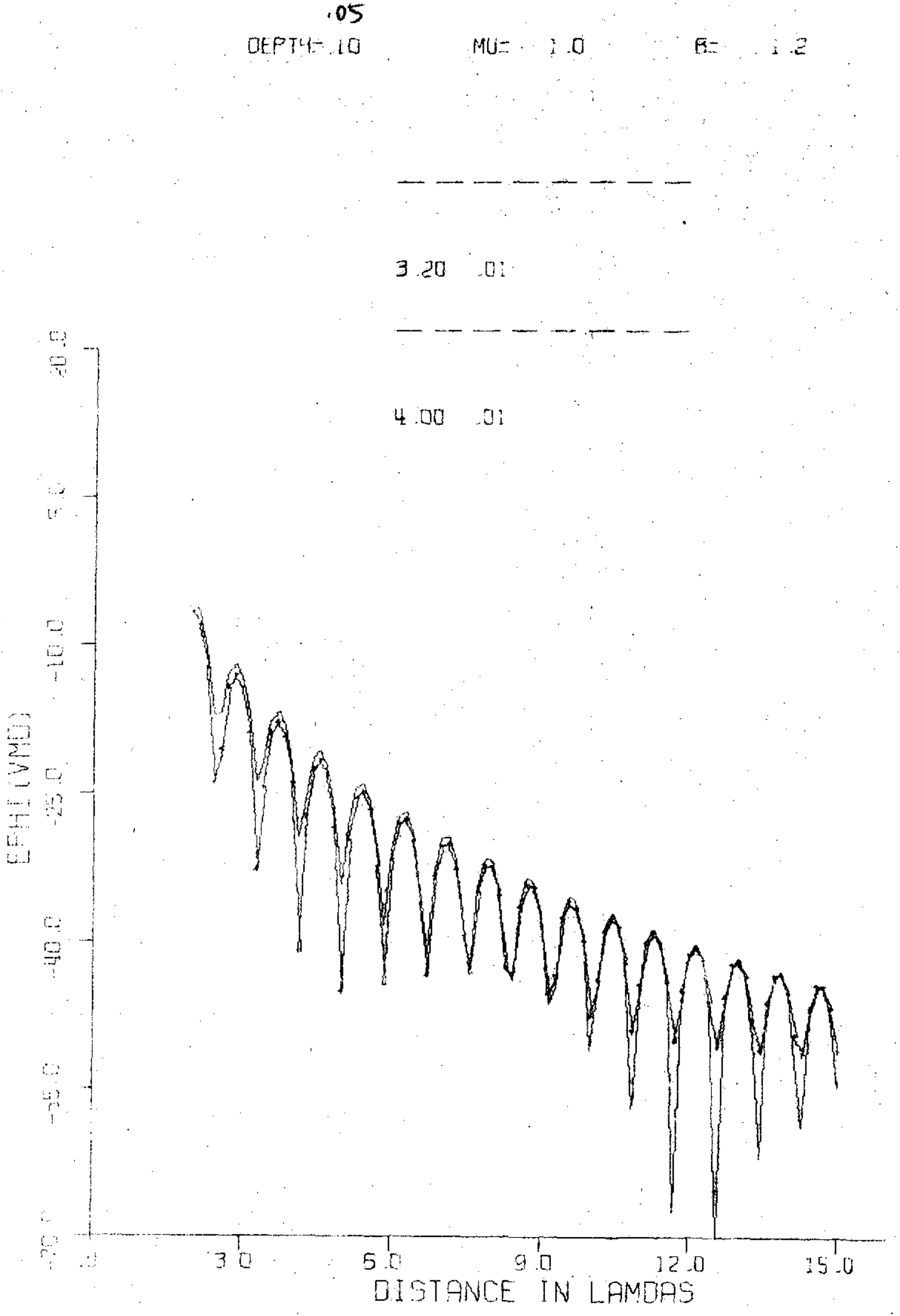
DEPTH=.10 MU= 1.0 B= .8

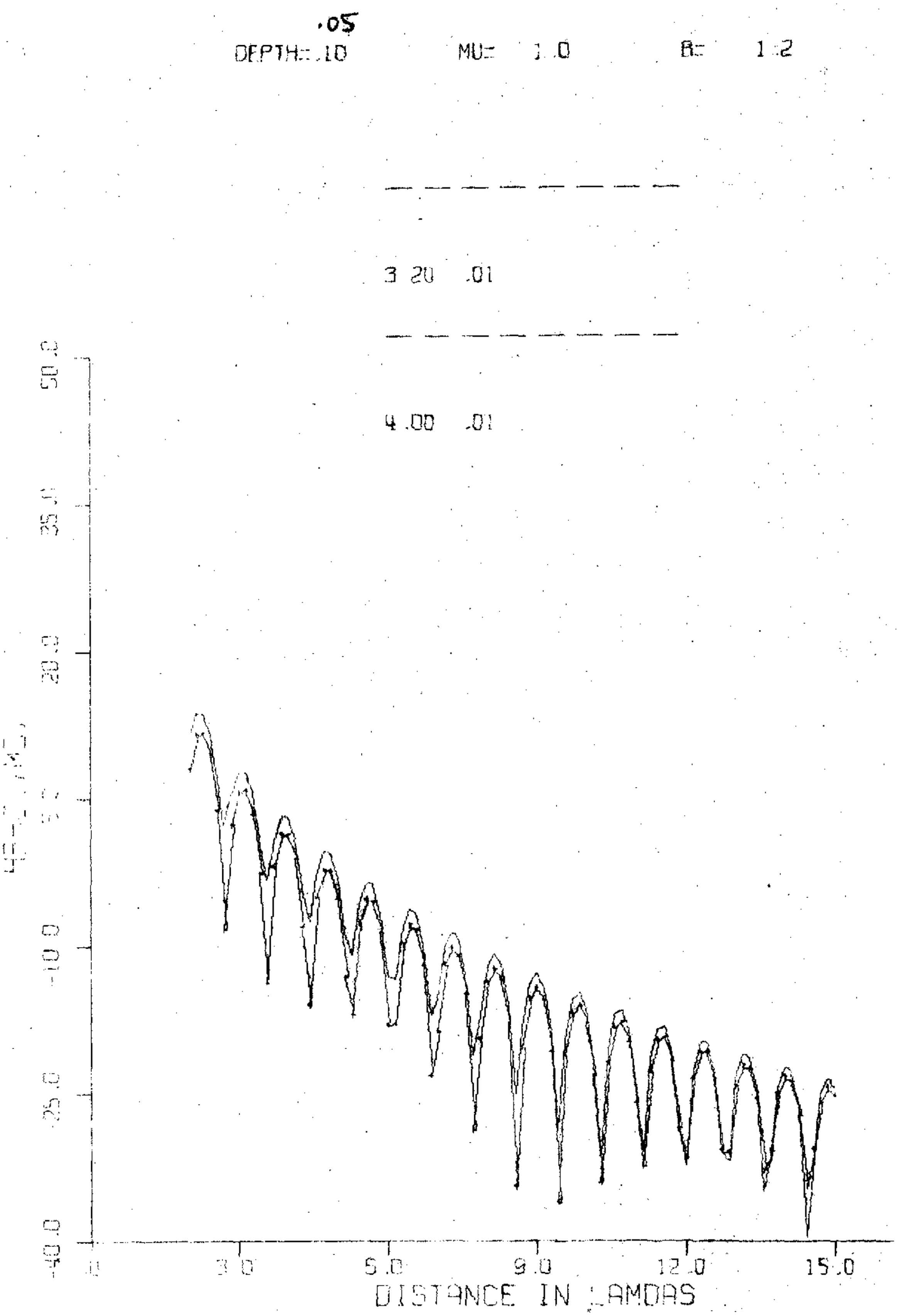


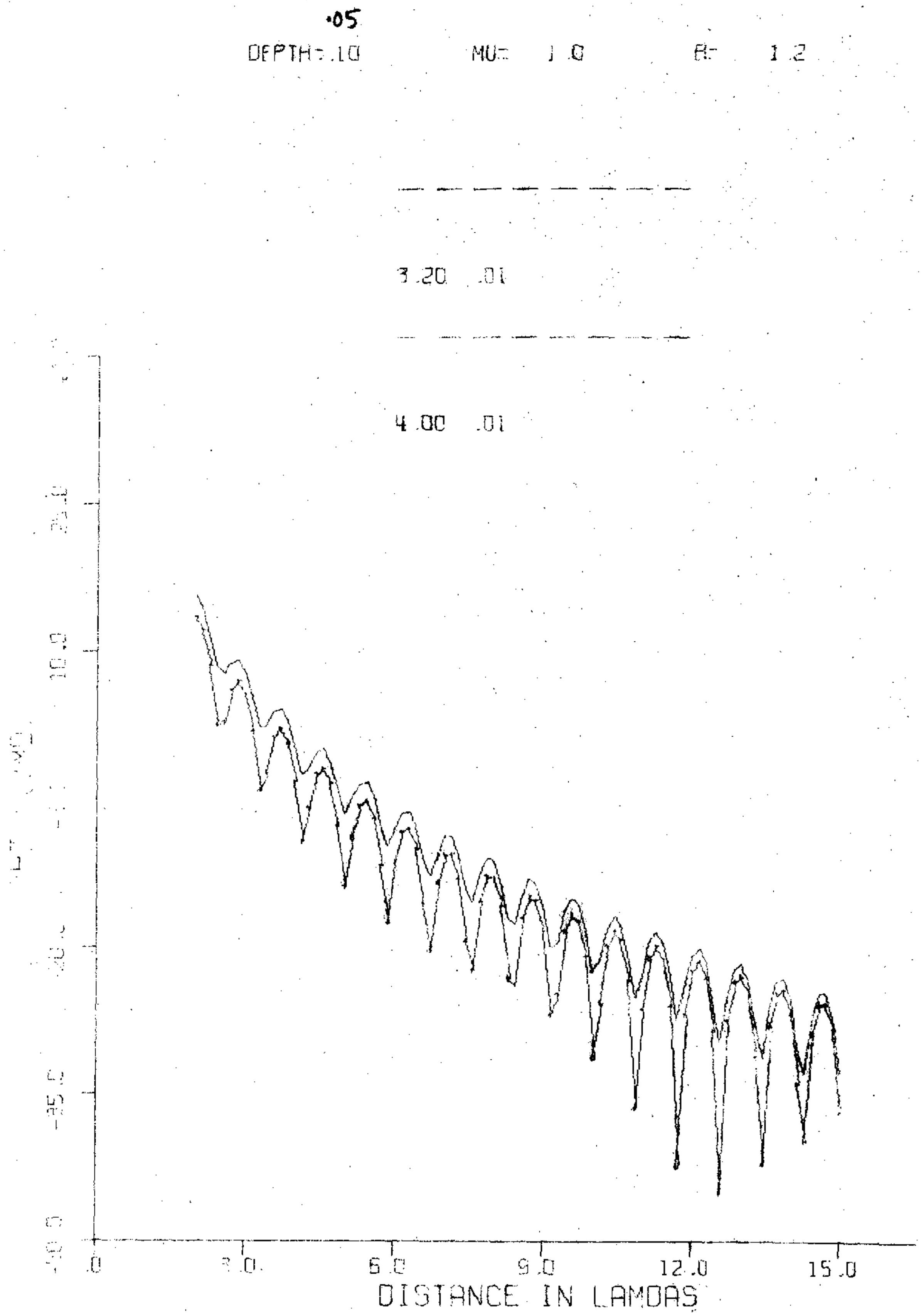

DEPTH=.05
MU= 1.0
B= .9
3.20 .01
6.00
4.00 .01
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
EPHI (VMD)
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
B= .9
3.20 .01
6.00
4.00 .01
50.0
35.0
20.0
5.0
-10.0
-25.0
-40.0
HAHQ(VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
R= .8
3.20 .01
6.00
4.00 .01
E (VMD)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


.05
DEPTH=.10
MU= 1.0
B= 1.2
3.20 .01
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI(VMD)
0.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

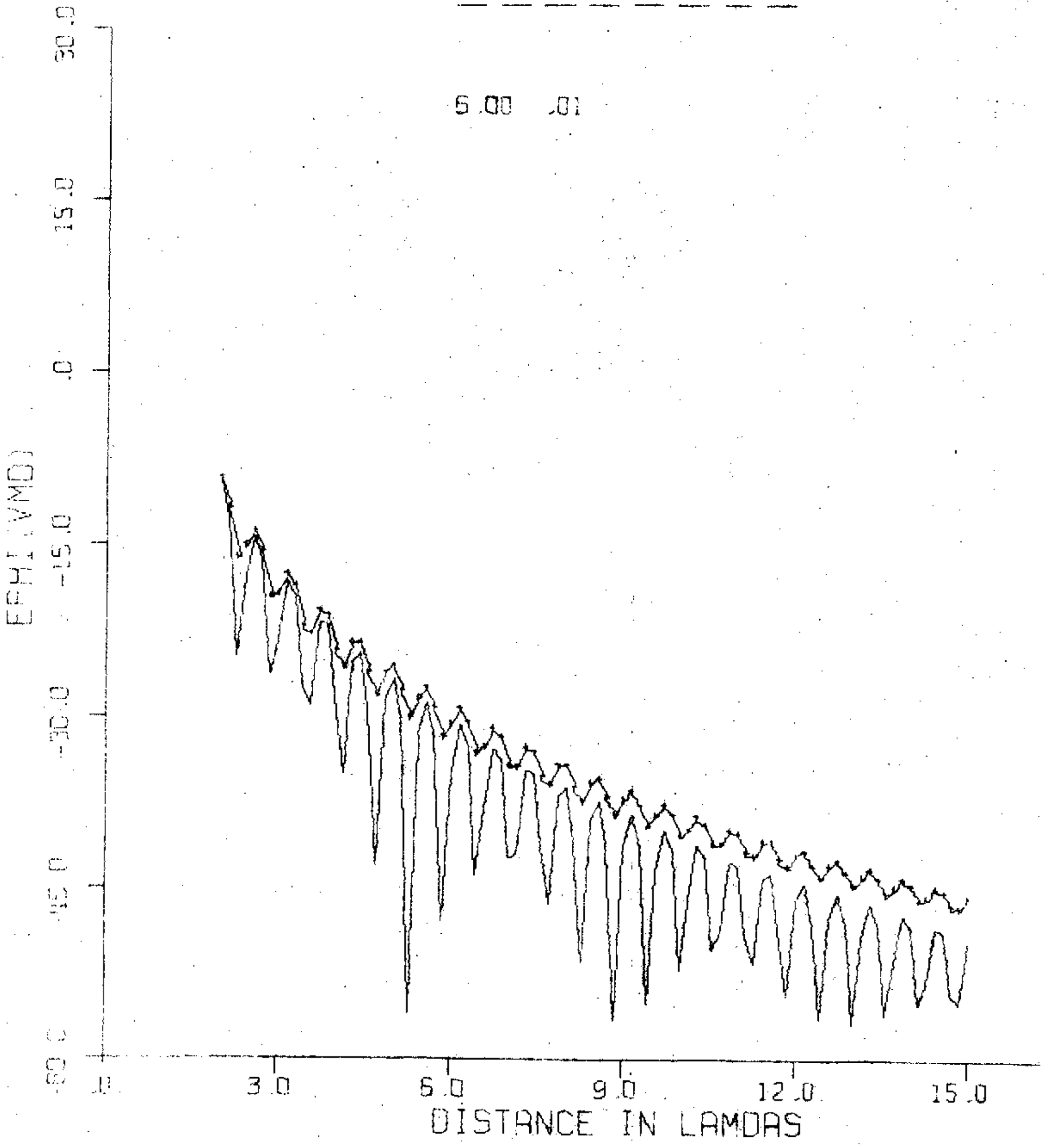

.05
DEPTH=.10
MU= 1.0
B= 1.2
3.20 .01
4.00 .01
50.0
35.0
20.0
5.0
-10.0
-25.0
-40.0
0
3.0
5.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


·05
DEPTH=.10
MU= 1.0
B= 1.2
3.20 .01
4.00 .01
25.0
10.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

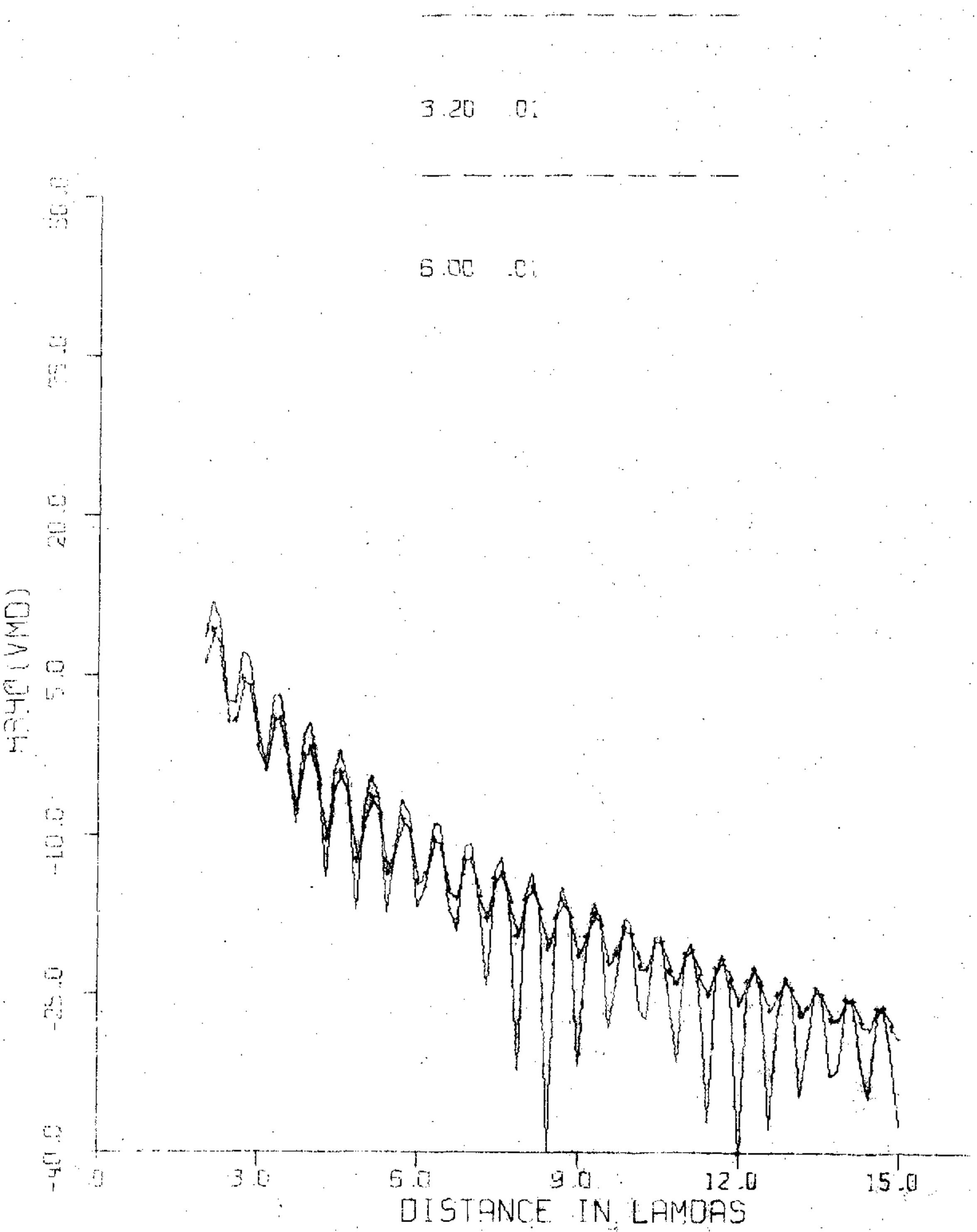
.05
DEPTH=.10 MU= 1.0 B= 1.2

3.20 .01

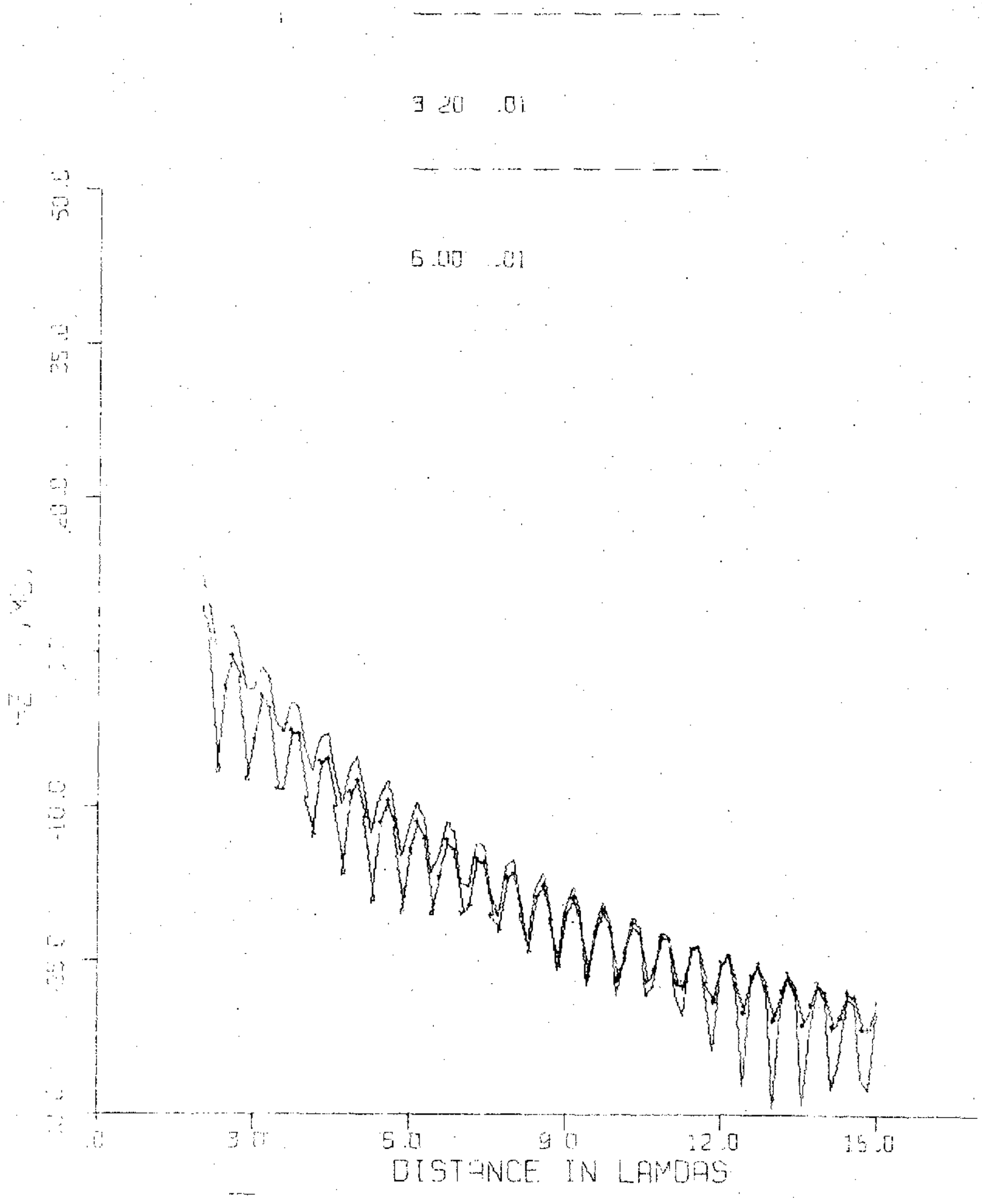
6.00 .01

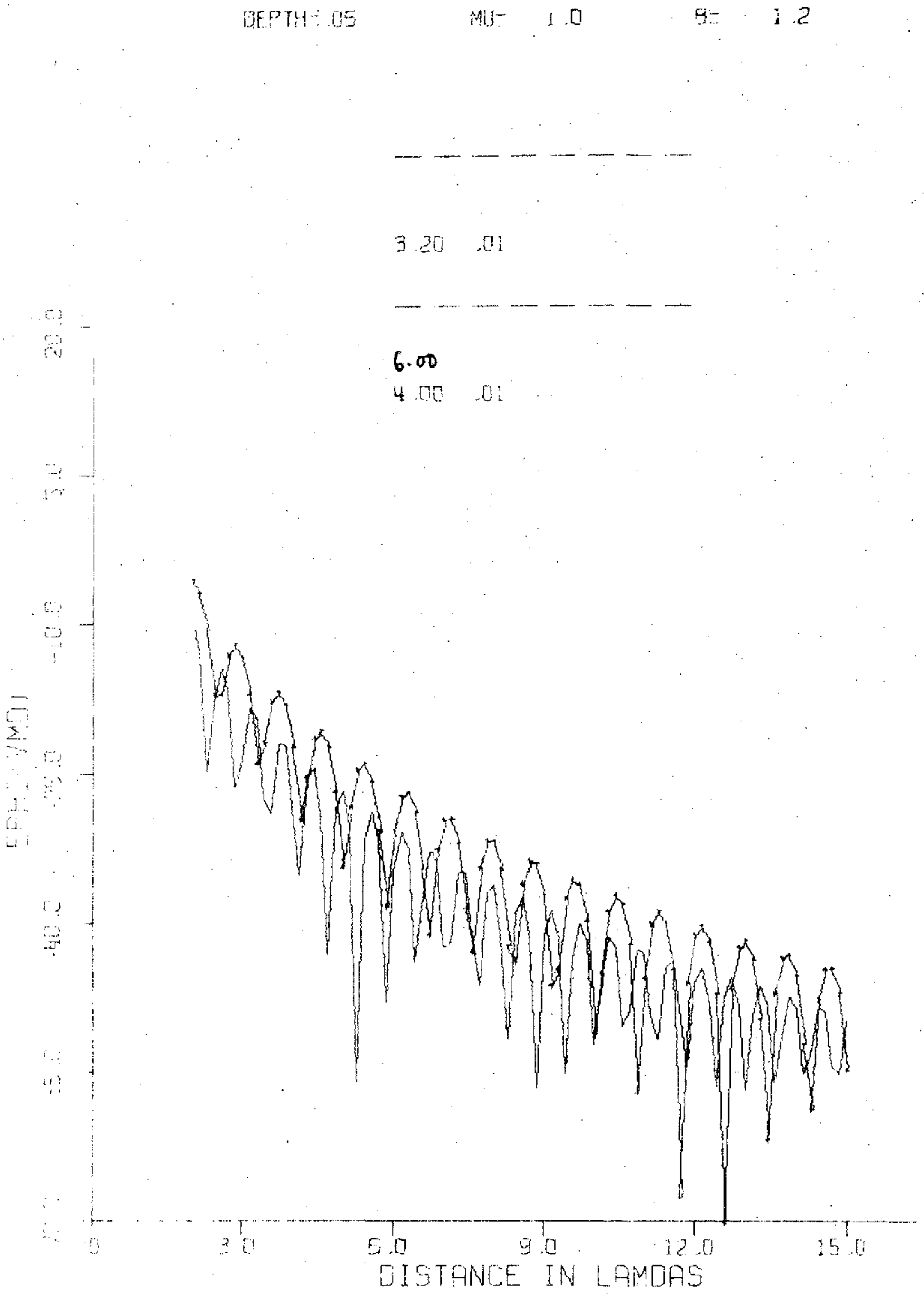


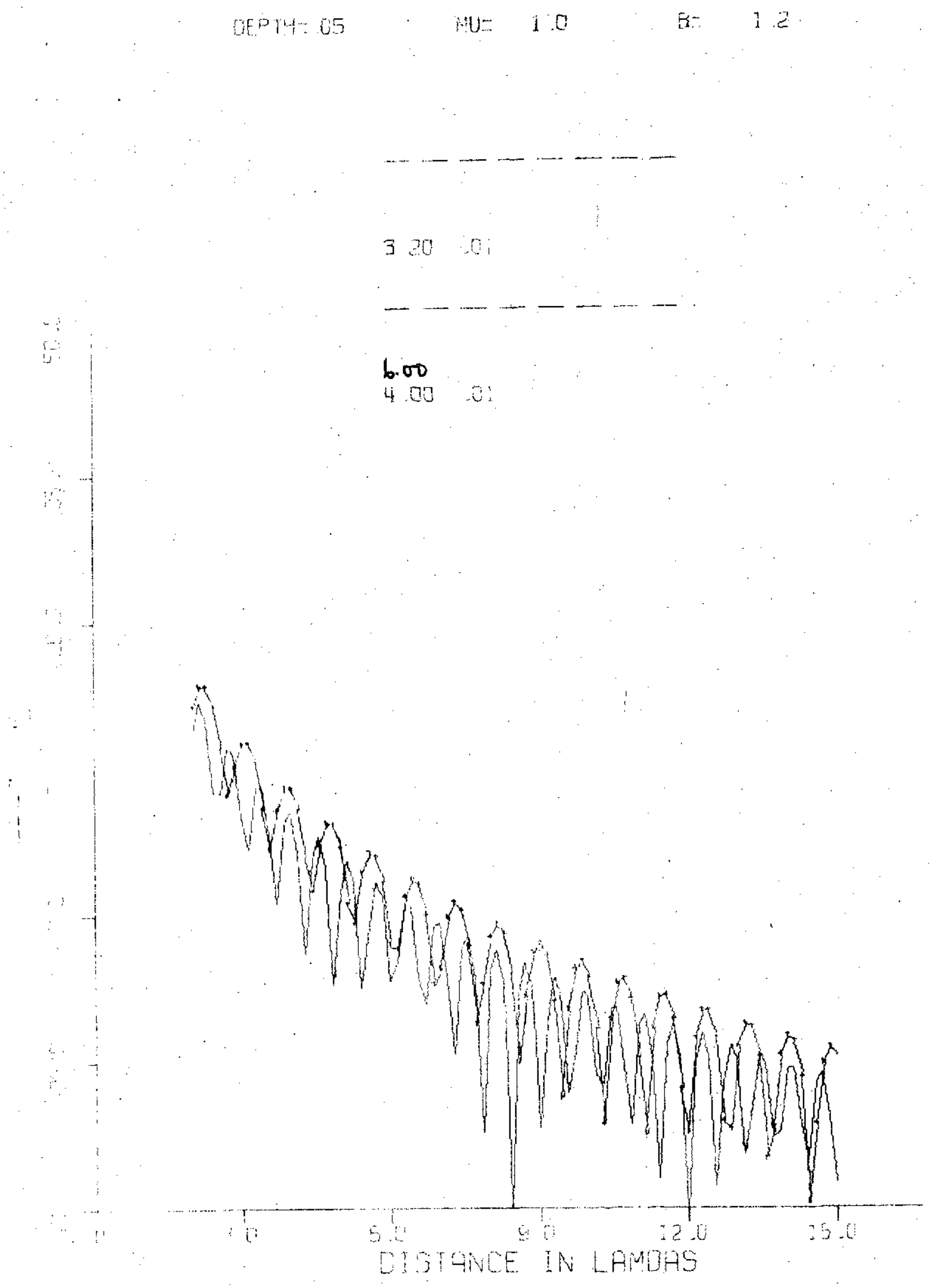
.05
DEPTH=.10 MU= 1.0 B= 1.2

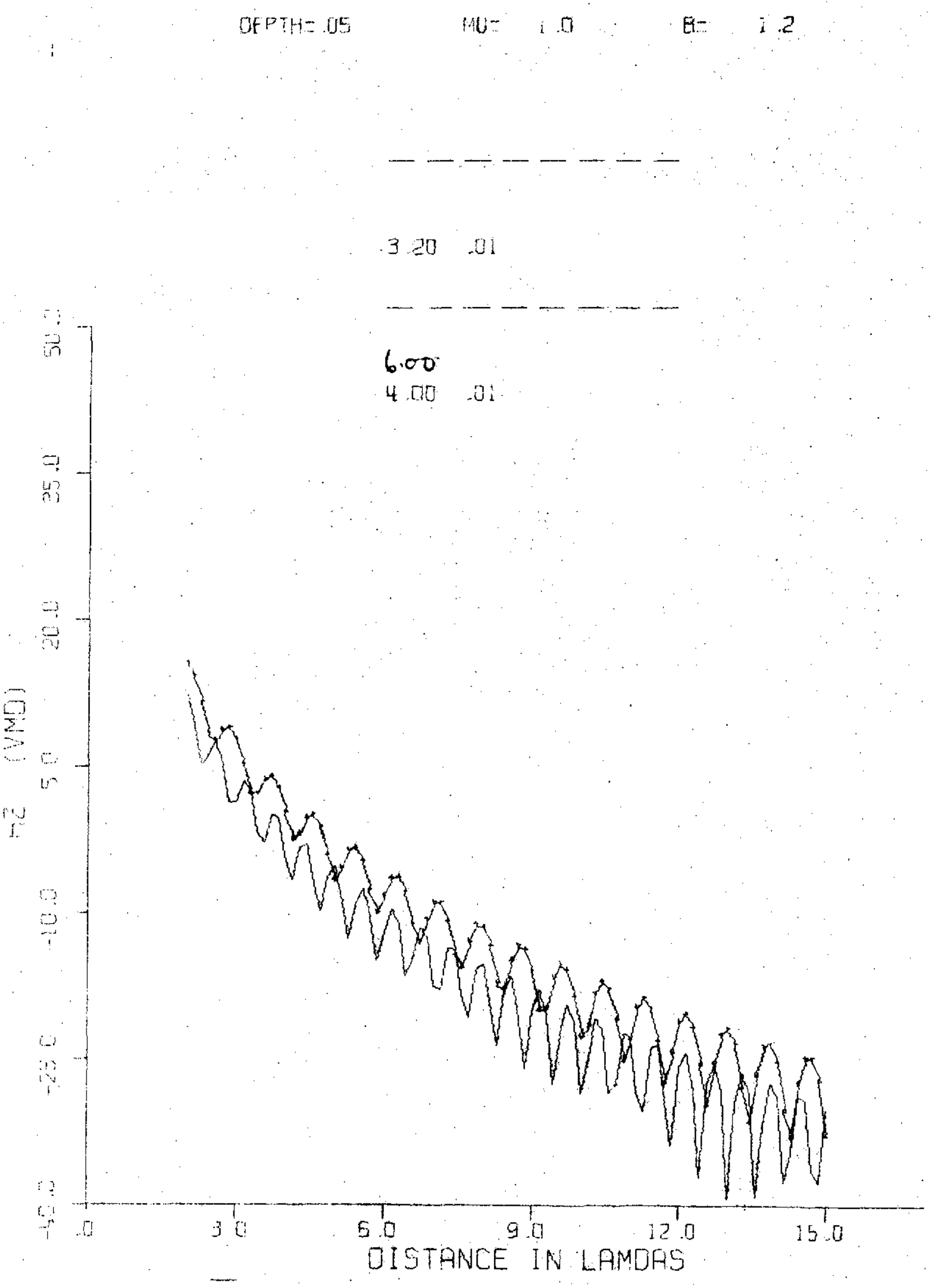


.05
DEPTH=.10 MU= 1.0 R= 1.2



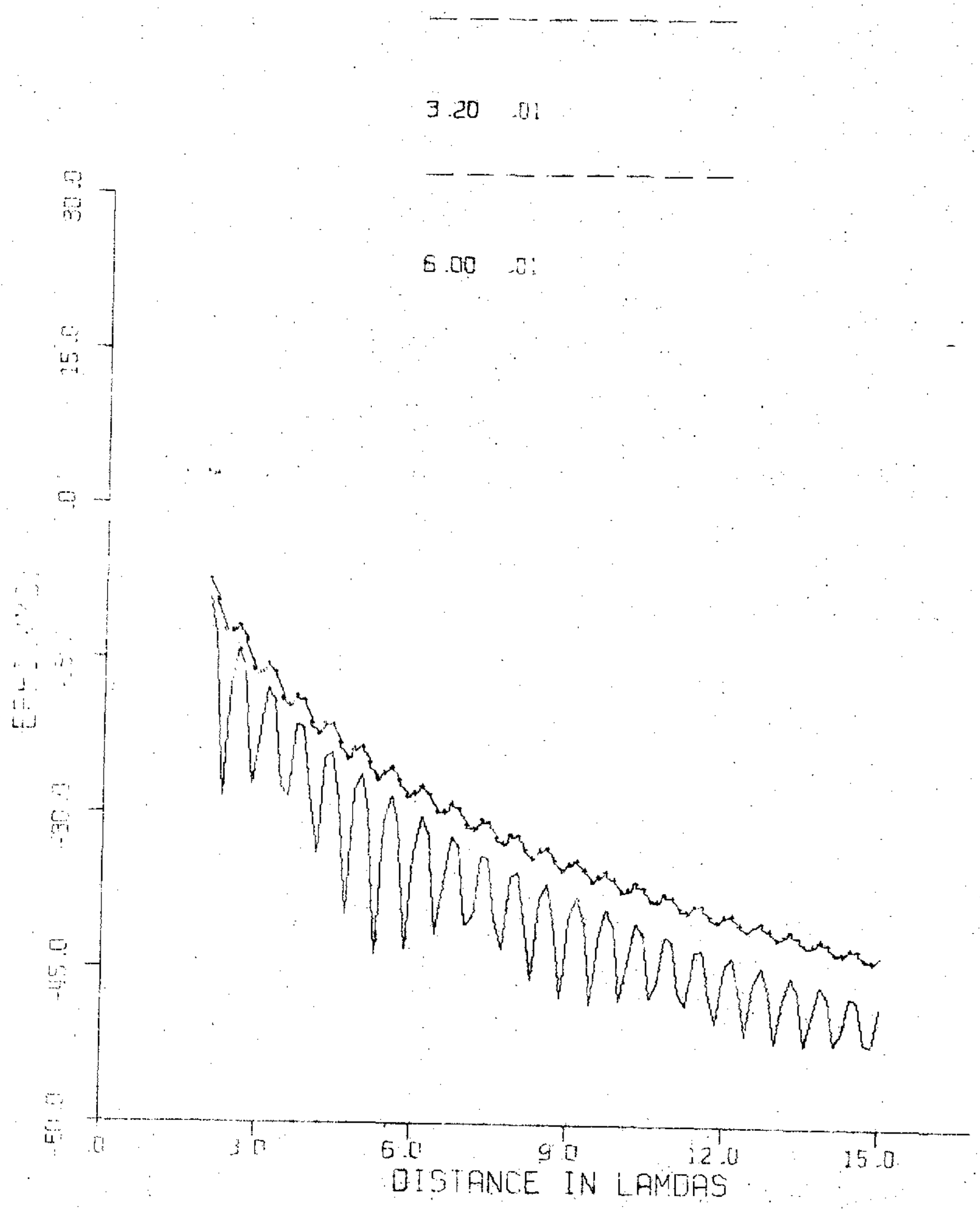

DEPTH=.05
MU= 1.0
B= 1.2
3.20 .01
6.00
4.00 .01
20.0
-10.0
-40.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH= .05
MU= 1.0
B= 1.2
3.20 .01
6.00
4.00 .01
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
B= 1.2
3.20 .01
6.00
4.00 .01
50.0
35.0
20.0
5.0
-10.0
-25.0
-40.0
F2 (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

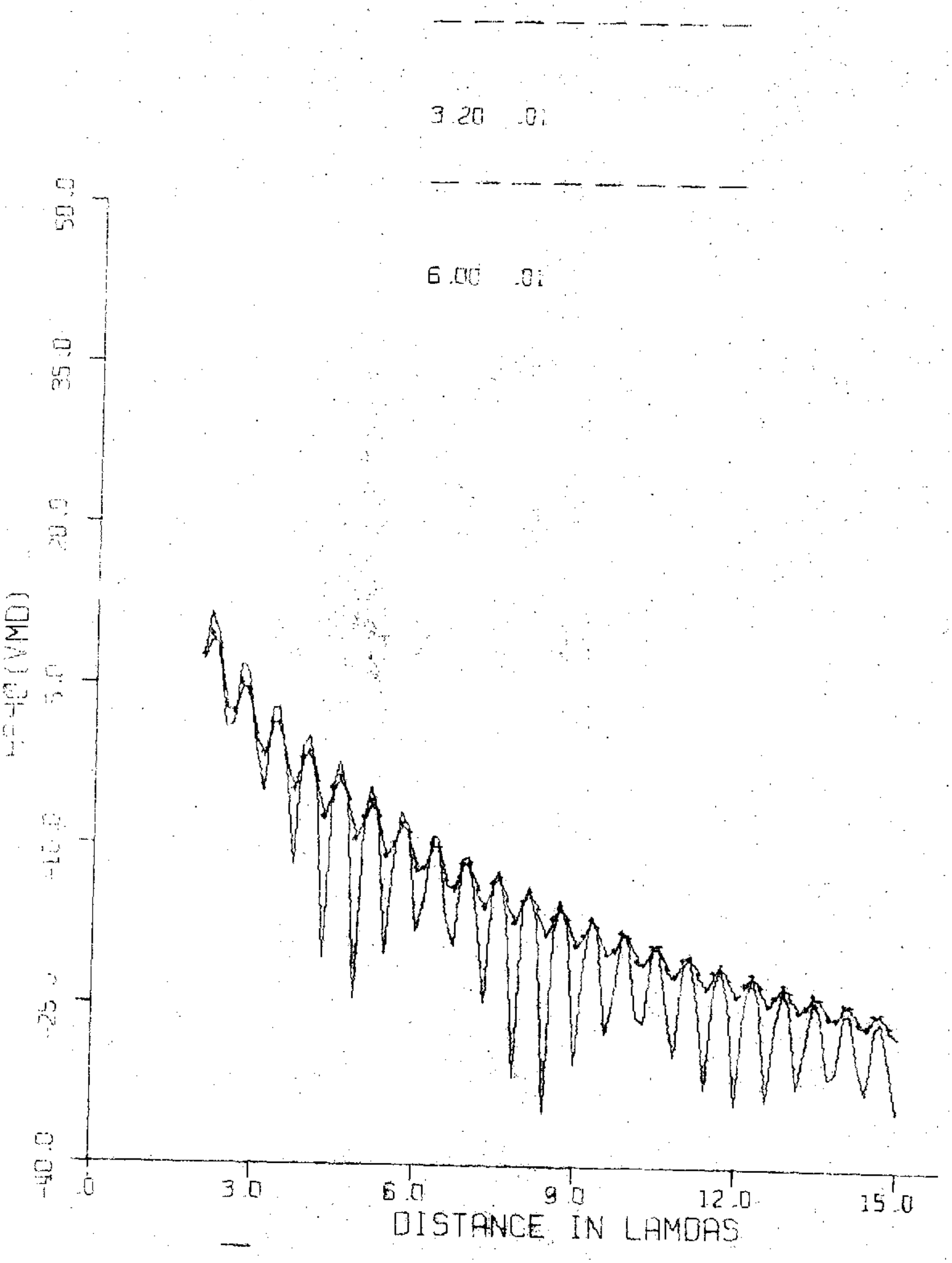
.05

DEPTH=.10 MU= 1.2 R= 1.0



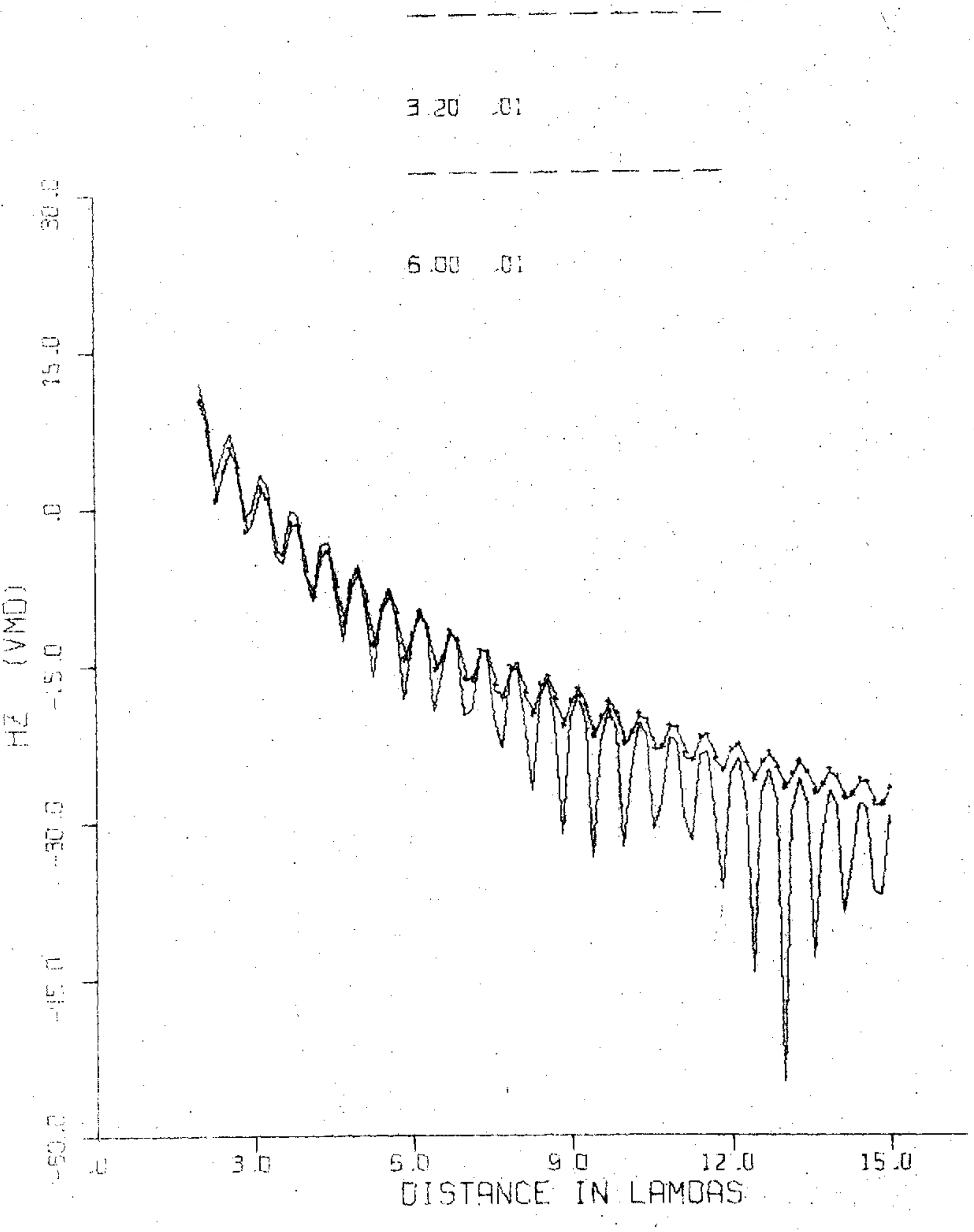
.05

DEPTH=.10 MU= 1.2 B= 1.0

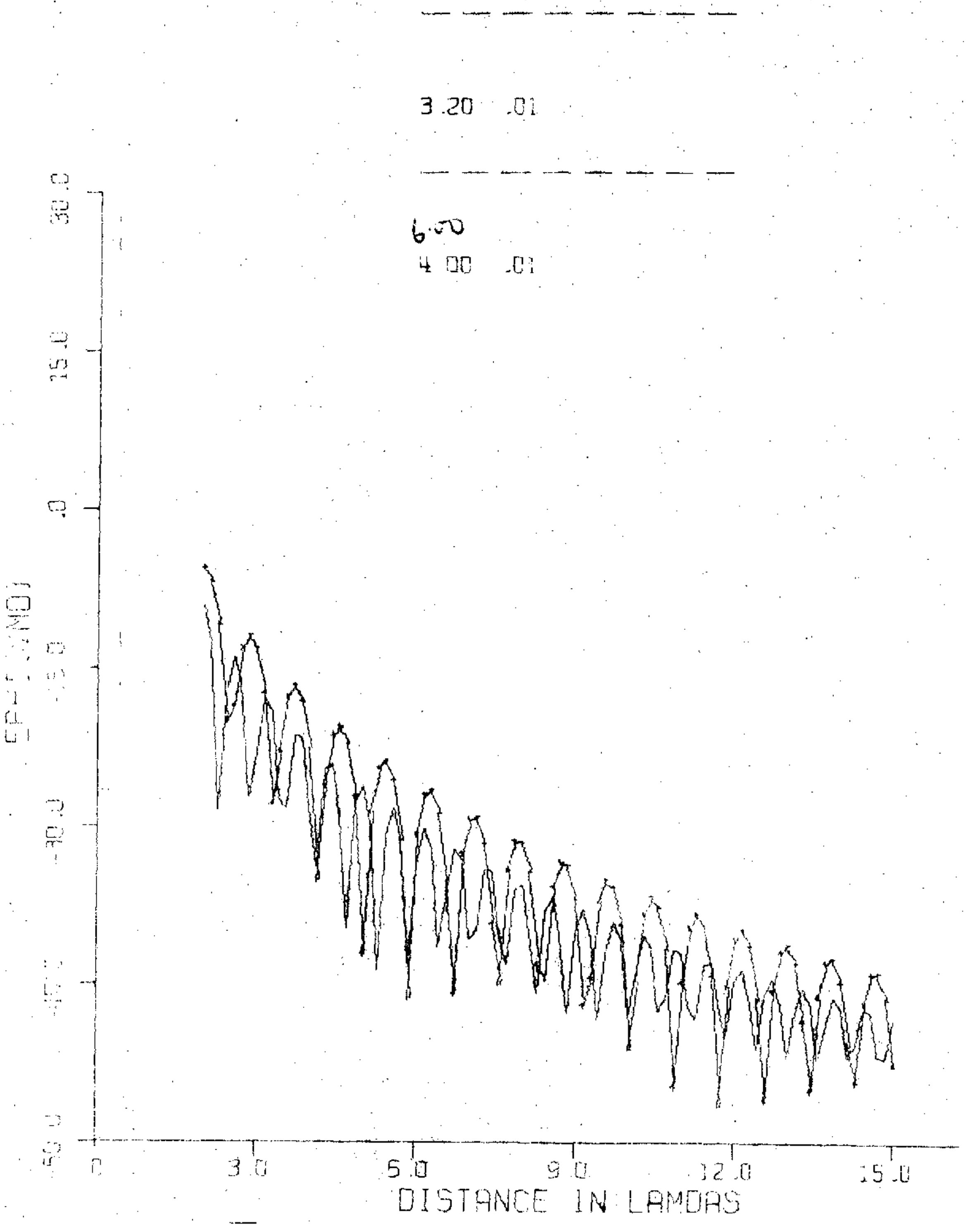


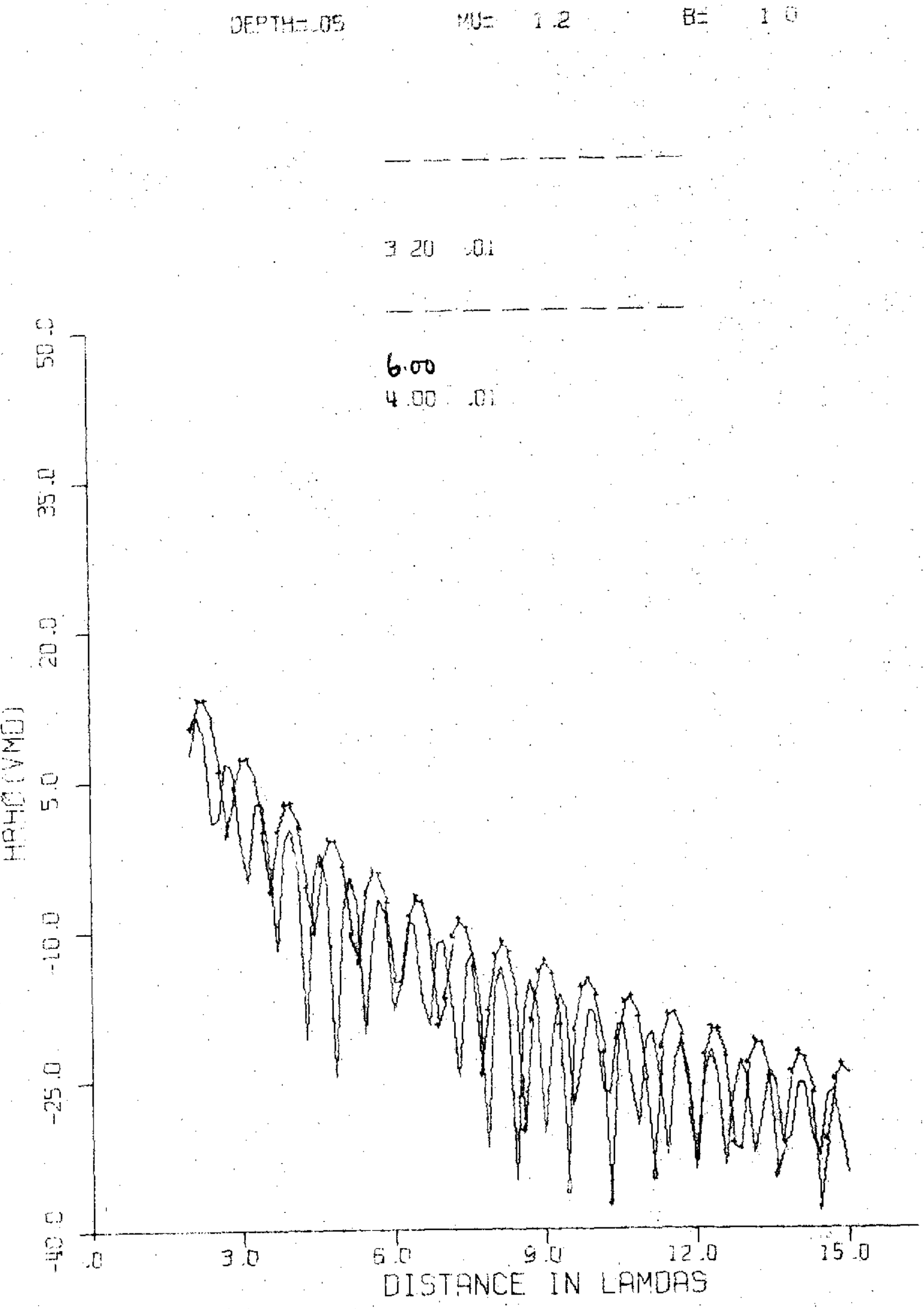
.05

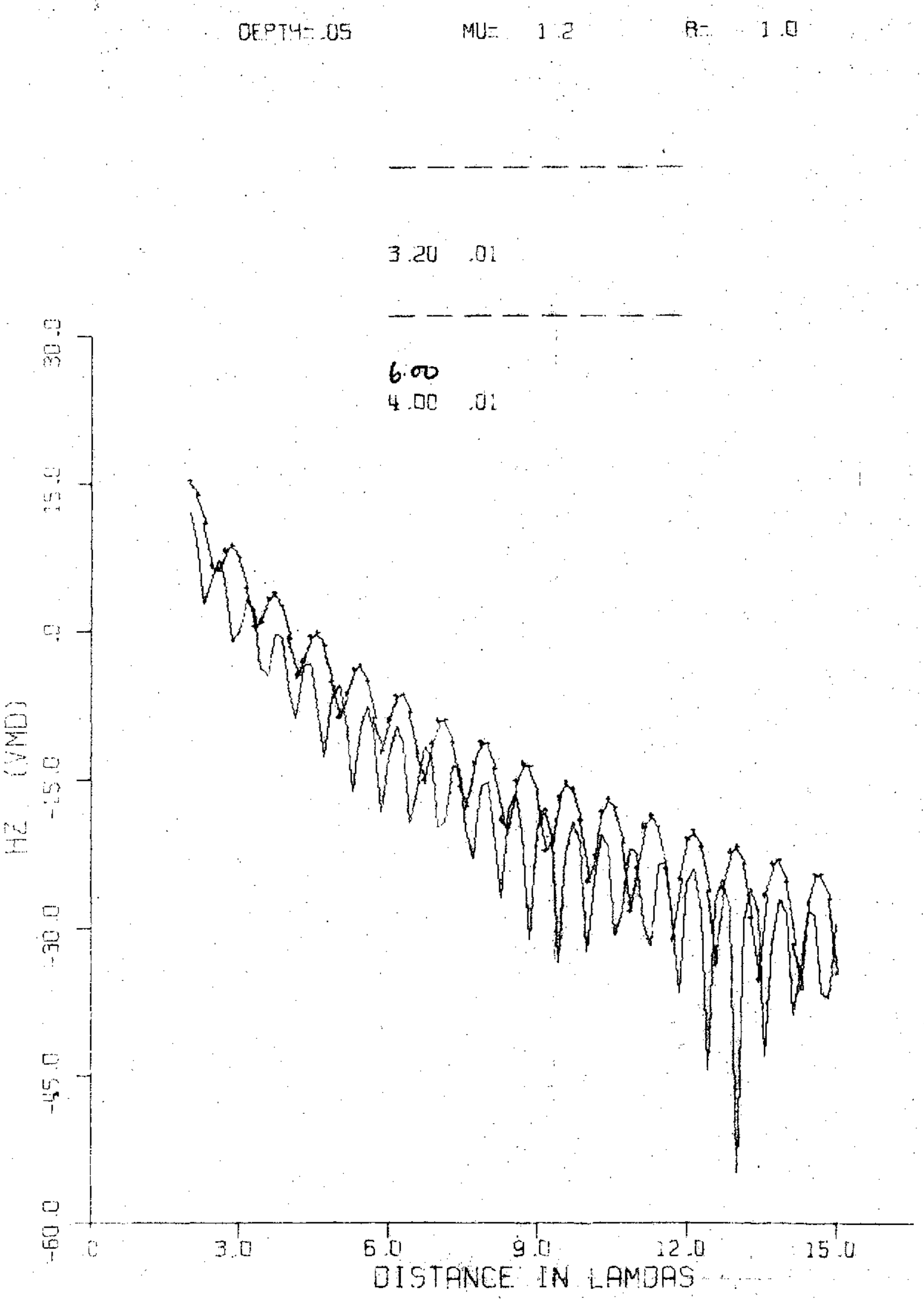
DEPTH=.10 MU= 1.2 B= 1.0

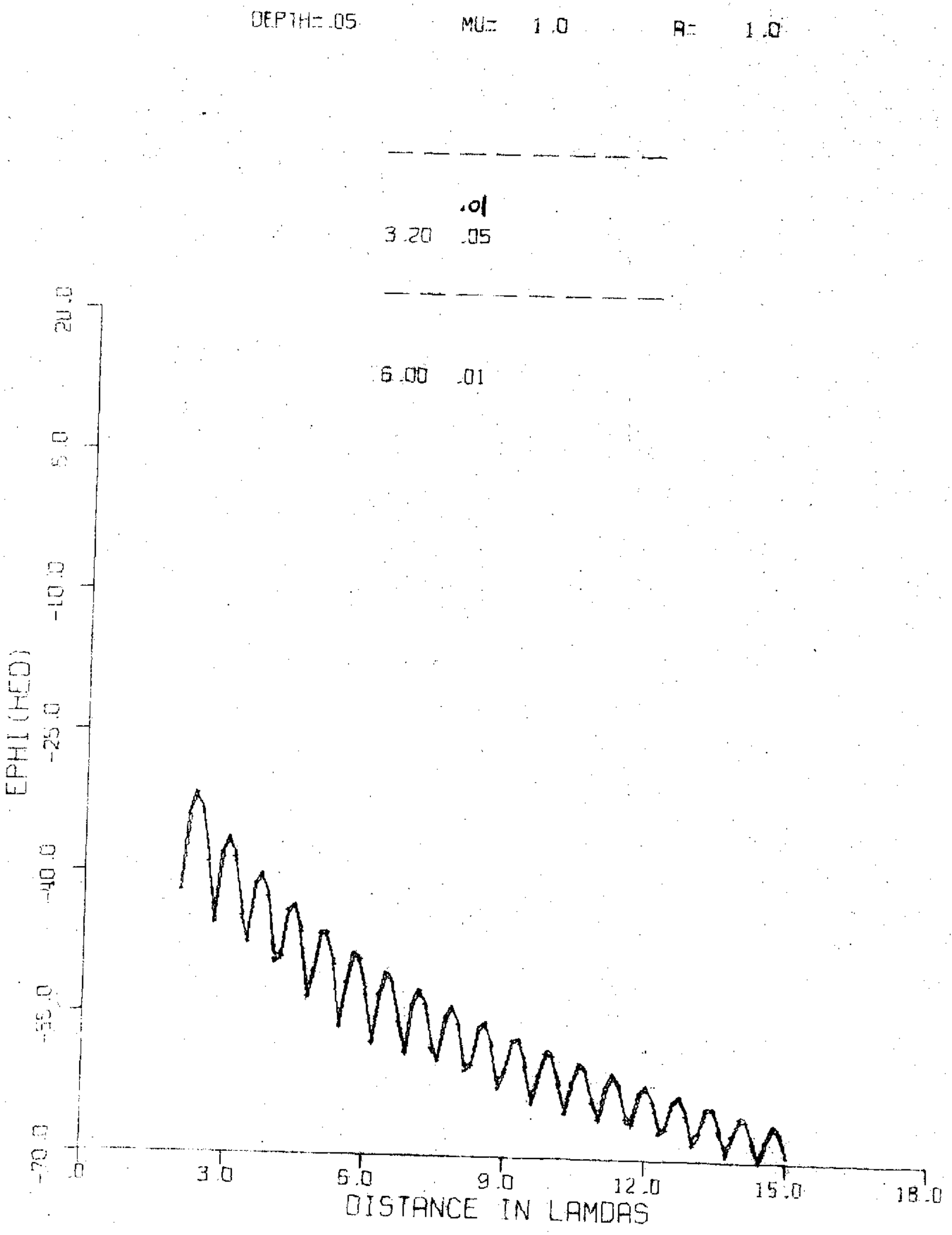


DEPTH=.05 MU= 1.2 R= 1.0




DEPTH=.05
MU= 1.2
B= 1.0
3.20 .01
6.00
4.00 .01
50.0
35.0
20.0
5.0
-10.0
-25.0
-40.0
HAHO(VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

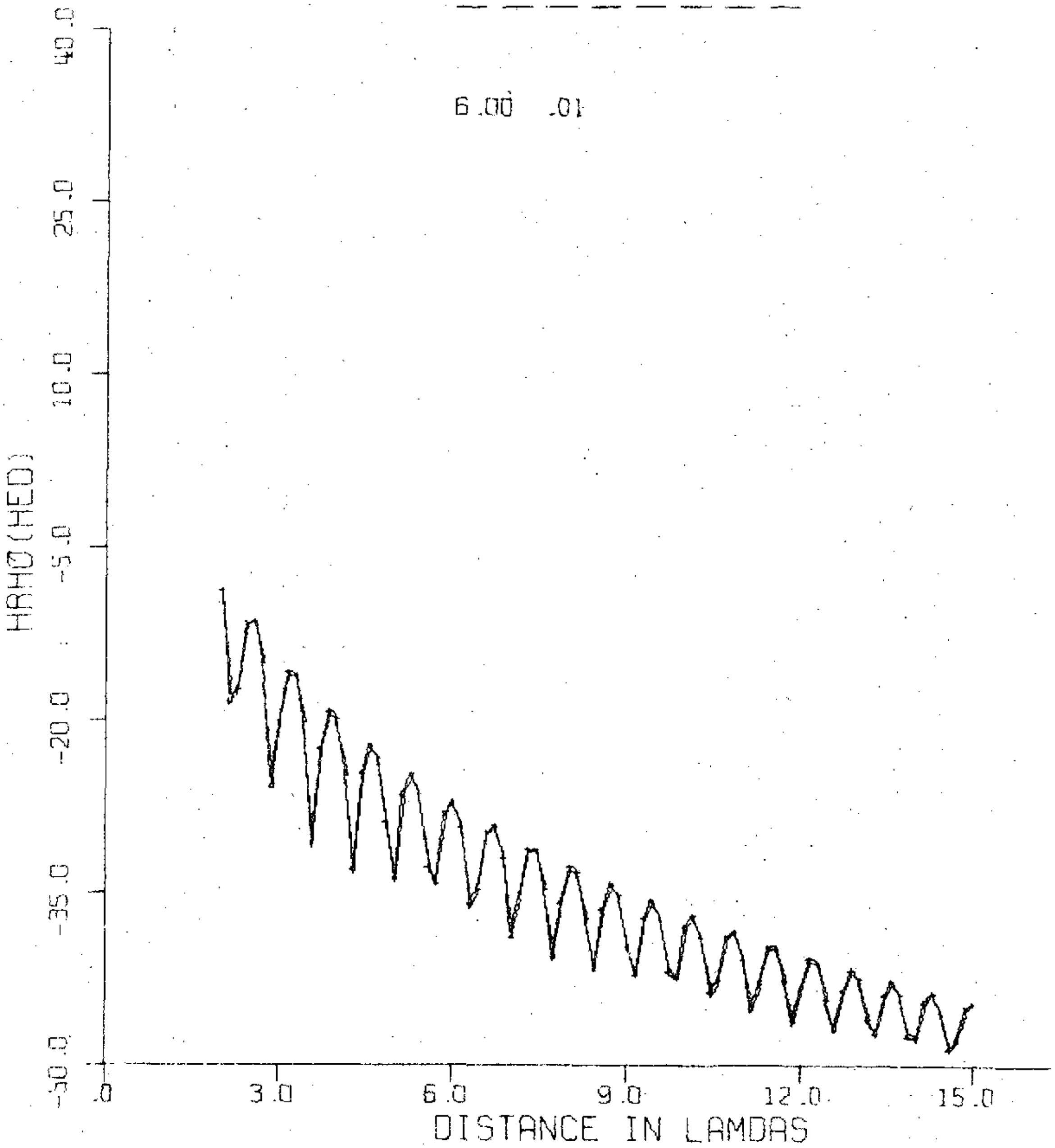

DEPTH=.05
MU= 1.2
R= 1.0
3.20 .01
6.00
4.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
HZ (VMD)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

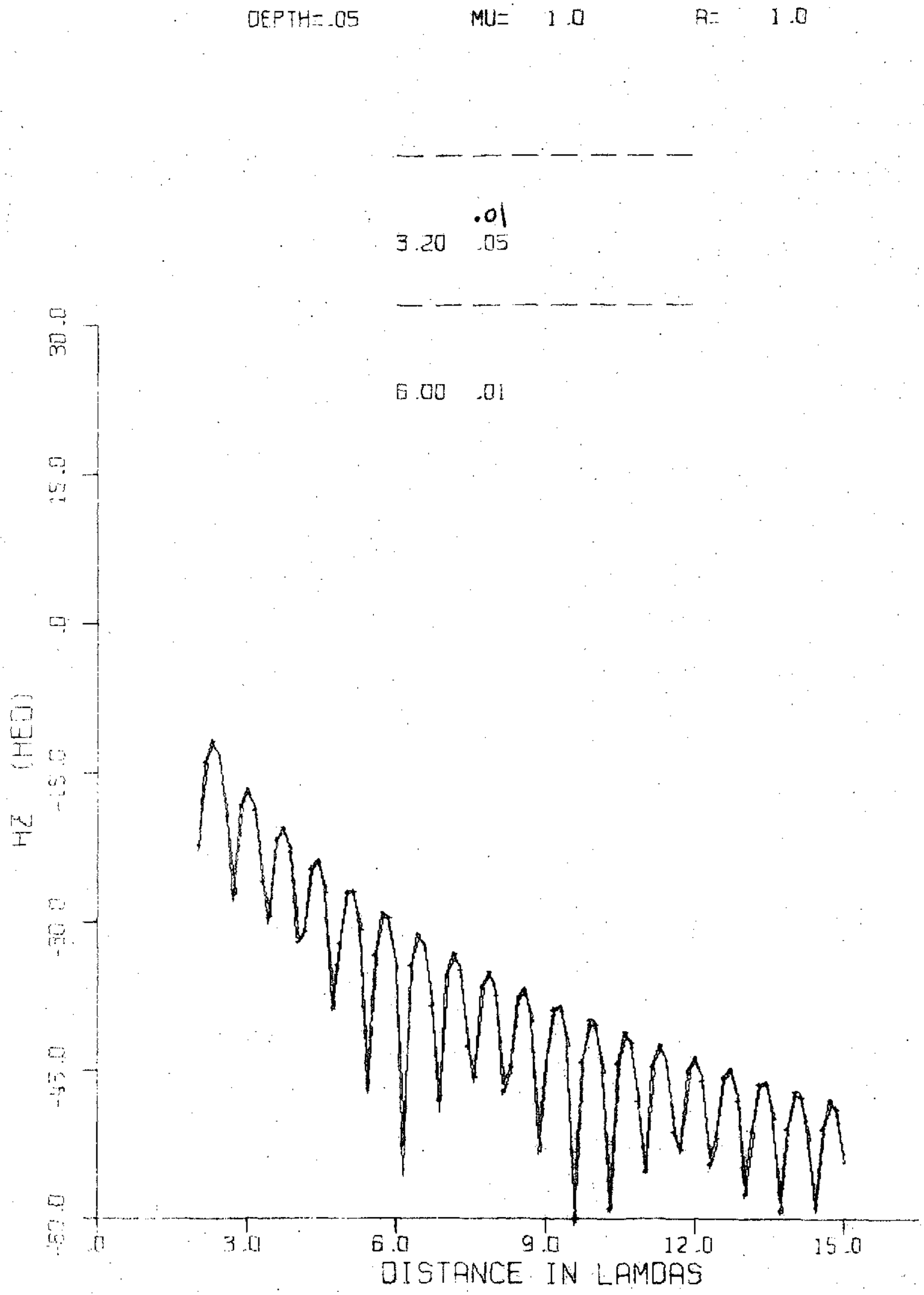

DEPTH=.05
MU= 1.0
A= 1.0
.01
3.20 .05
6.00 .01
EPHI(HED)
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
18.0
DISTANCE IN LAMDAS

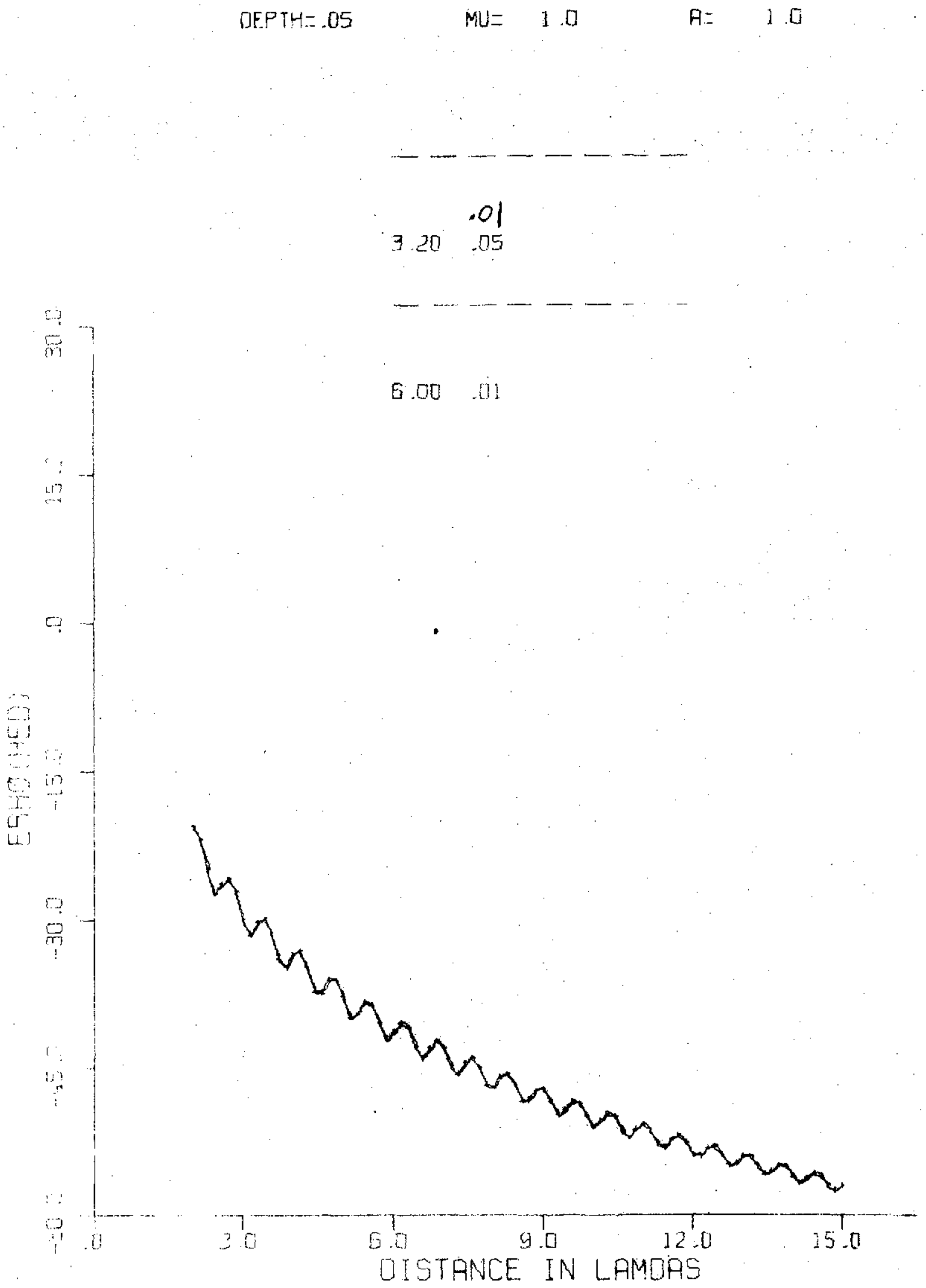
DEPTH= .05 MU= 1.0 A= 1.0

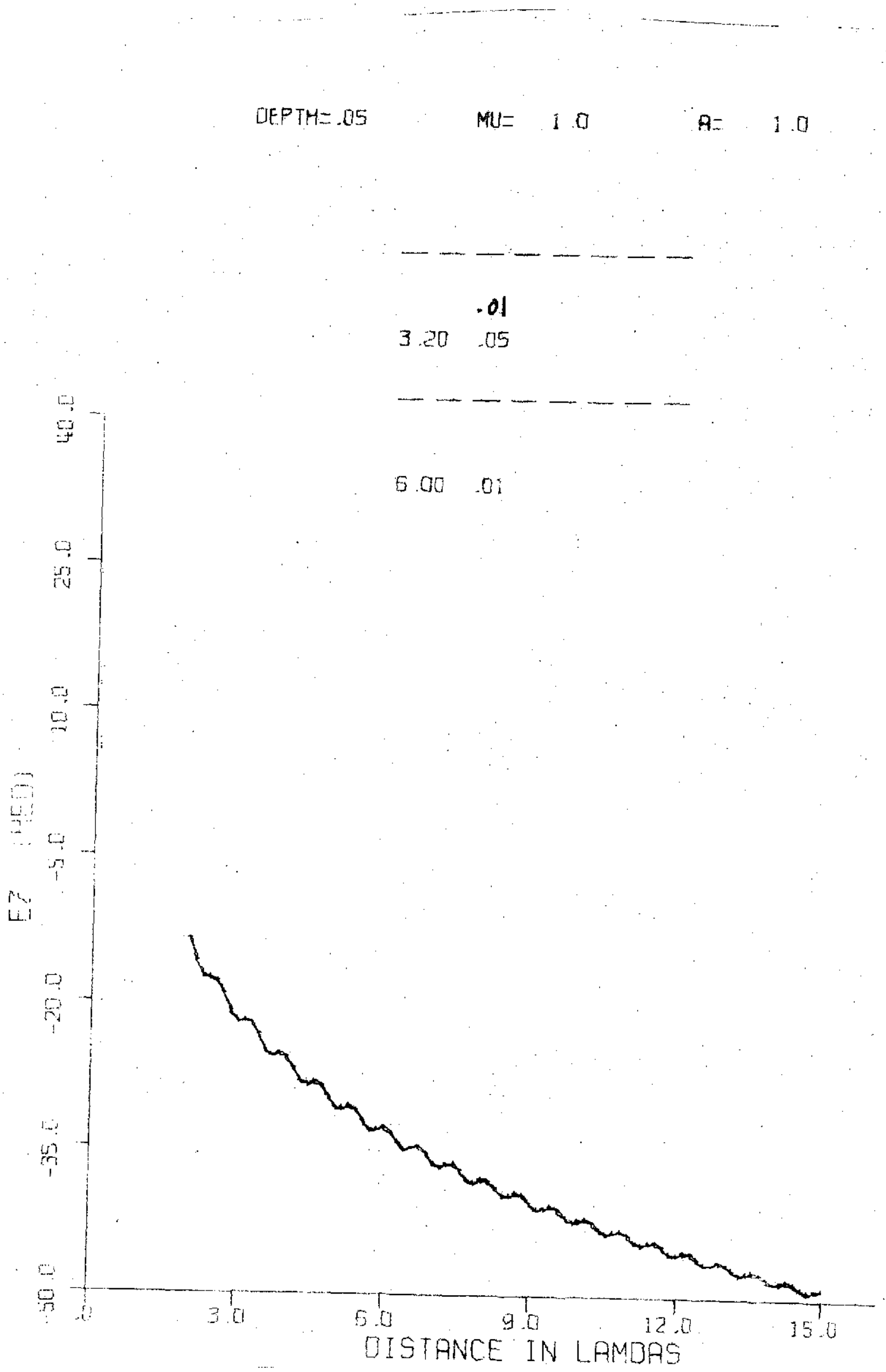
.01
3.20 .05

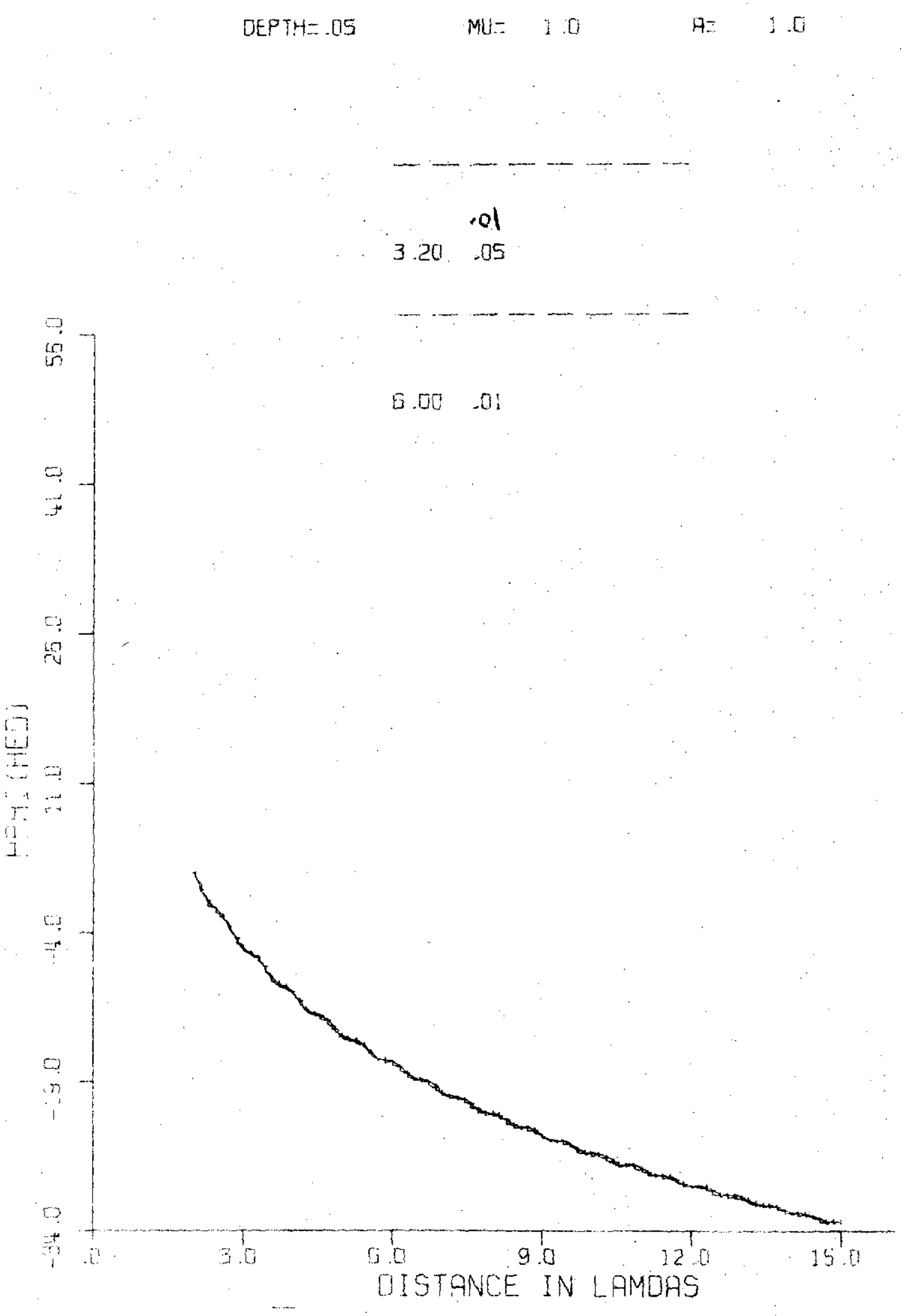
6.00 .01

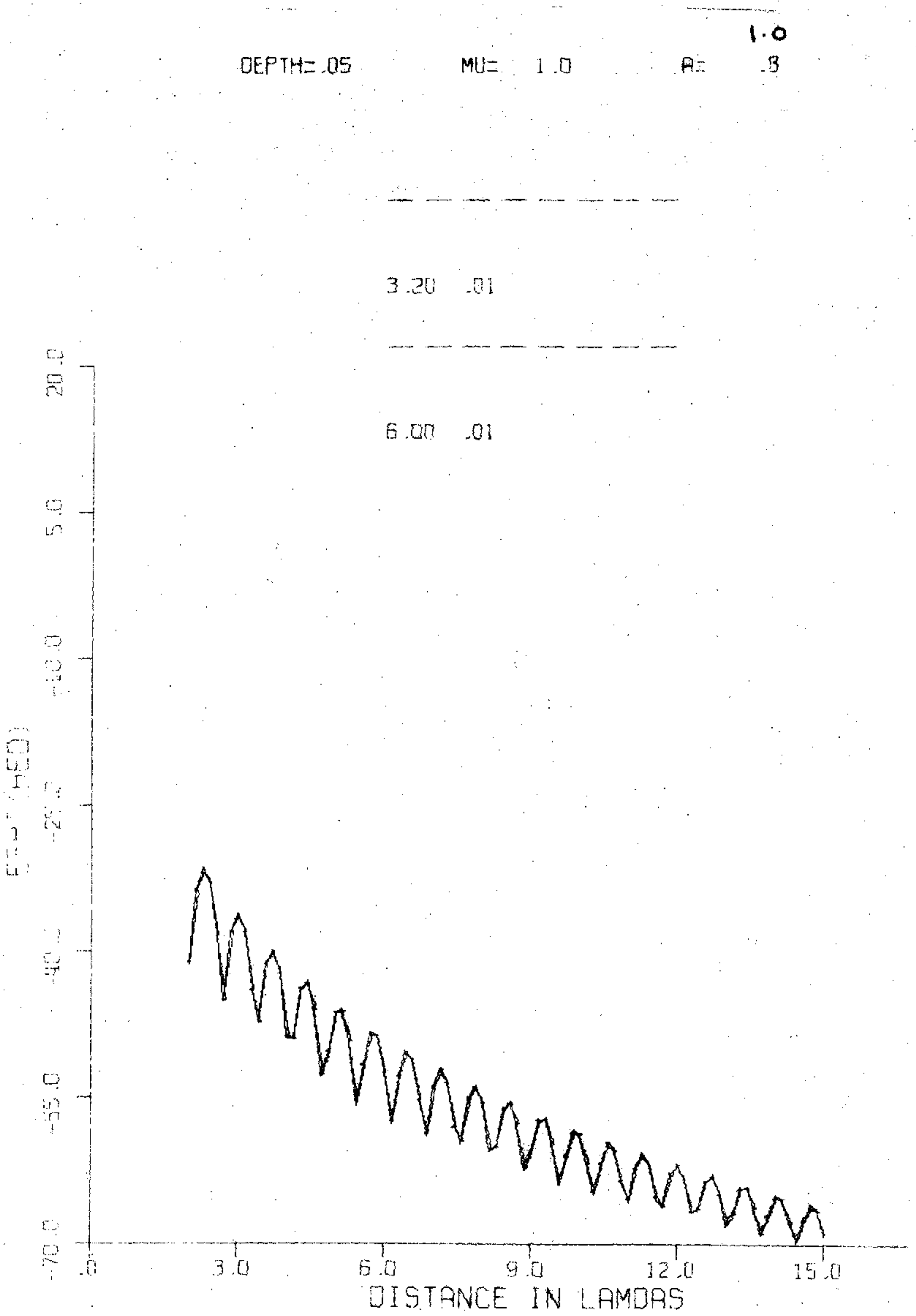


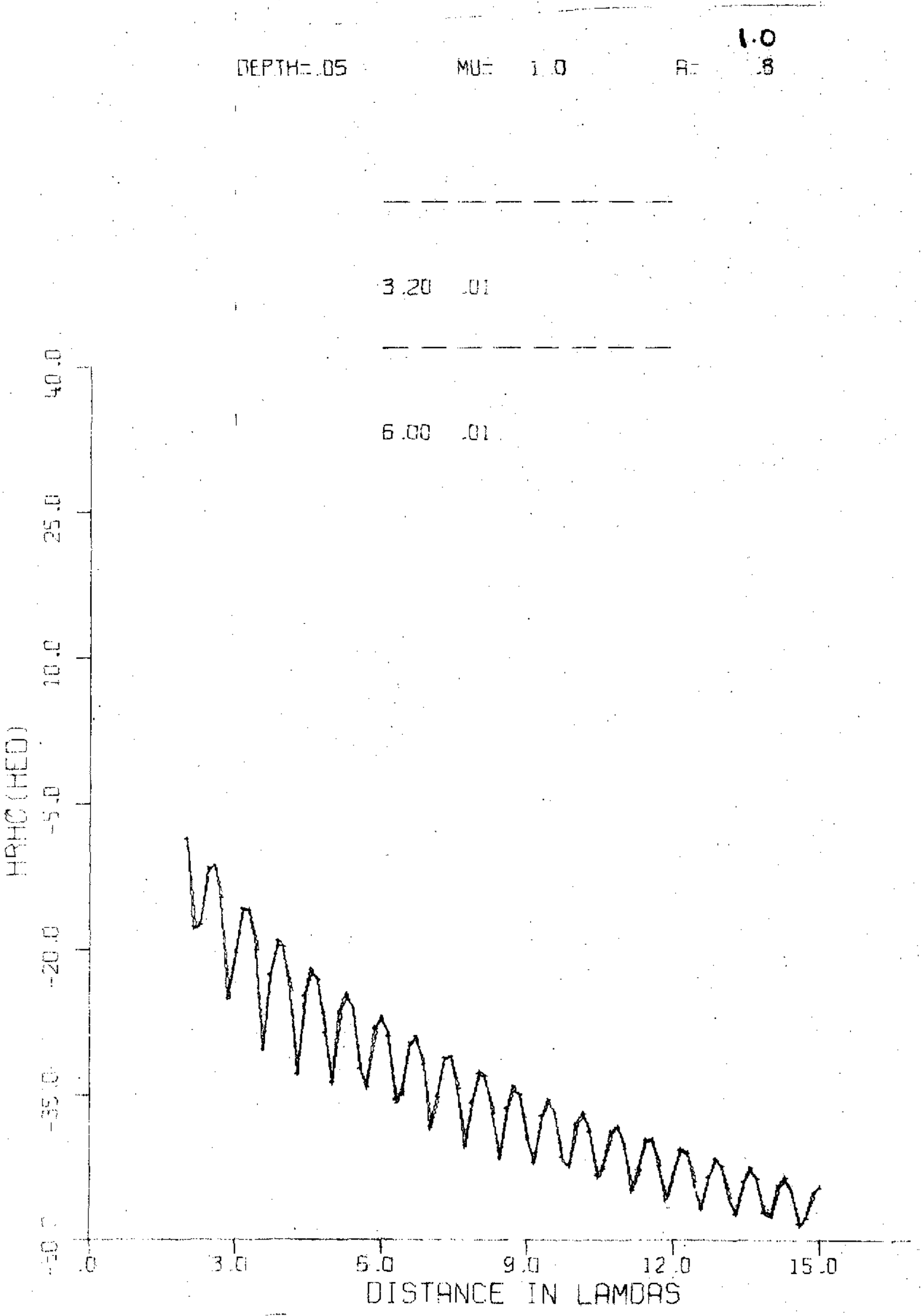

DEPTH=.05
MU= 1.0
R= 1.0
.01
3.20 .05
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
HZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A: 1.0
.01
3.20 .05
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
ESHO(AHED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= 1.0
.01
3.20 .05
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
EZ (DB)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

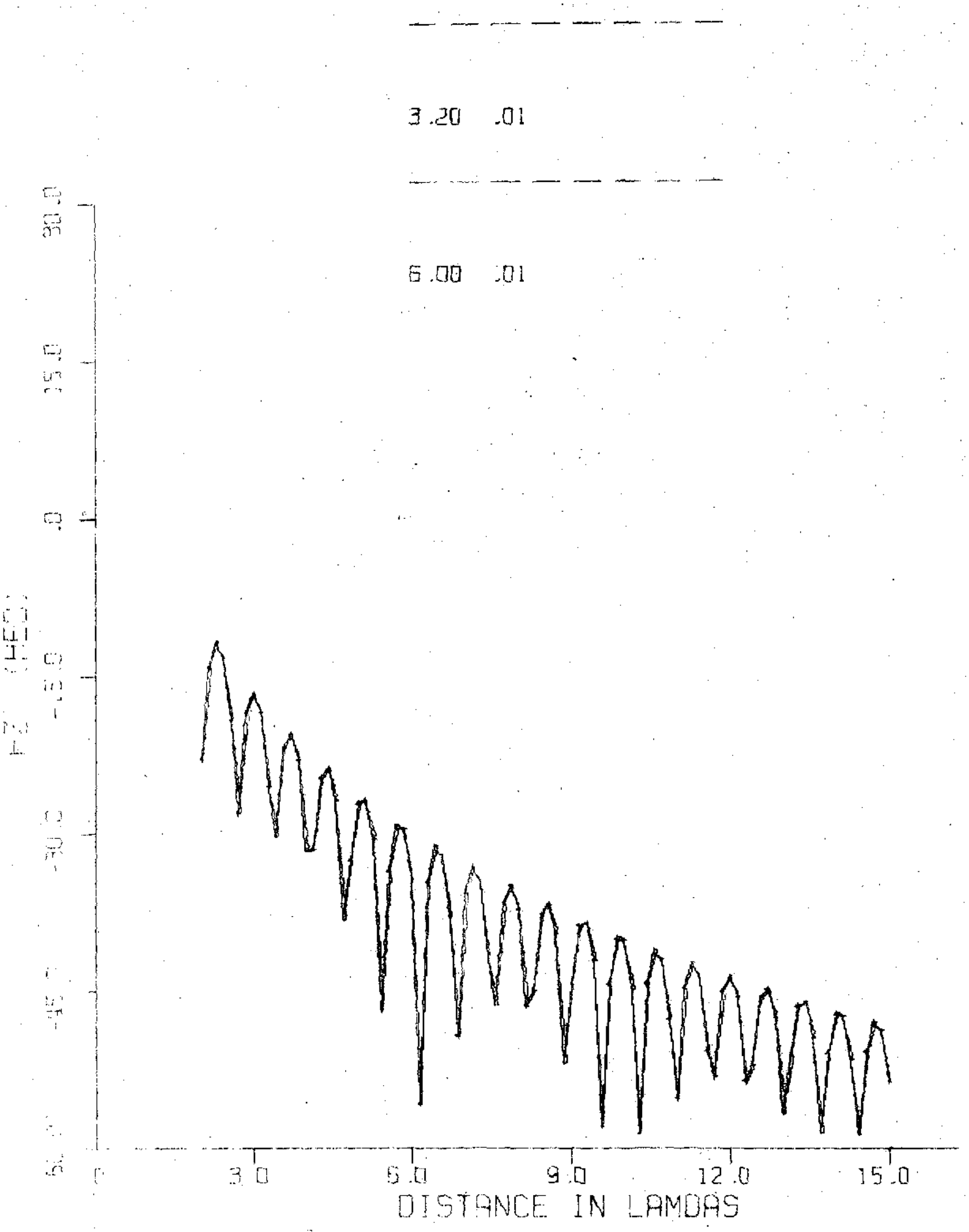

DEPTH=.05
MU= 1.0
A= 1.0
.01
3.20 .05
6.00 .01
HPHI(HED)
55.0
41.0
26.0
11.0
-4.0
-19.0
-34.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

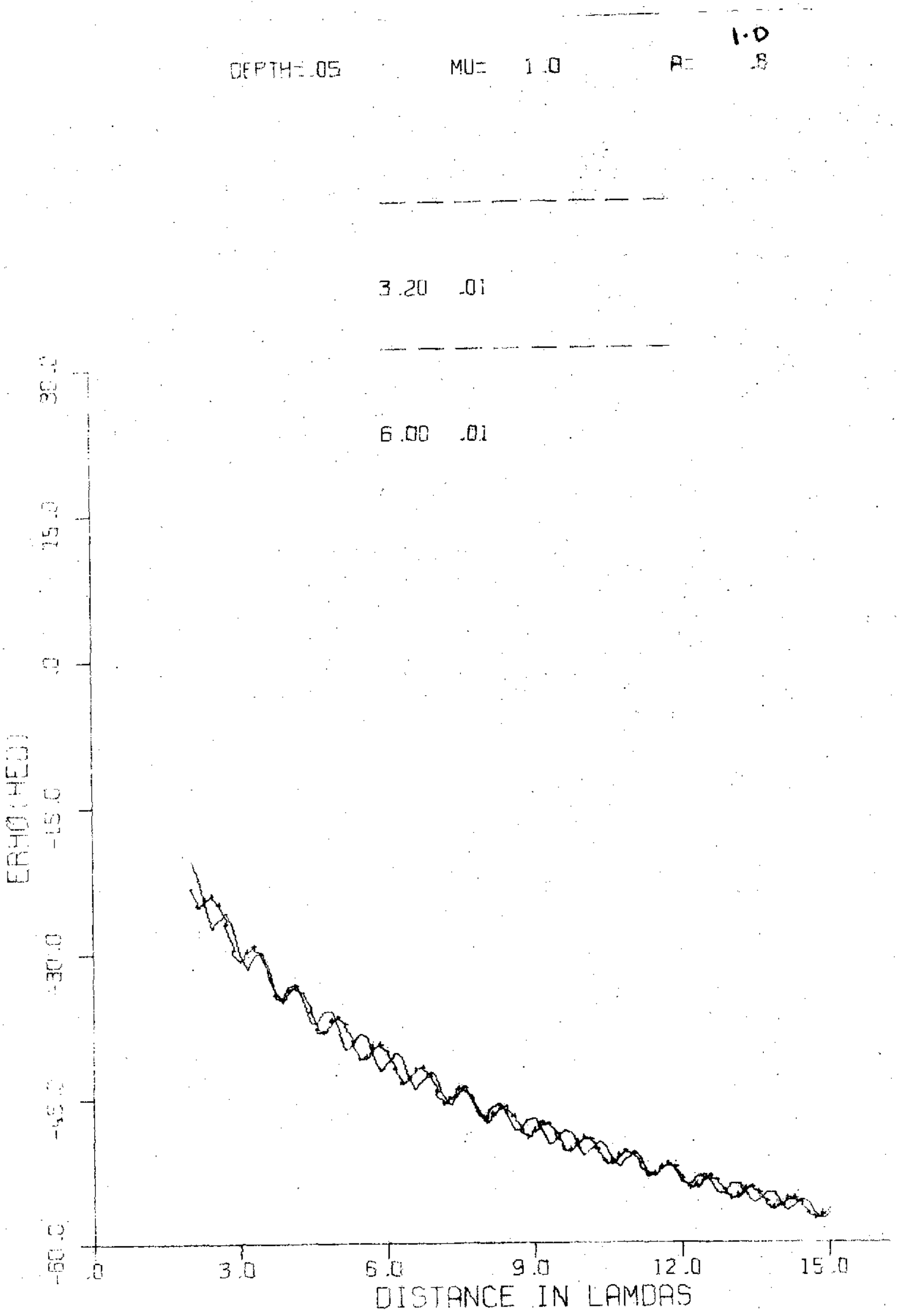

1.0
DEPTH=.05
MU= 1.0
A= .8
3.20 .01
6.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= .8
1.0
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HRHC(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

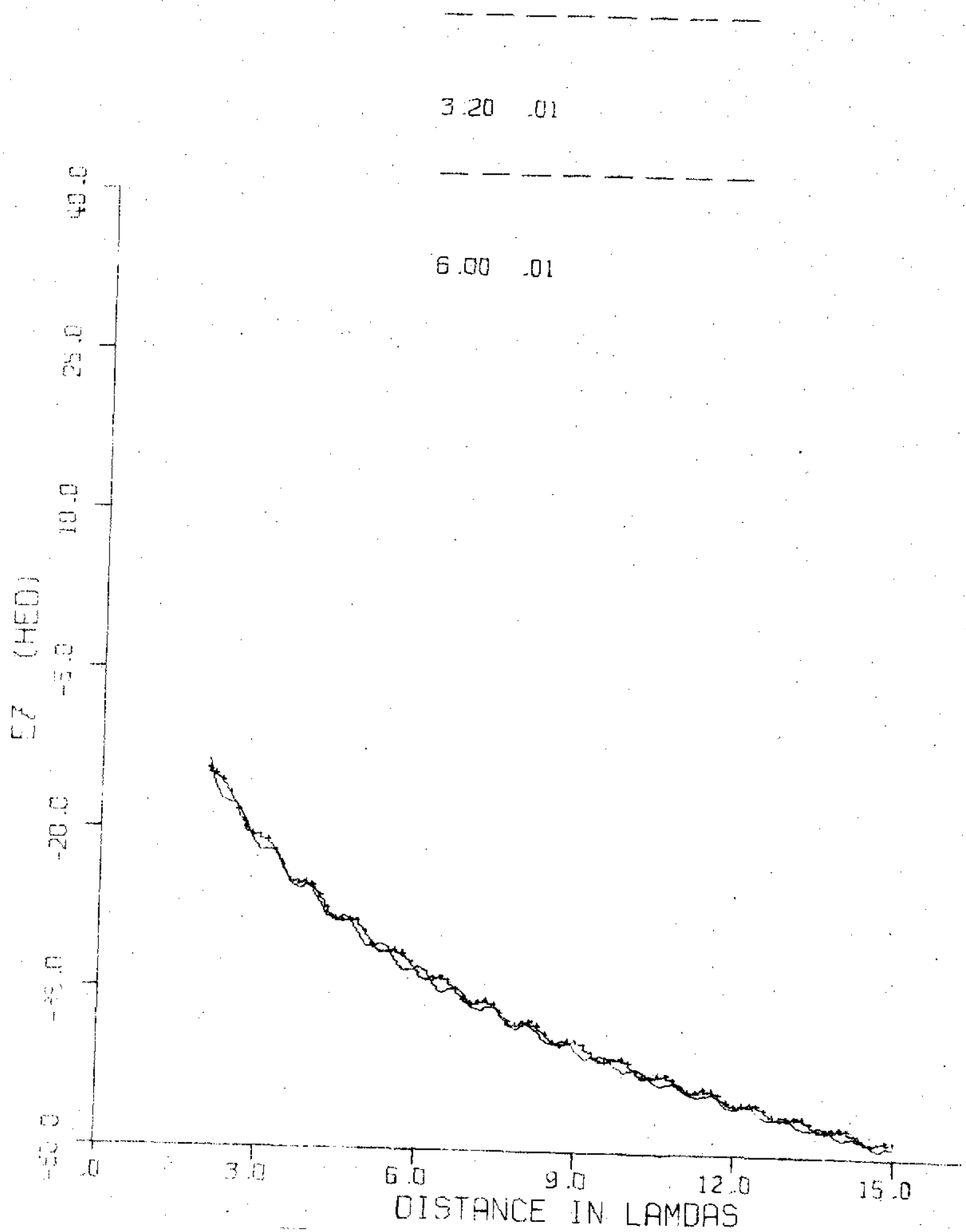
1.0

DEPTH=.05 MU= 1.0 A= .8



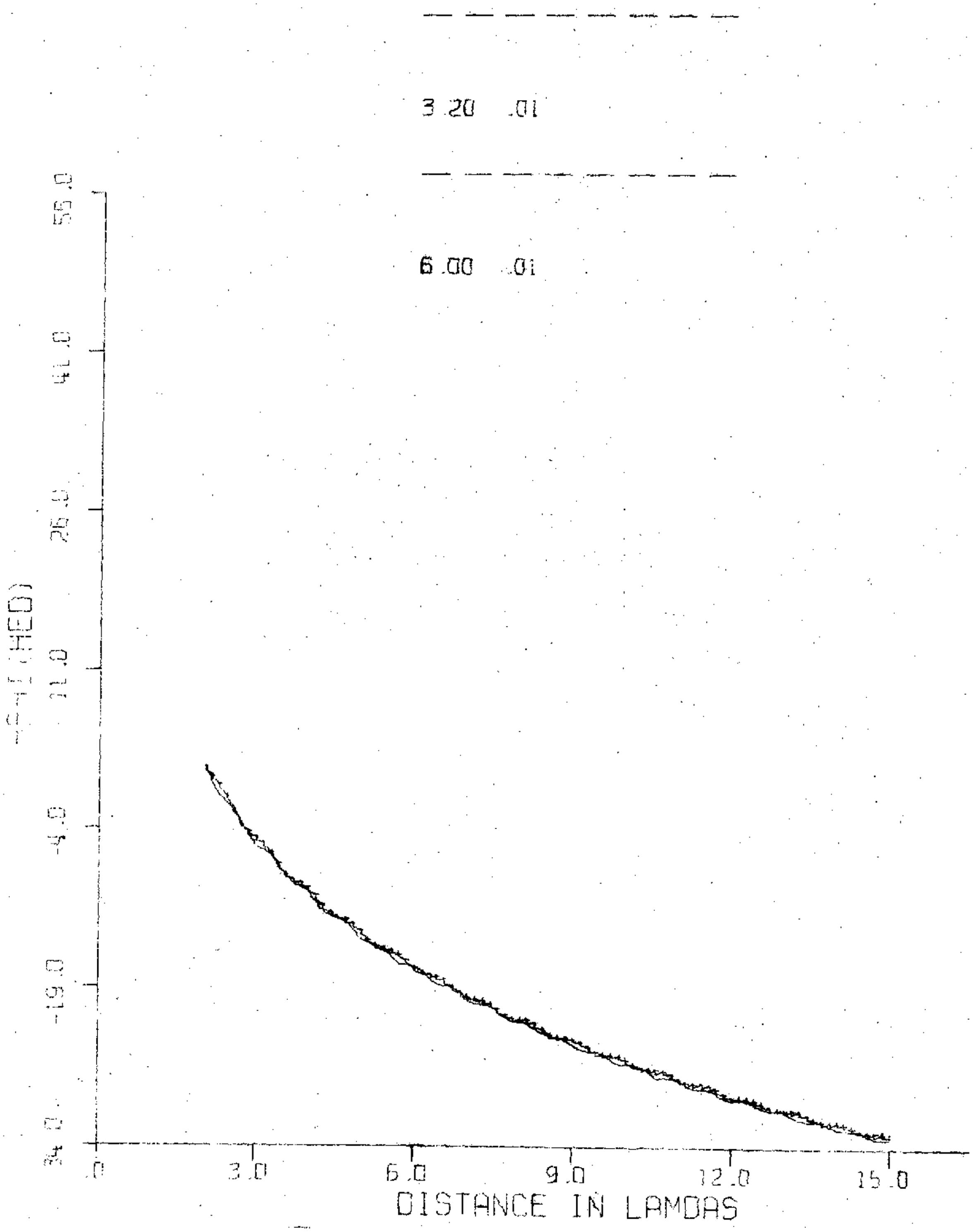

1.0
DEPTH=.05
MU= 1.0
R= .8
3.20 .01
6.00 .01
30.0
15.0
0
-15.0
-30.0
-45.0
-60.0
ERHO(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

DEPTH= .05 MU= 1.0 A= ~~.8~~ 1.0



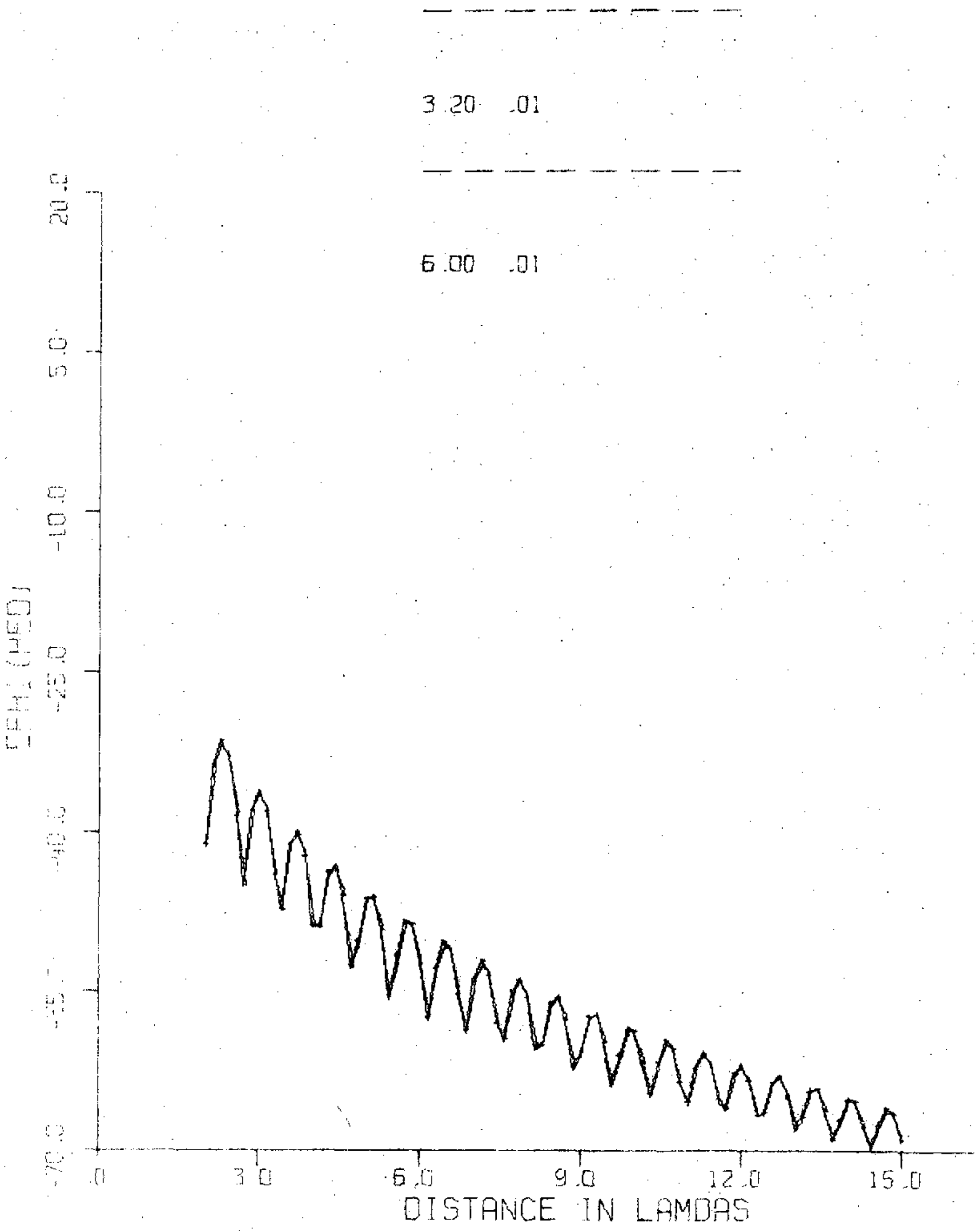
1·0

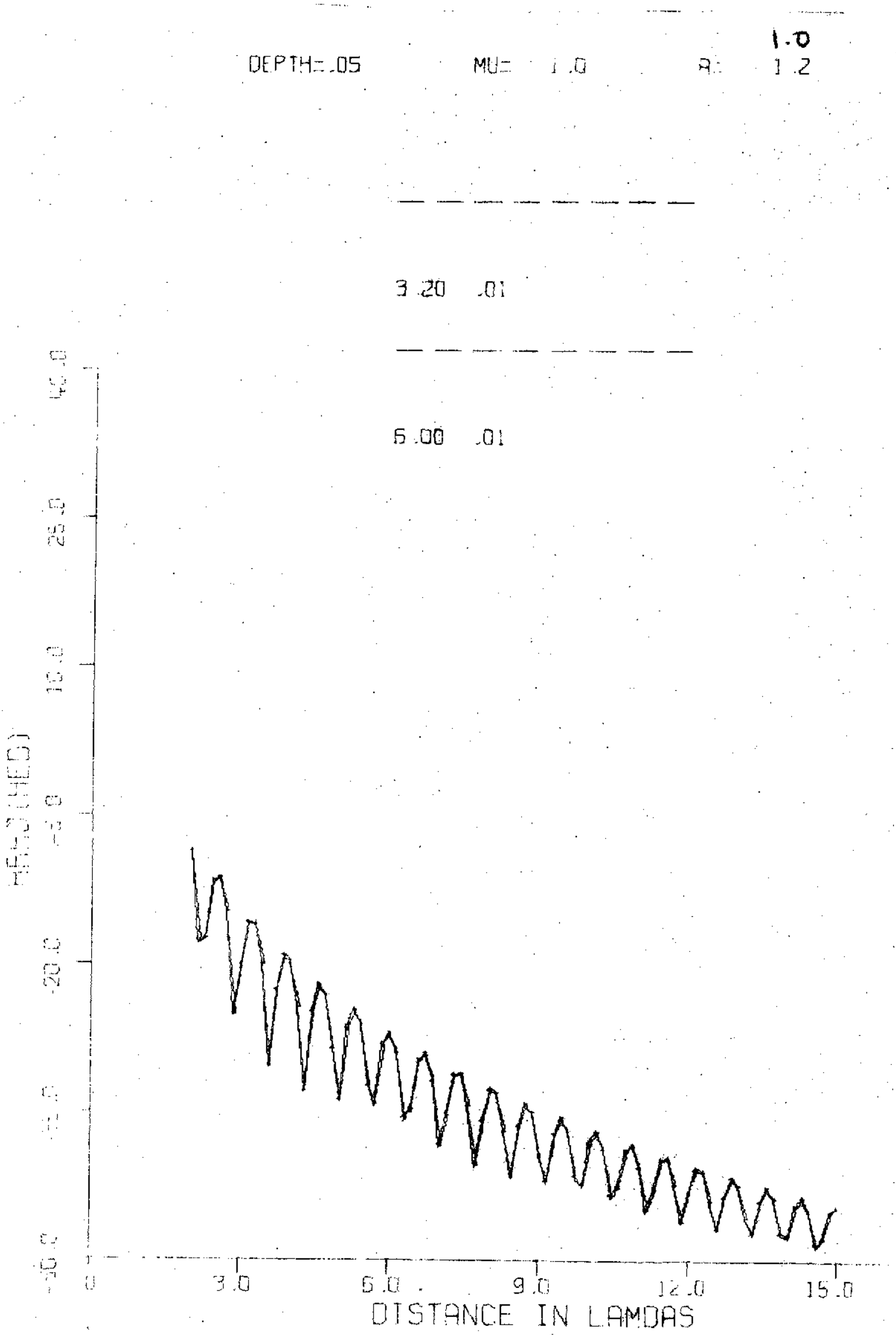
DEPTH=.05 MU= 1.0 R= .8

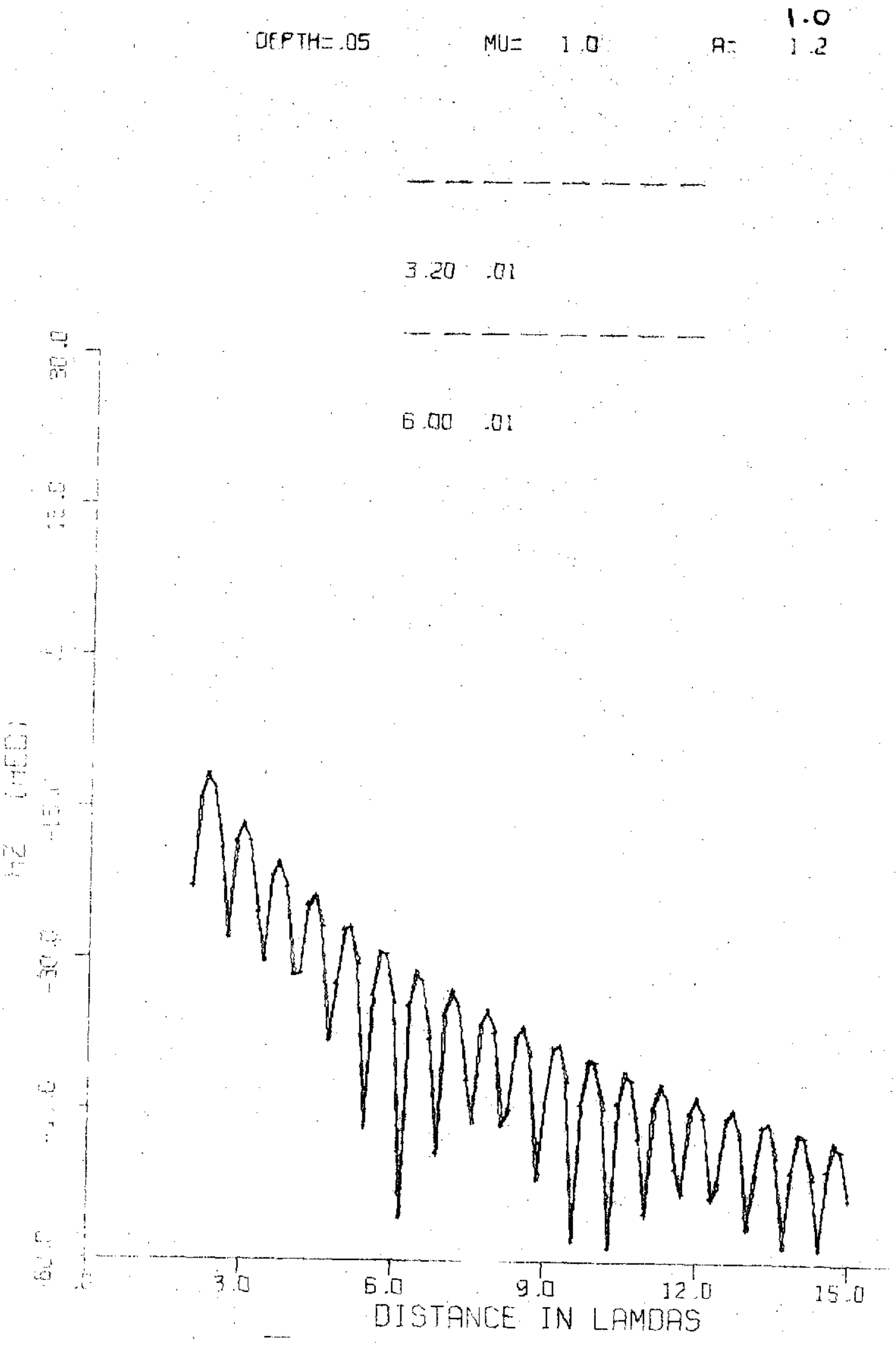


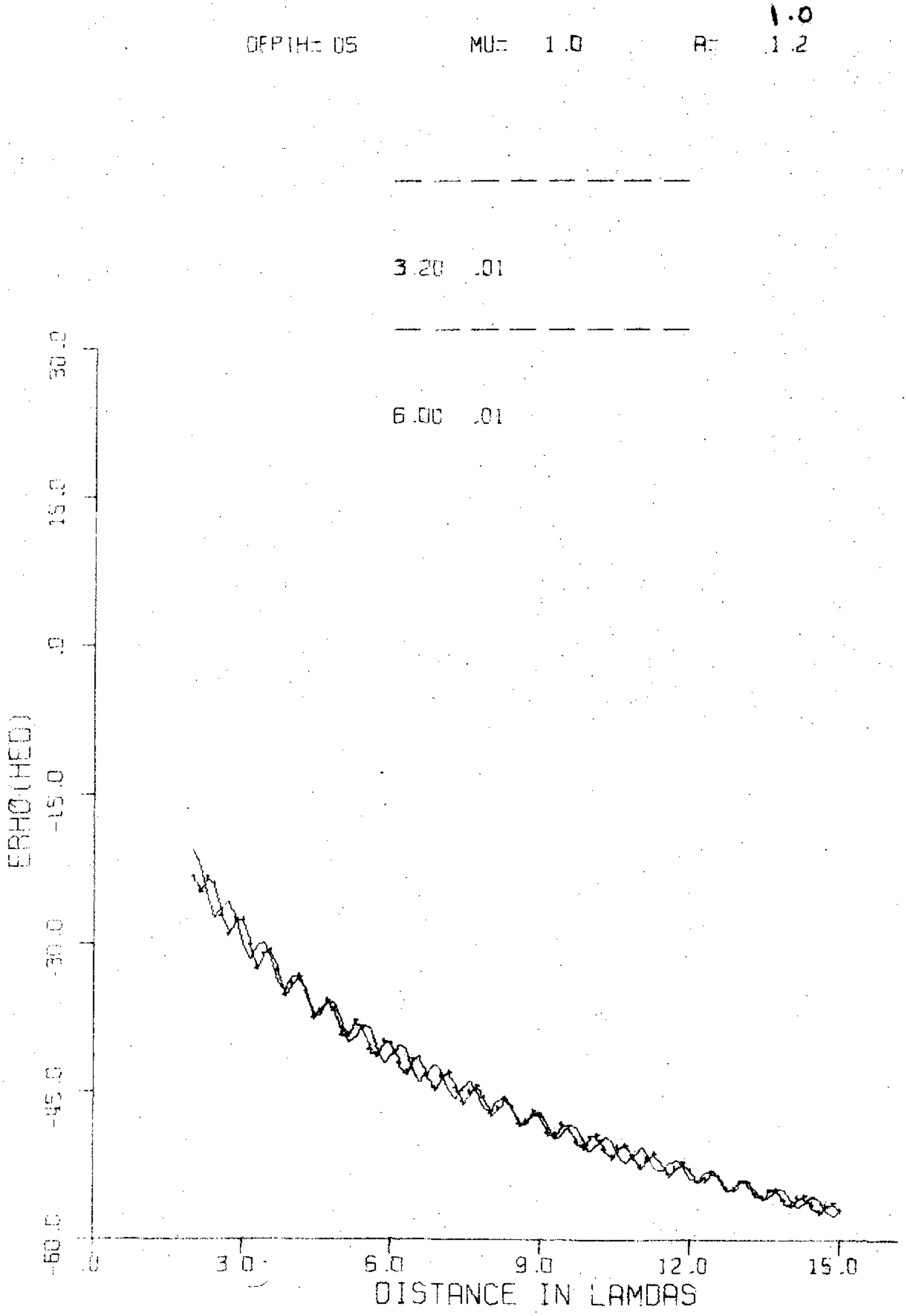
1.0

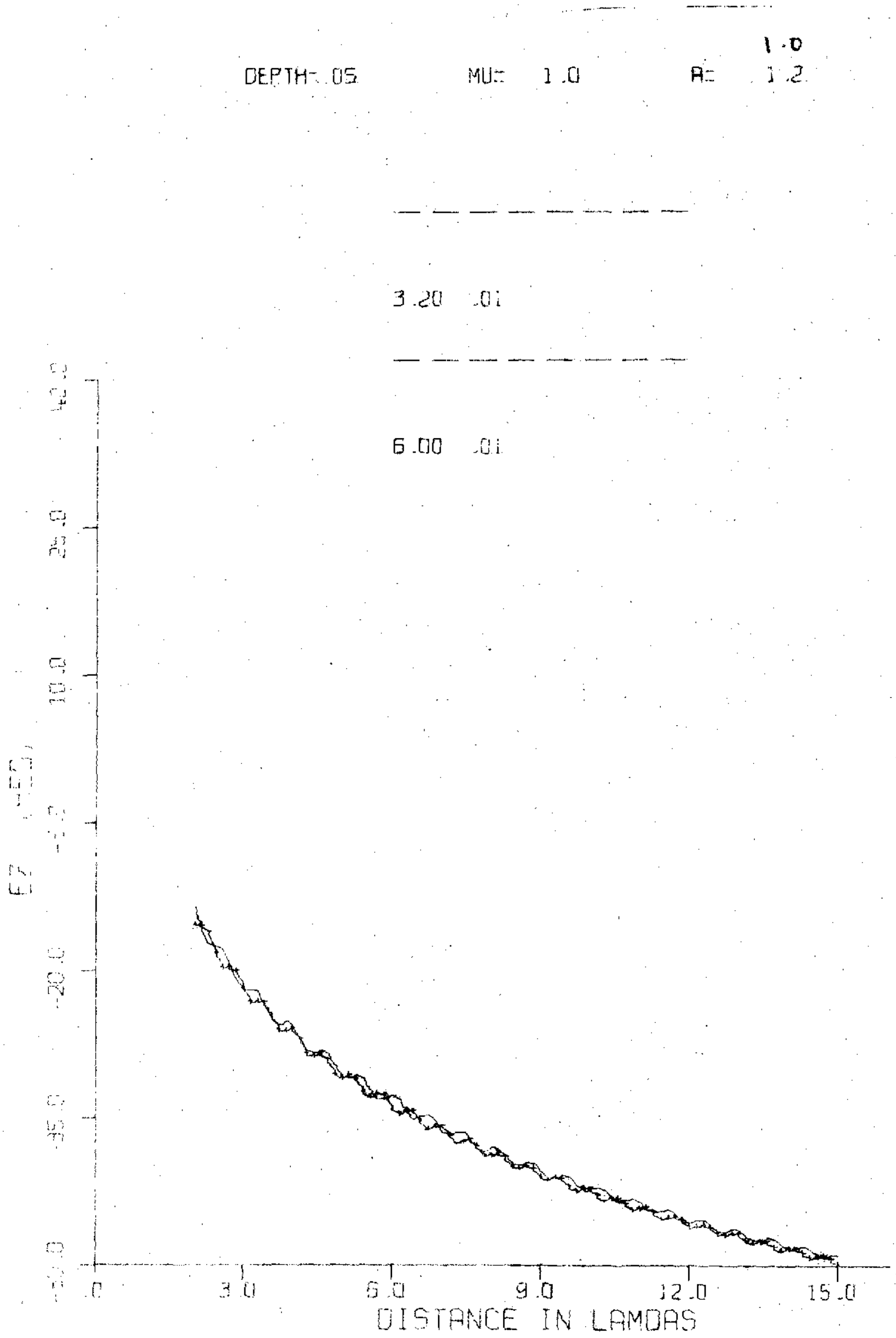
DEPTH=.05 MU= 1.0 R= 1.2

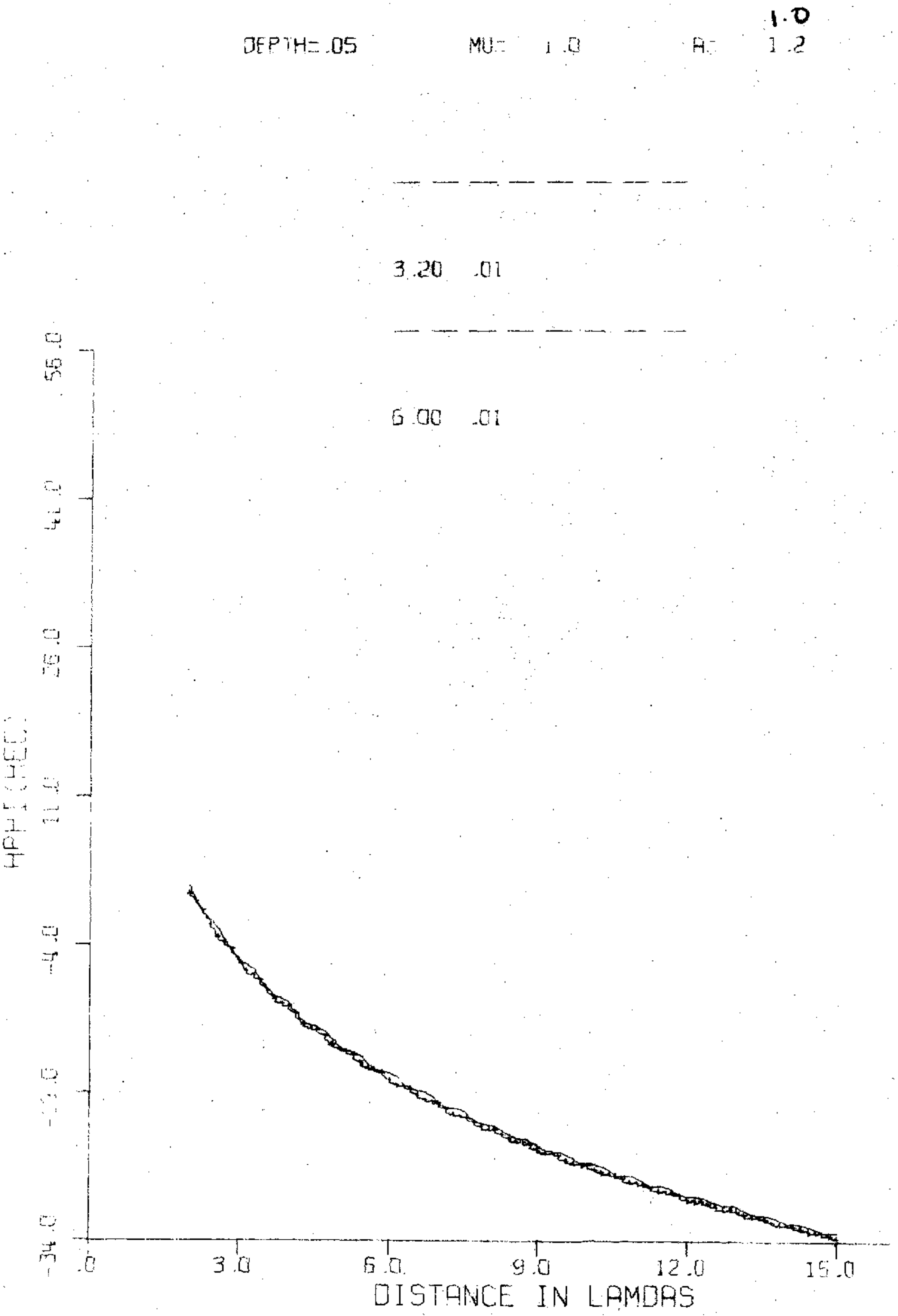



1.0
DEPTH=.05
MU= 1.0
A= 1.2
3.20 .01
6.00 .01
MAG(HED)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= 1.2
1.0
3.20 .01
6.00 .01
30.0
15.0
0
-15.0
-30.0
-45.0
-60.0
HZ (DEG.)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

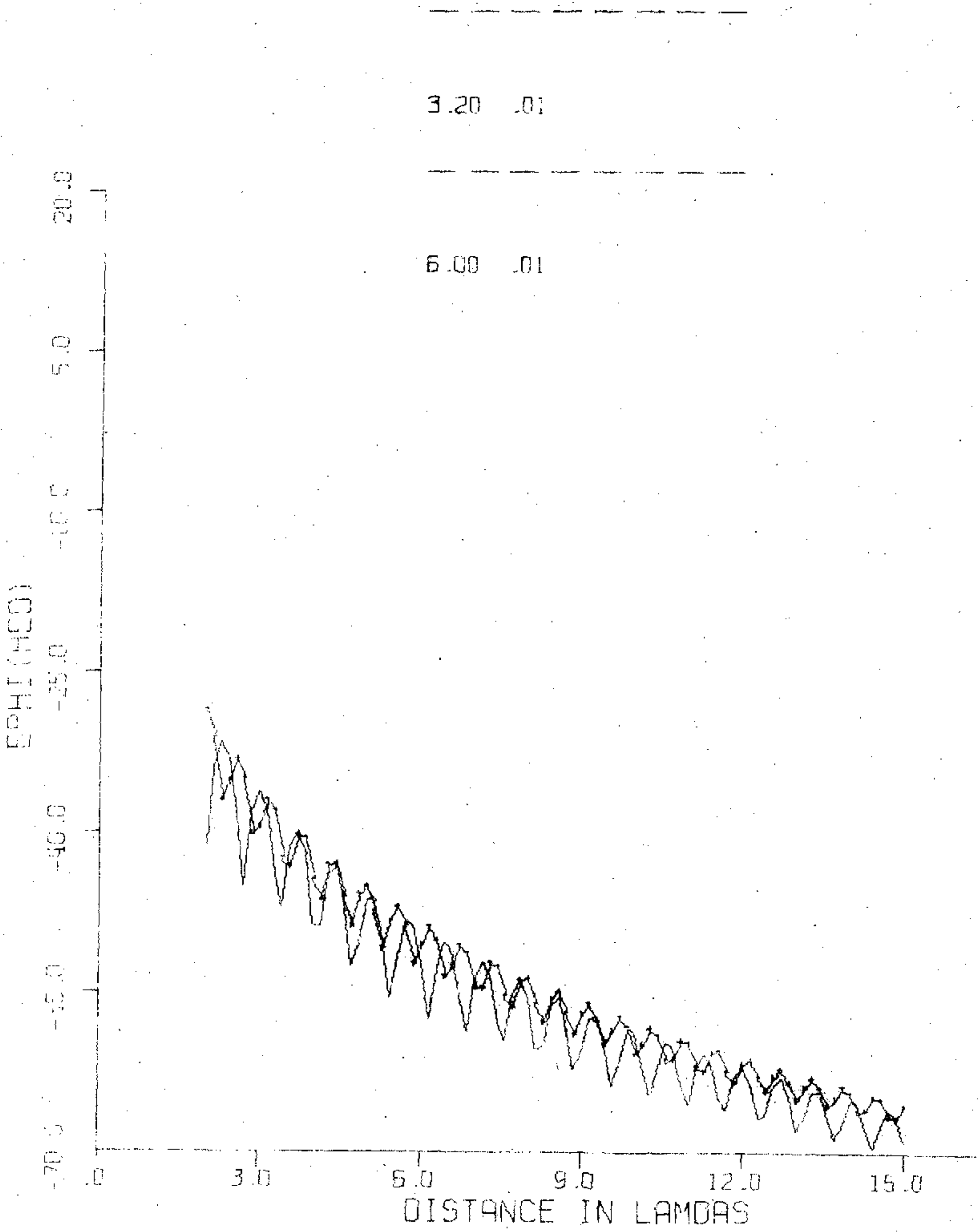

DEPTH= 05
MU= 1.0
A= 1.2
1.0
3.20 .01
6.00 .01
ERHO(HED)
30.0
15.0
0
-15.0
-30.0
-45.0
-60.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

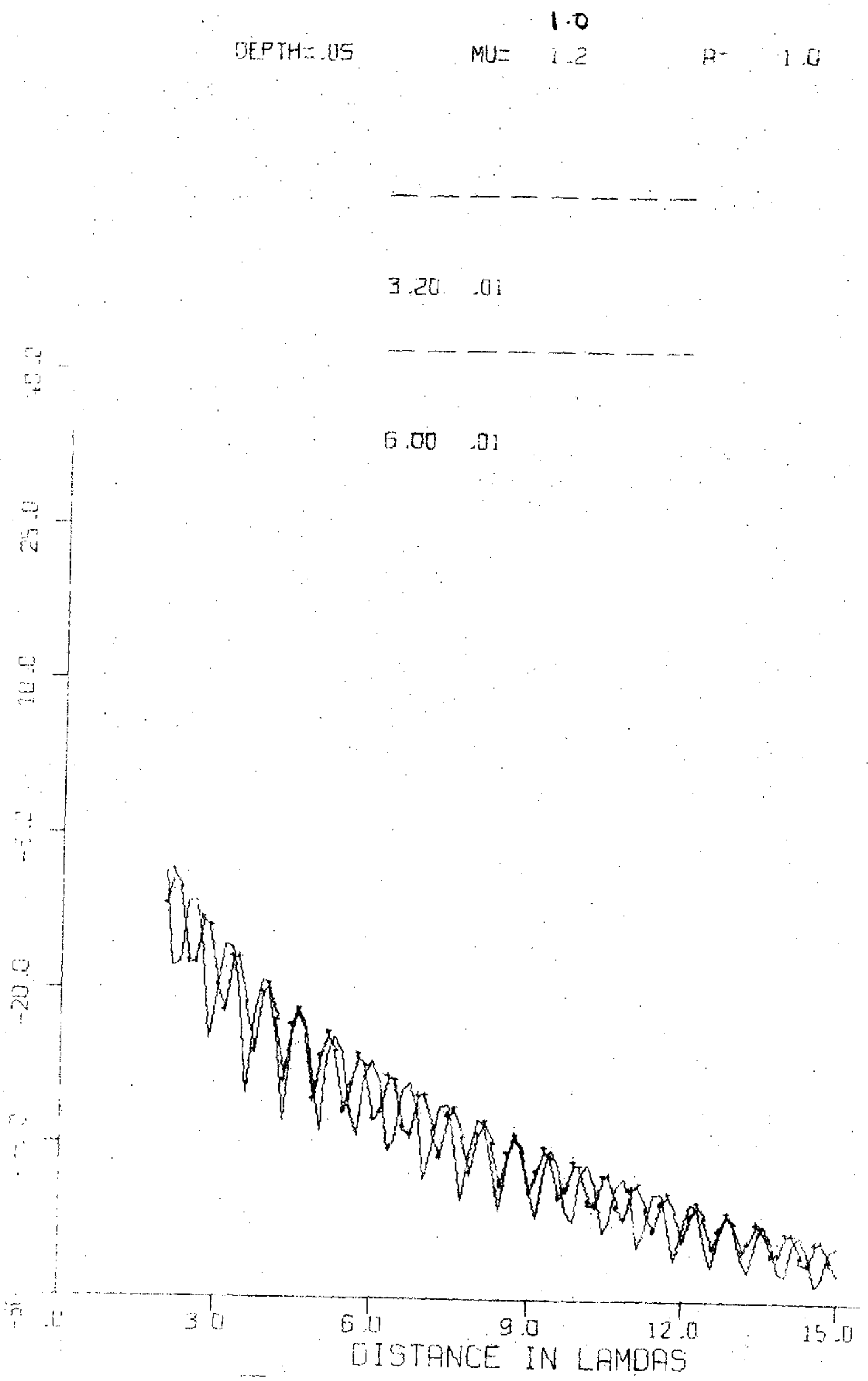

1.0
DEPTH=.05
MU= 1.0
A= 1.2
3.20 .01
6.00 .01
EZ (DB)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

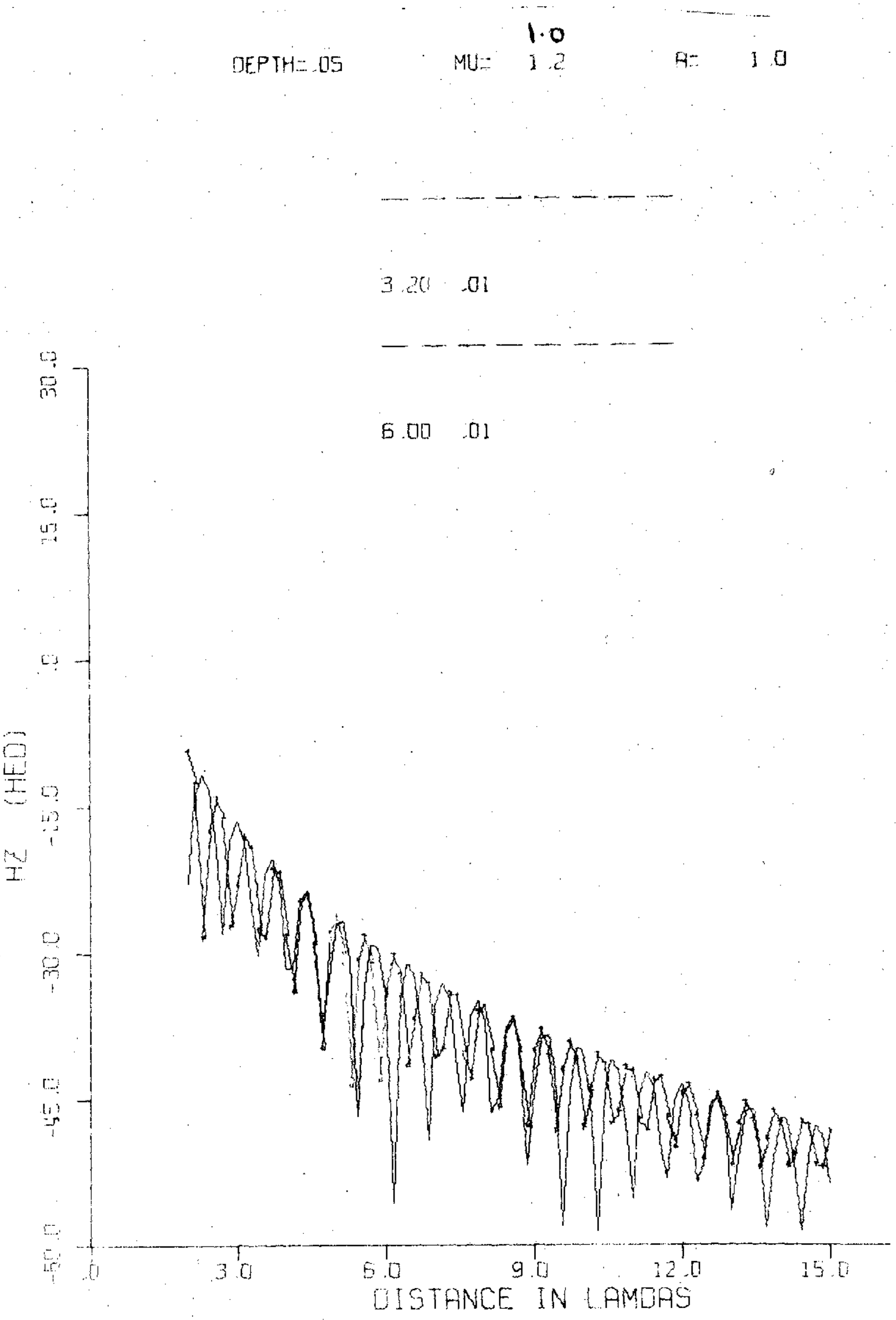

DEPTH=.05
MU= 1.0
A= 1.2
1.0
3.20 .01
6.00 .01
56.0
41.0
26.0
11.0
-4.0
-19.0
-34.0
APHI(DEG)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

1.0

DEPTH=.05 MU= 1.2 A= 1.0

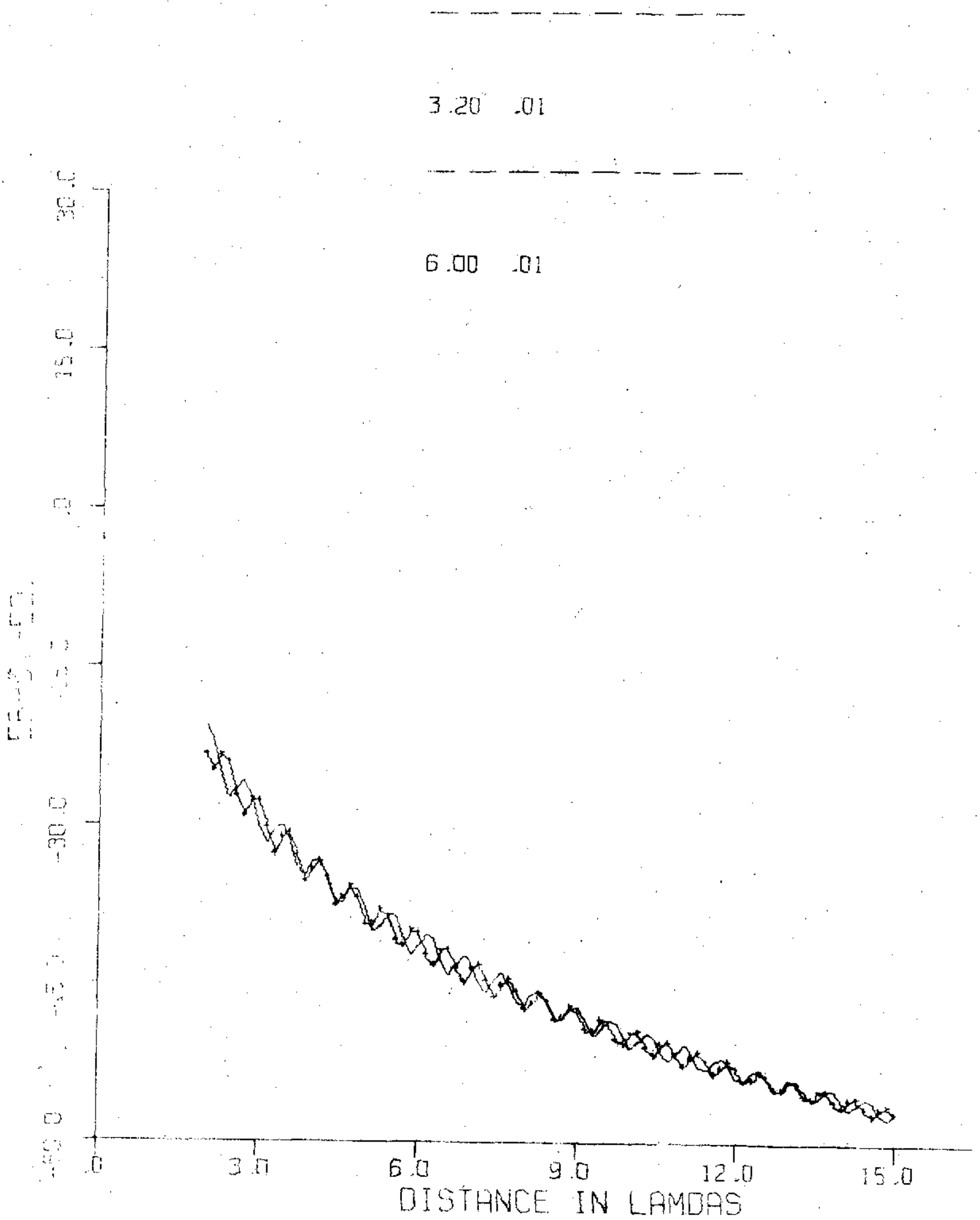



1·0
DEPTH=.05
MU= 1.2
R= 1.0
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

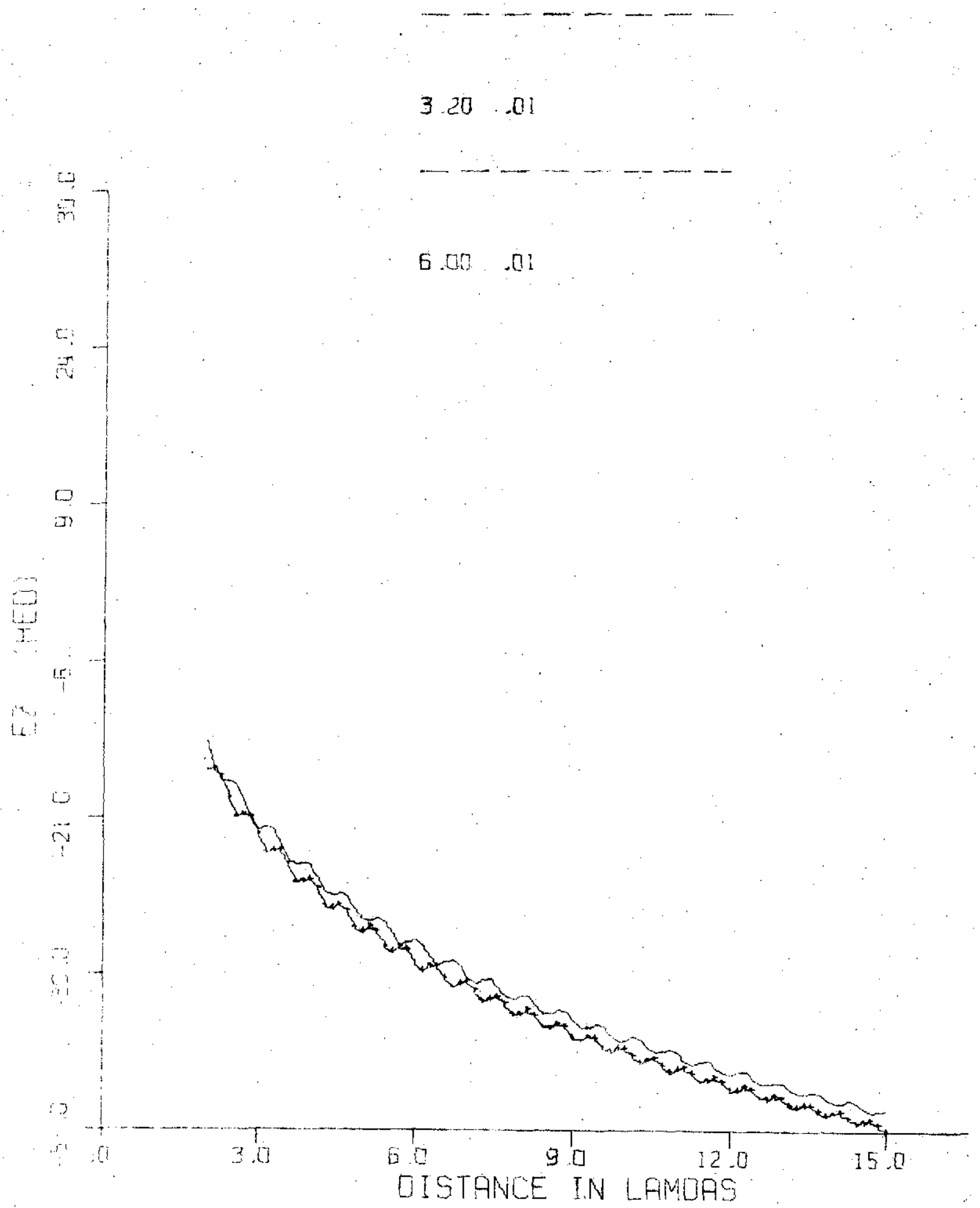

DEPTH=.05
MU= 1.2
1·0
A= 1.0
3.20 .01
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
HZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

1.0

DEPTH=.05 MU= 1.2 R= 1.0

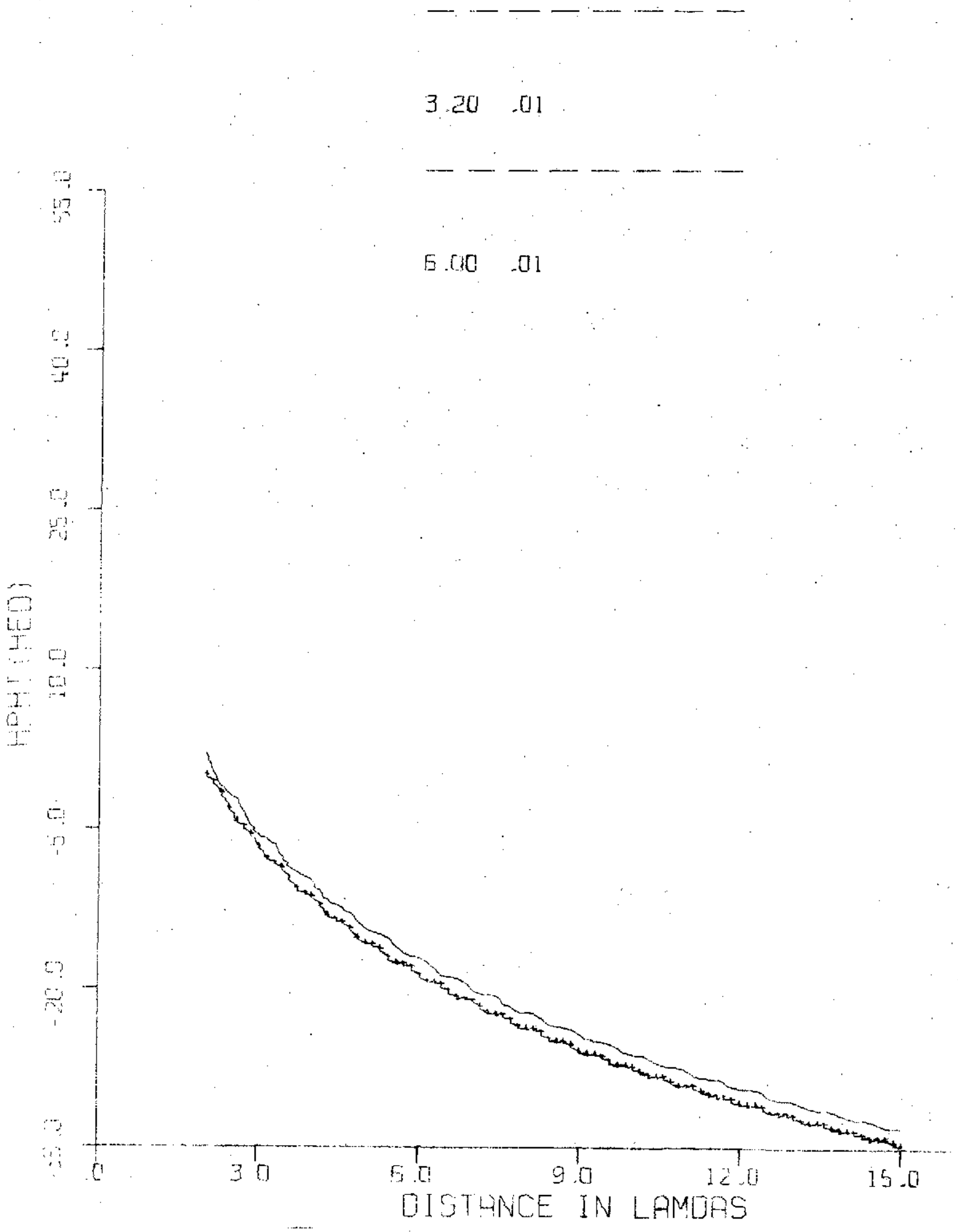


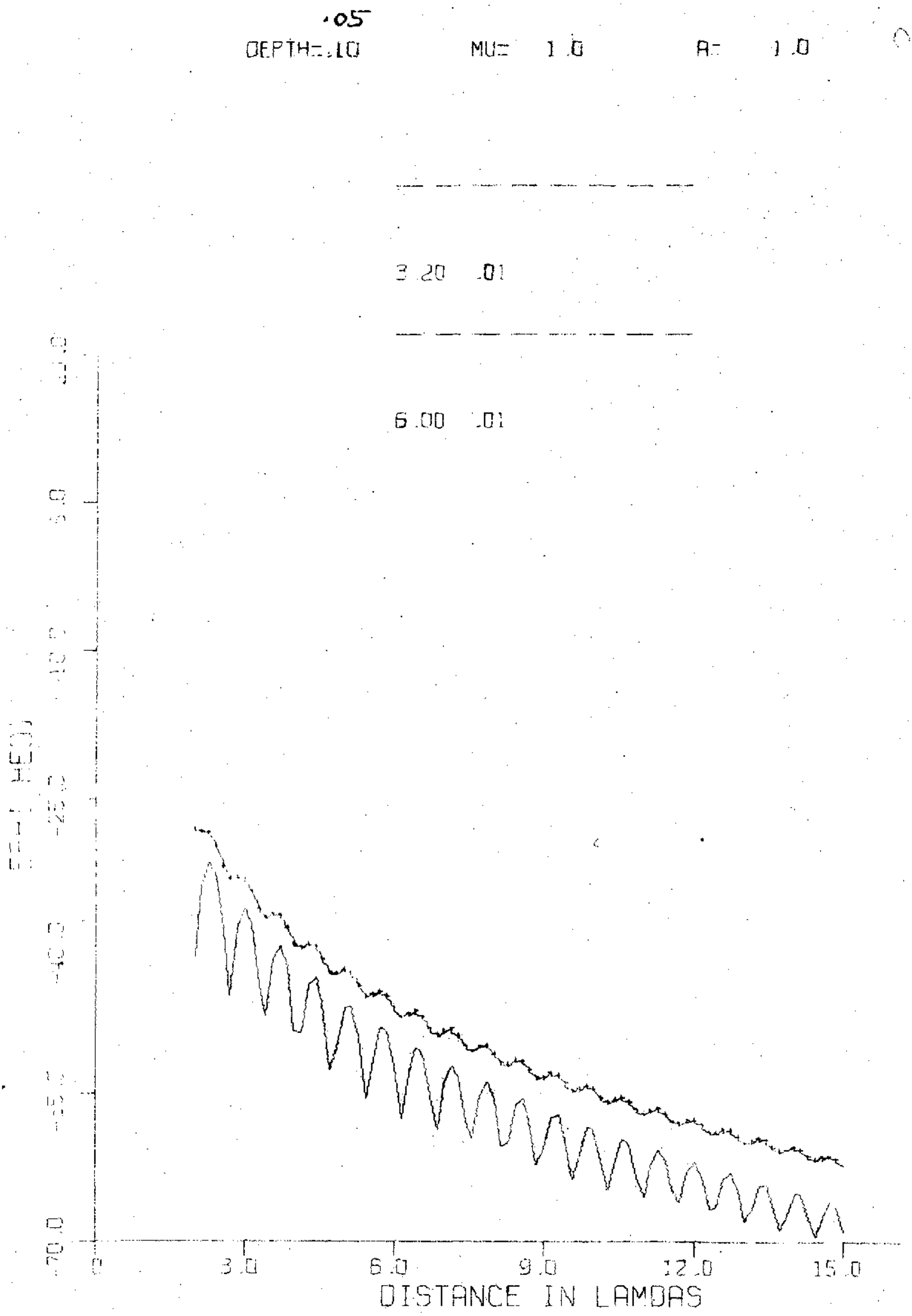
DEPTH=.05 MU= ~~1.2~~ 1.0 A= 1.0

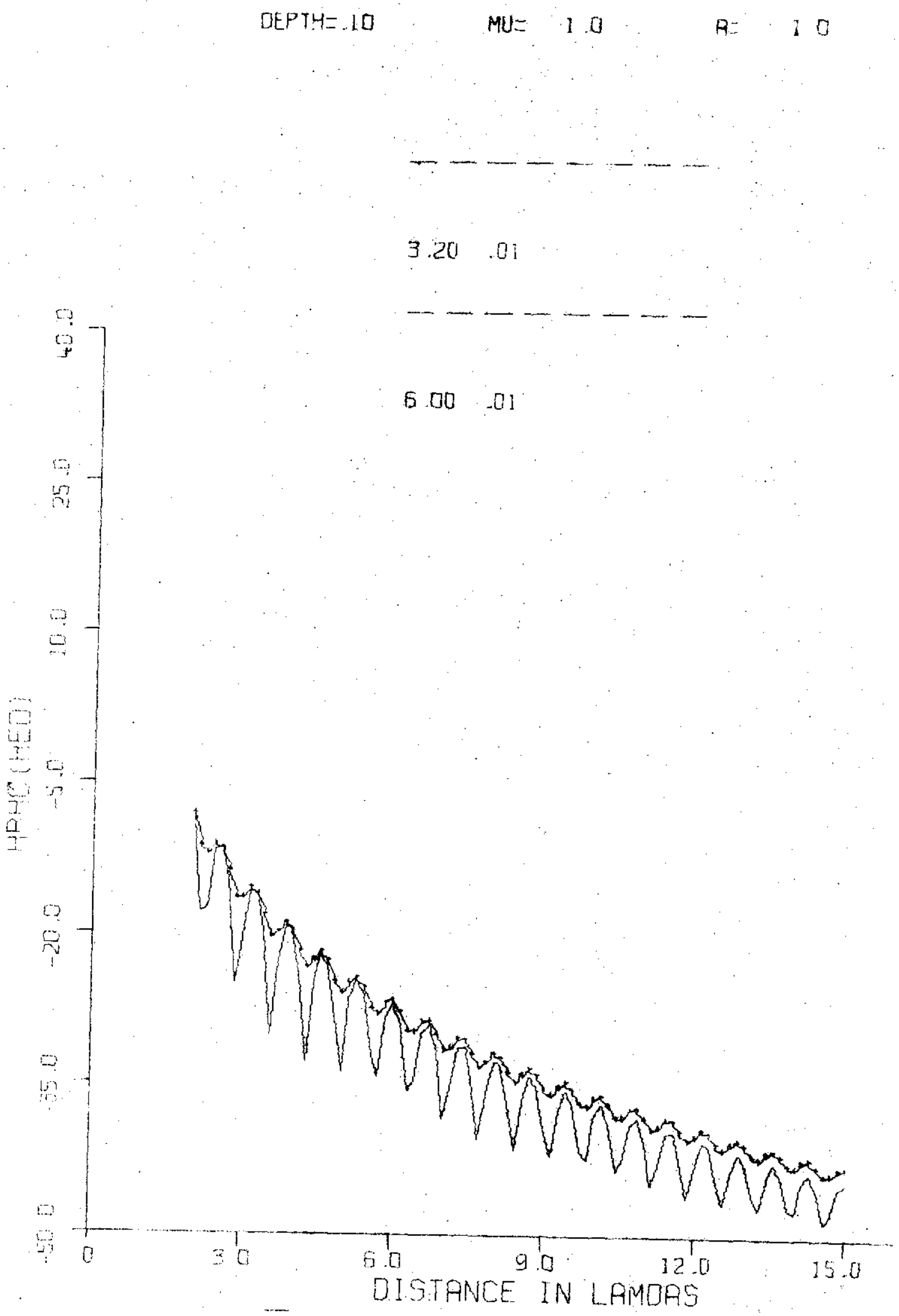


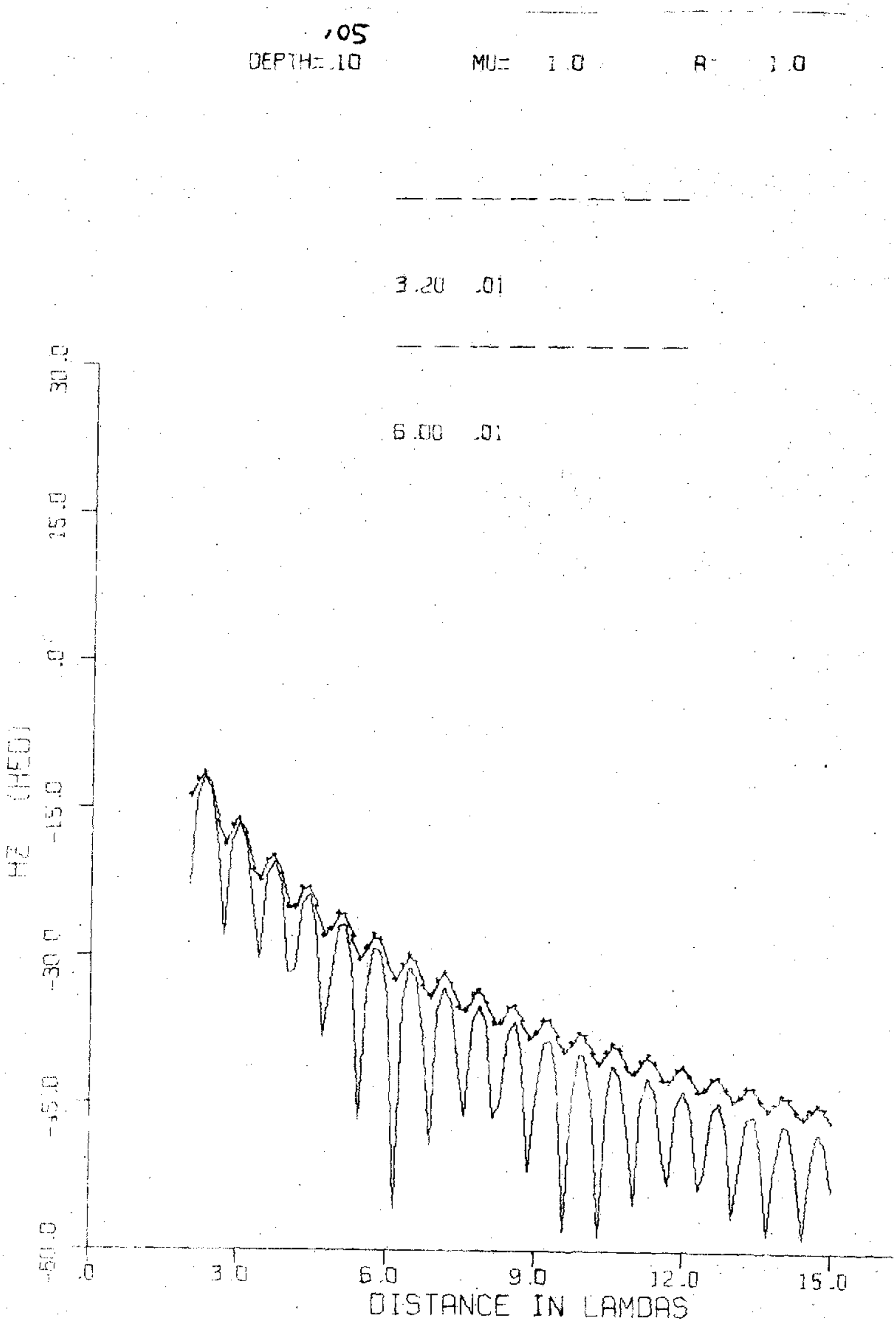
1.0

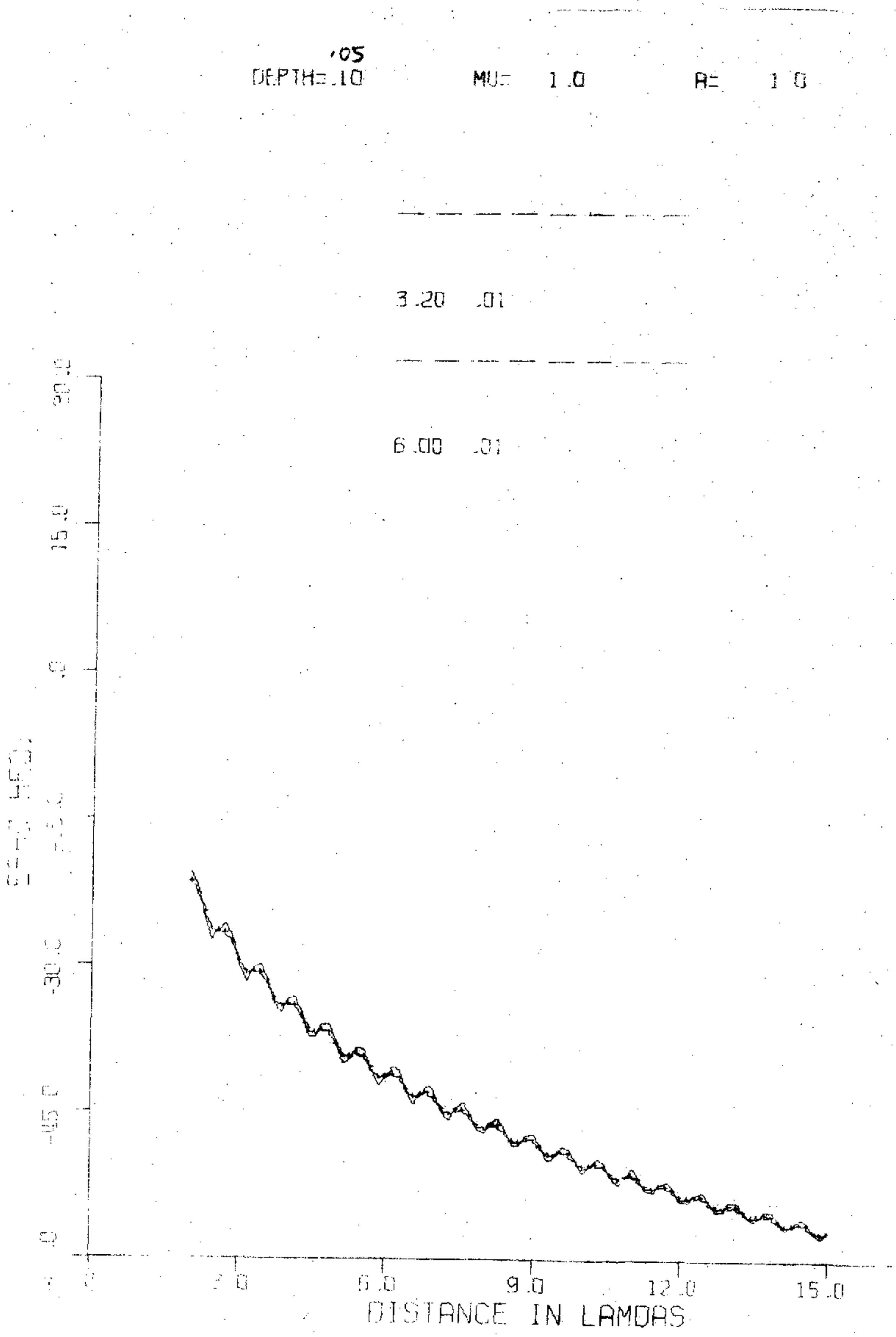
DEPTH=.05 MU= 1.2 R= 1.0



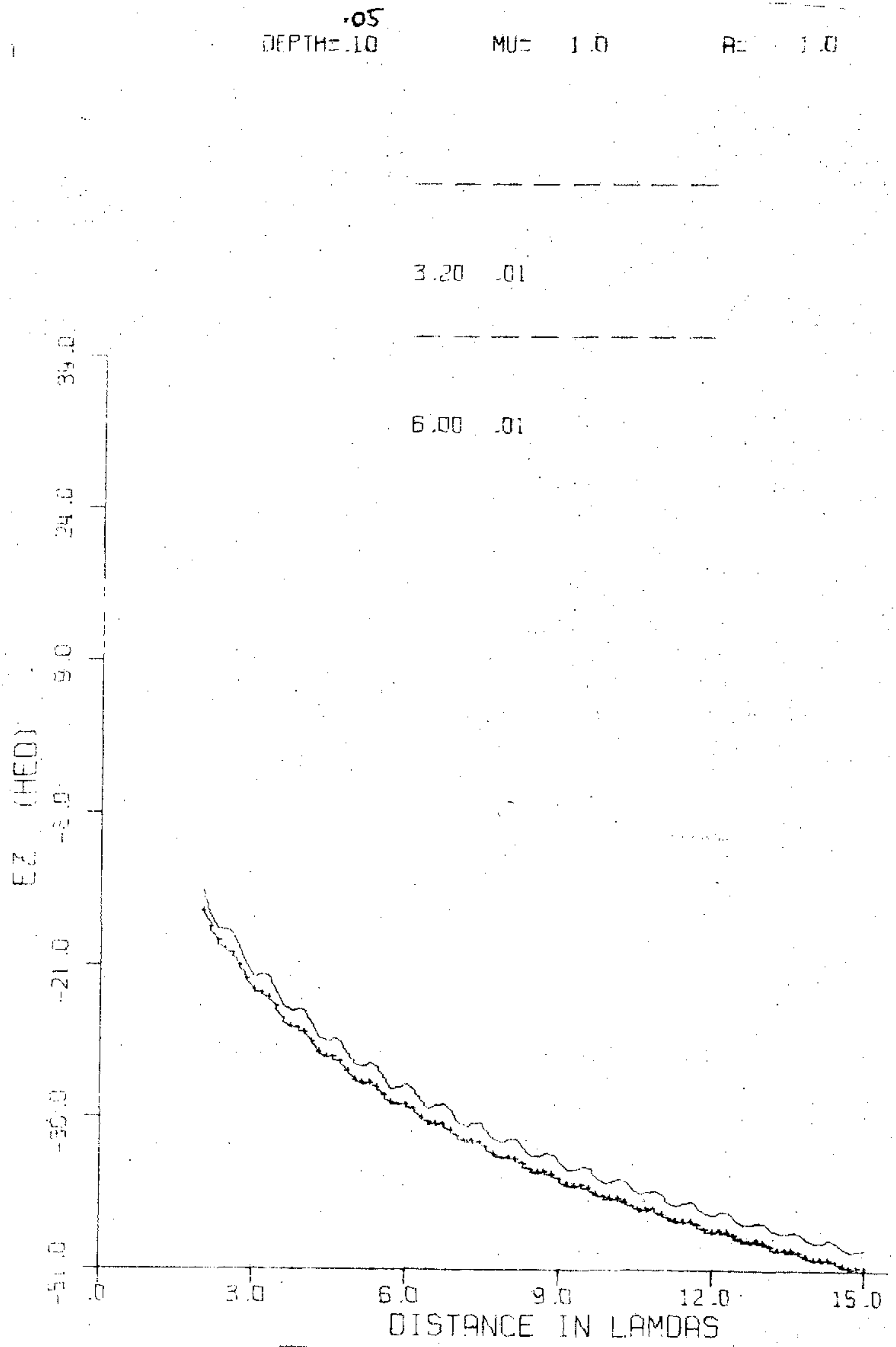

.05
DEPTH=.10
MU= 1.0
A= 1.0
3.20 .01
6.00 .01
FIELD (DB)
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

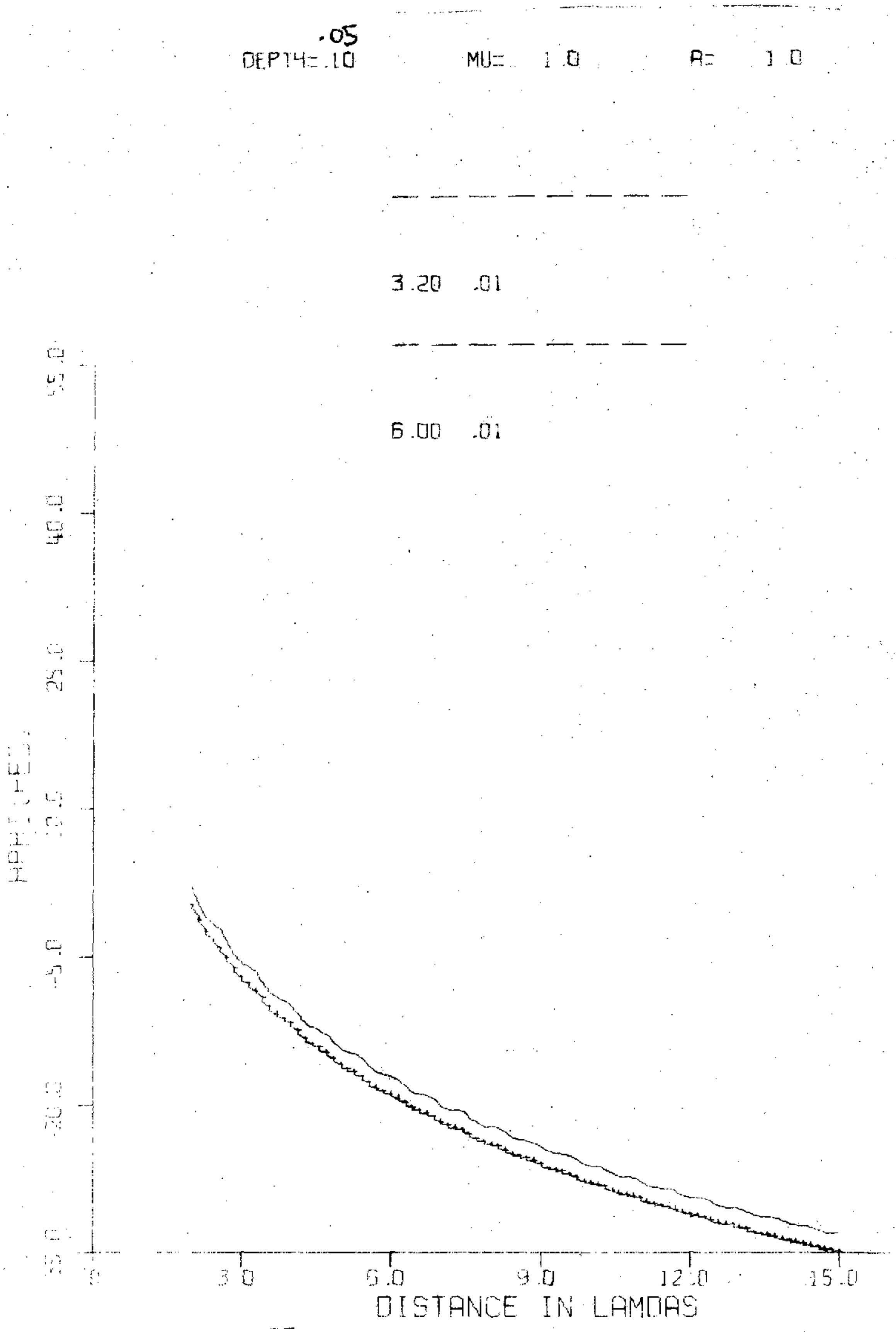

DEPTH=.10
MU= 1.0
R= 1.0
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HPHC(HED)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

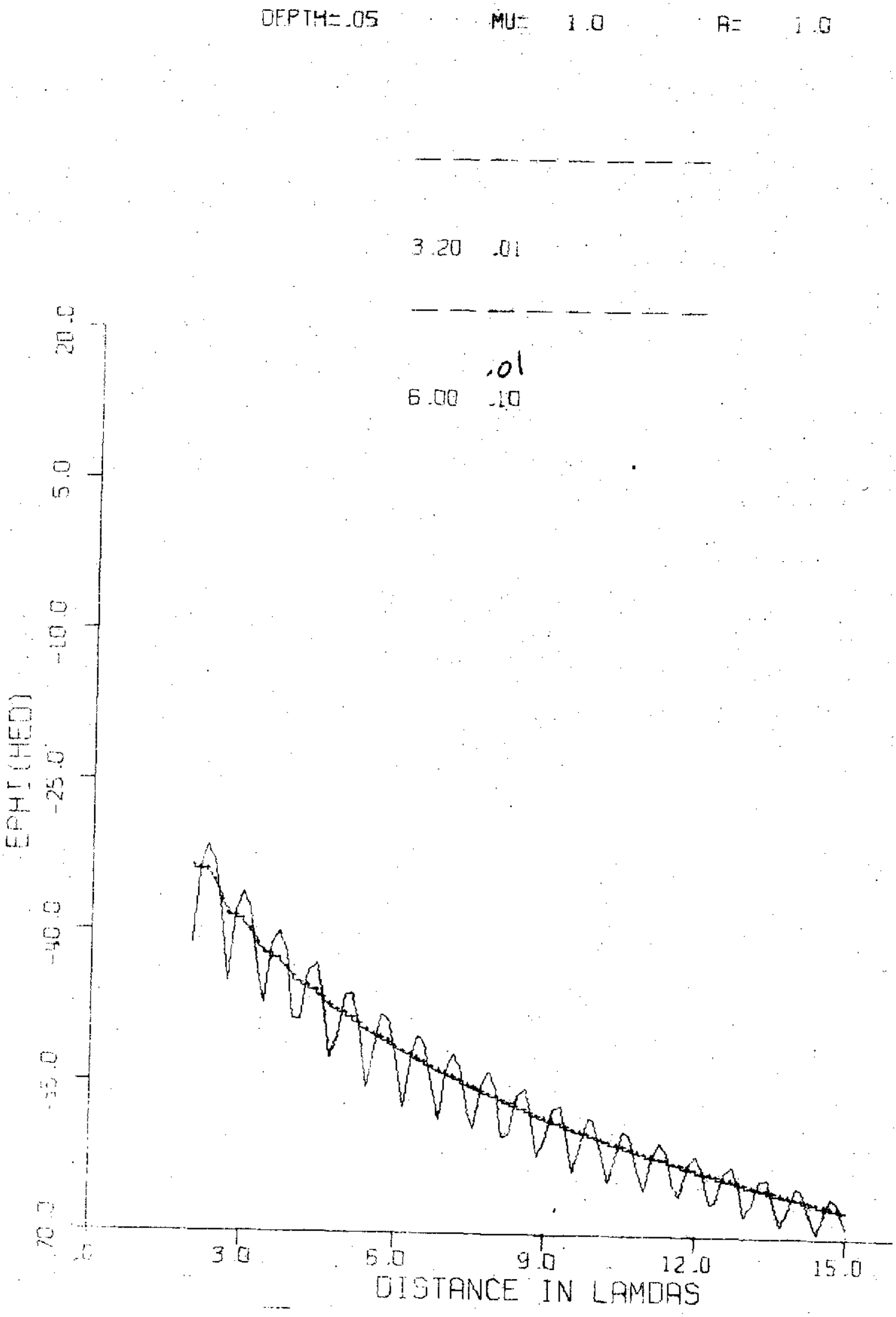

.05
DEPTH=.10
MU= 1.0
A= 1.0
3.20 .01
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
HZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

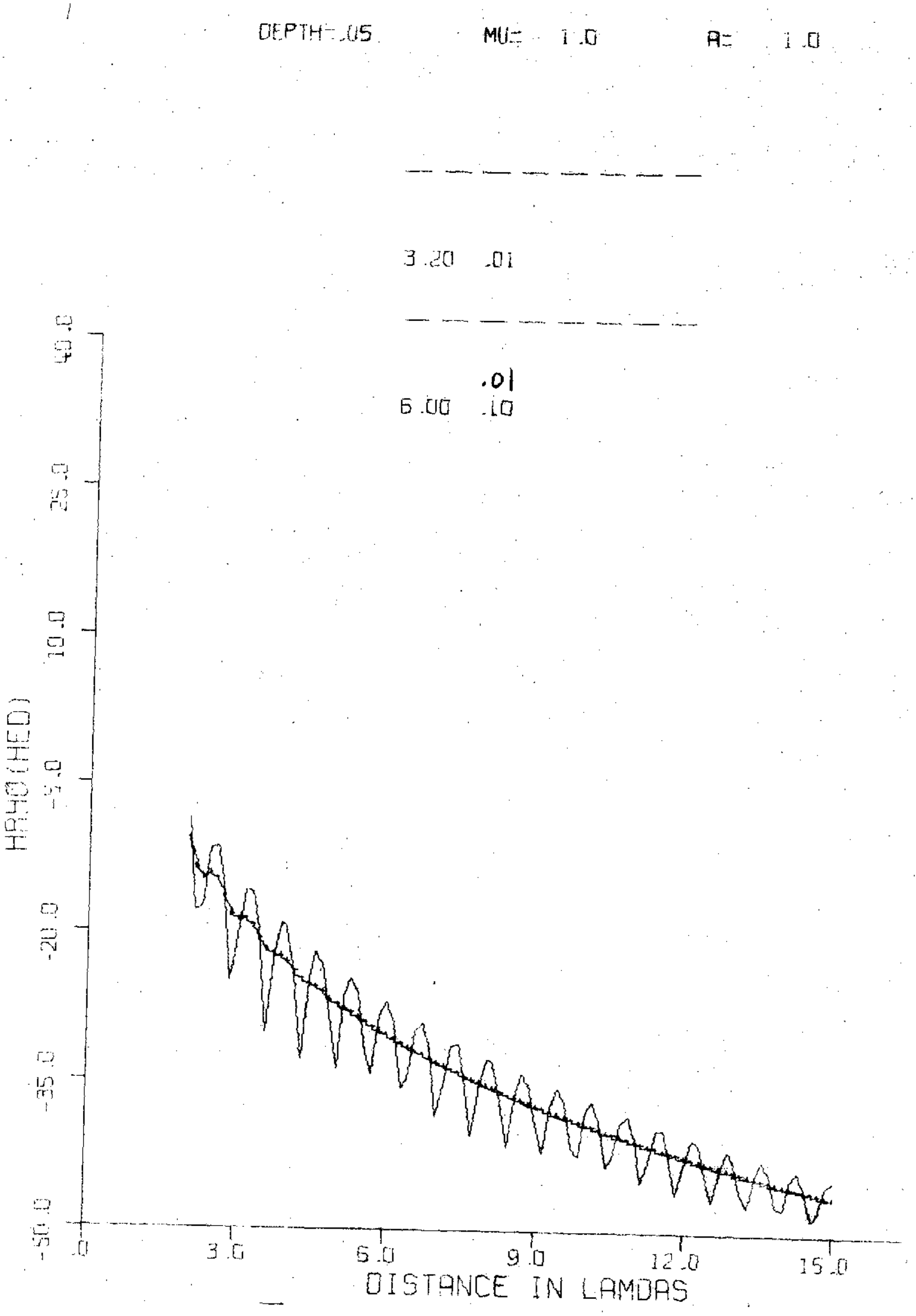


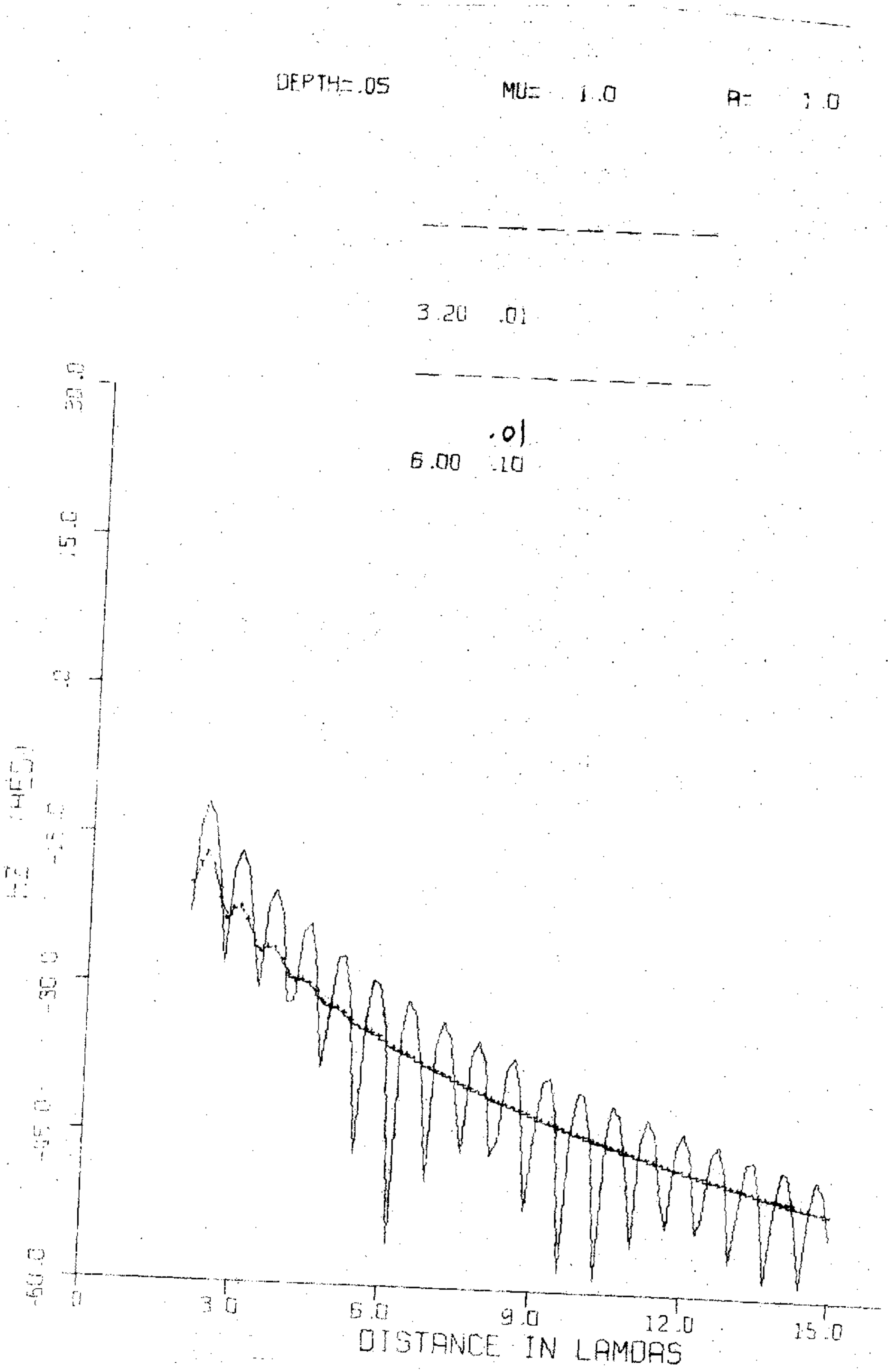
'05
DEPTH=.10
MU= 1.0
A= 1.0
3.20 .01
6.00 .01
30.0
15.0
.0
-15.0
-30.0
-45.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


.05
DEPTH=.10
MU= 1.0
A= 1.0
3.20 .01
6.00 .01
39.0
24.0
9.0
-6.0
-21.0
-36.0
-51.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

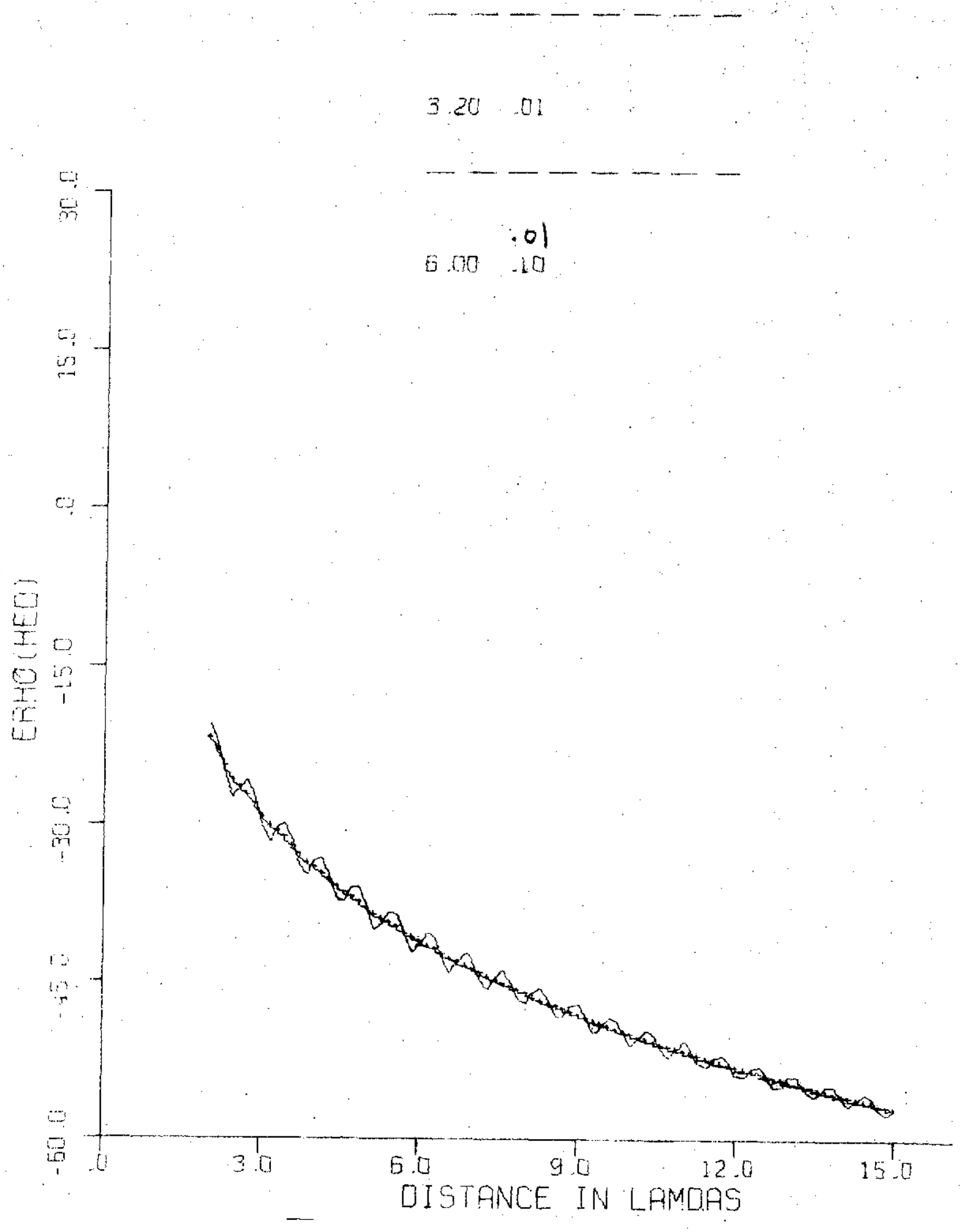

.05
DEPTH=.10
MU= 1.0
A= 1.0
3.20 .01
6.00 .01
HGHT (FEET)
55.0
40.0
25.0
10.0
-5.0
-20.0
-35.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

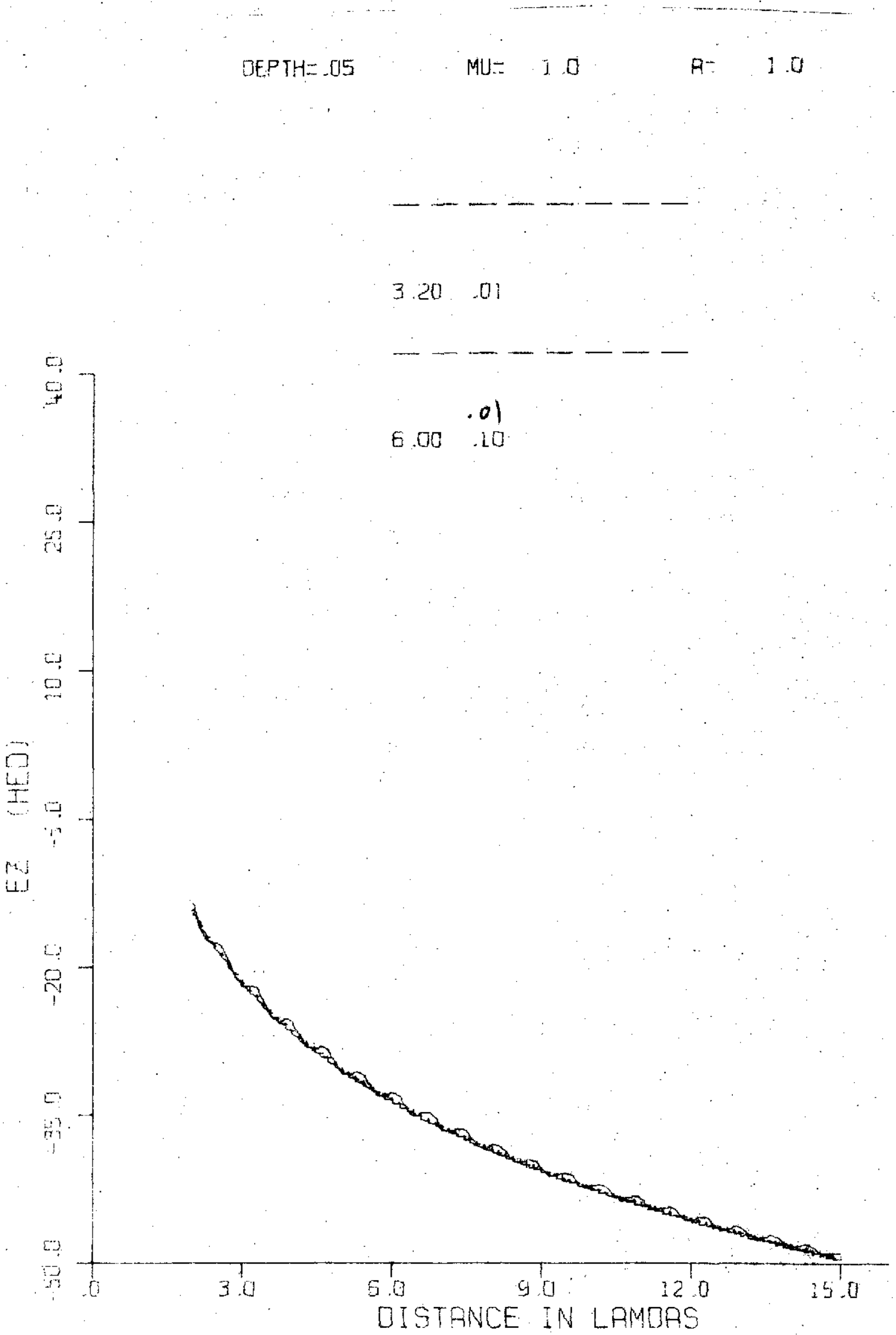

DEPTH=.05
MU= 1.0
R= 1.0
3.20 .01
.01
6.00 .10
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

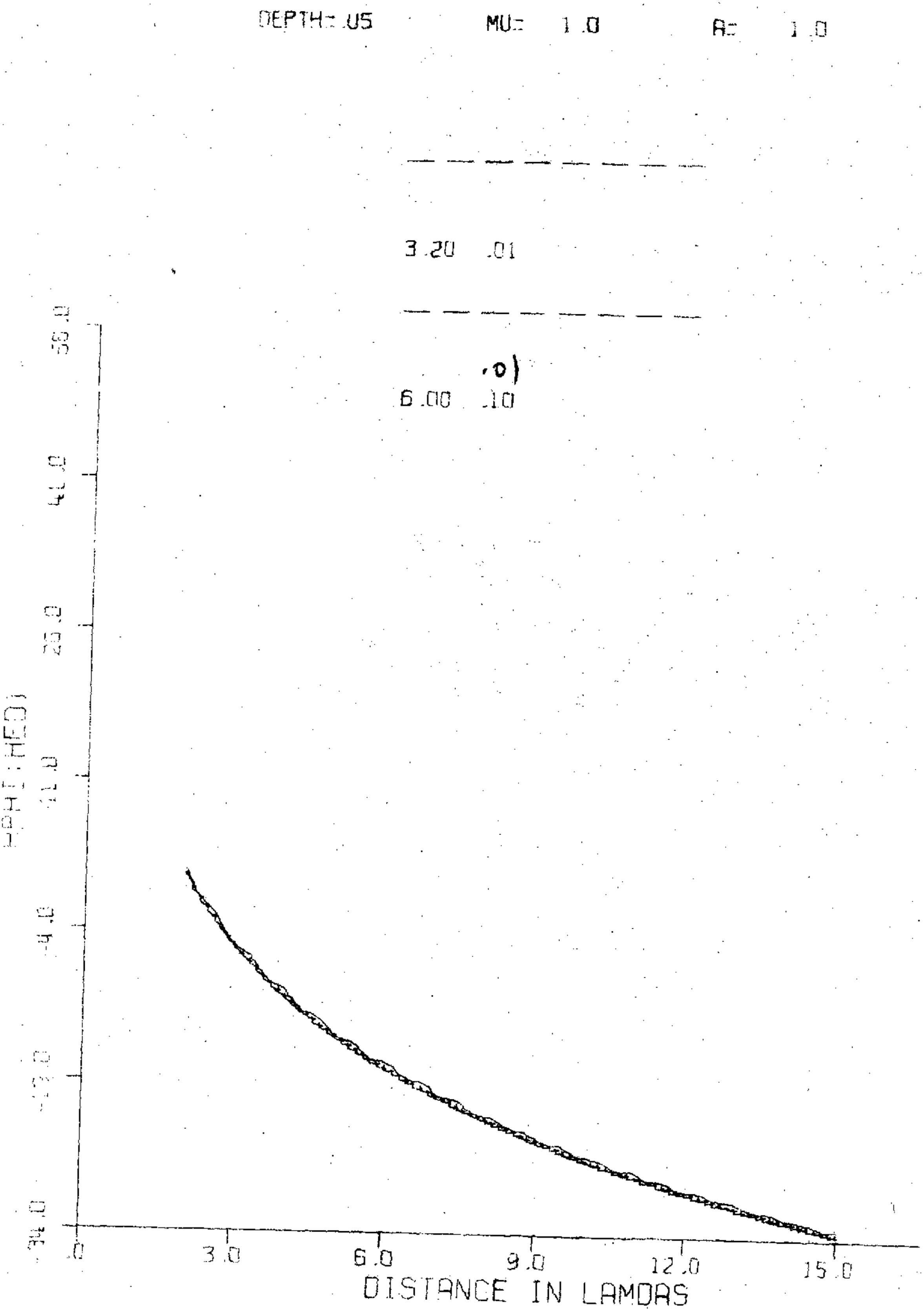

DEPTH=.05
MU= 1.0
A= 1.0
3.20 .01
.01
6.00 .10
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HA40(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

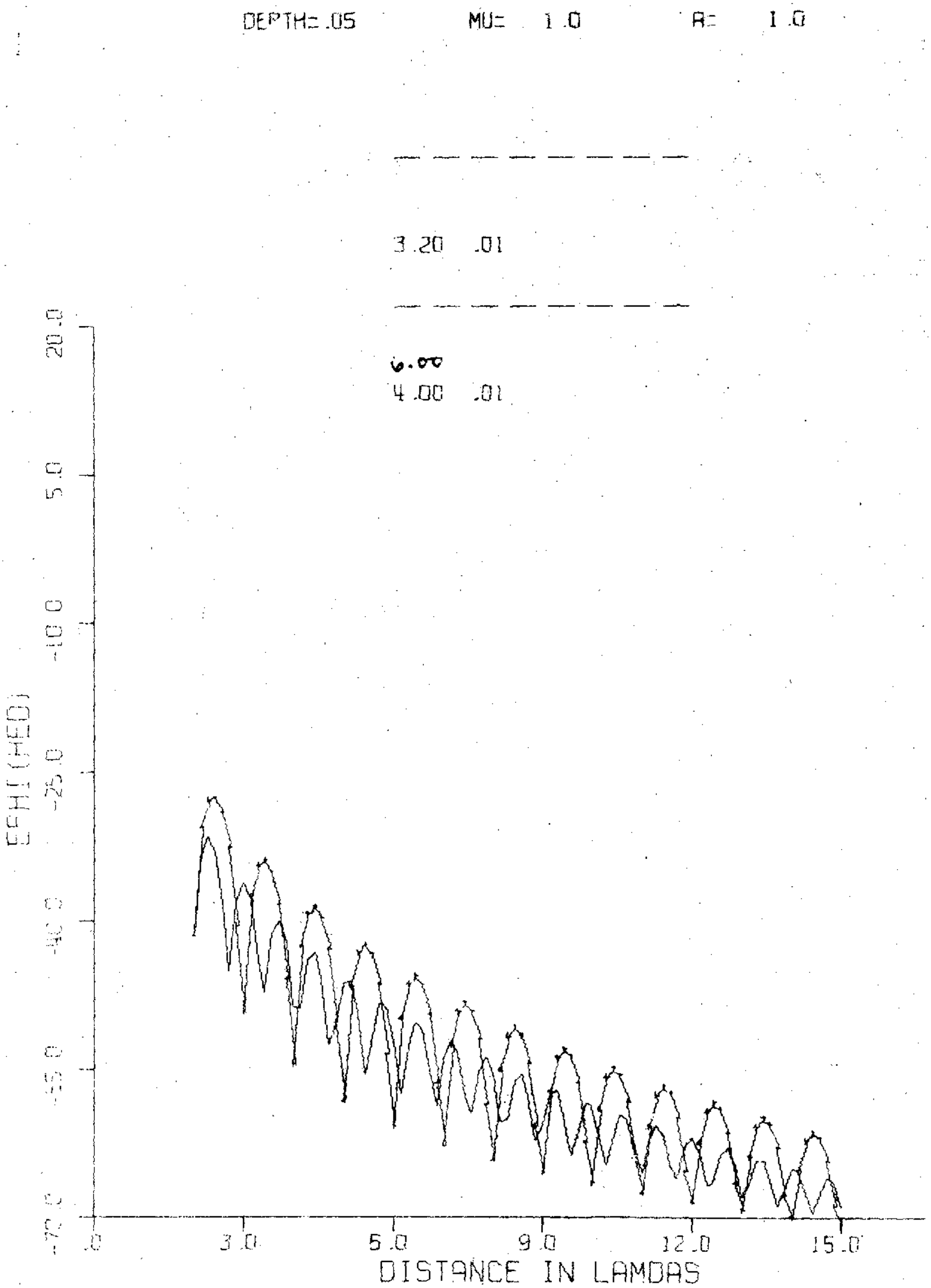

DEPTH=.05
MU= 1.0
R= 1.0
3.20 .01
.01
6.00 .10
30.0
15.0
0
-15.0
-30.0
-45.0
-60.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

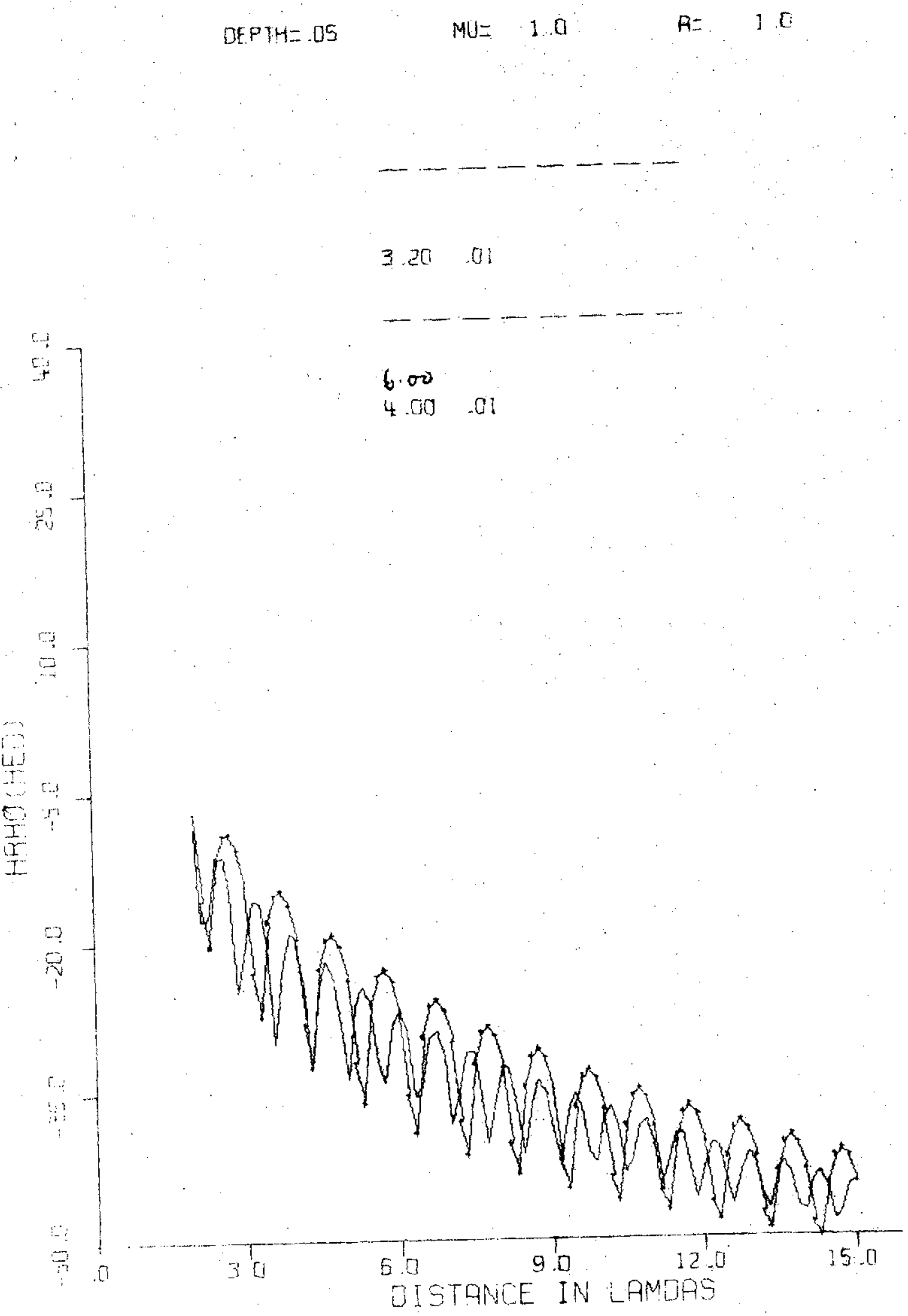
DEPTH=.05 MU= 1.0 A= 1.0

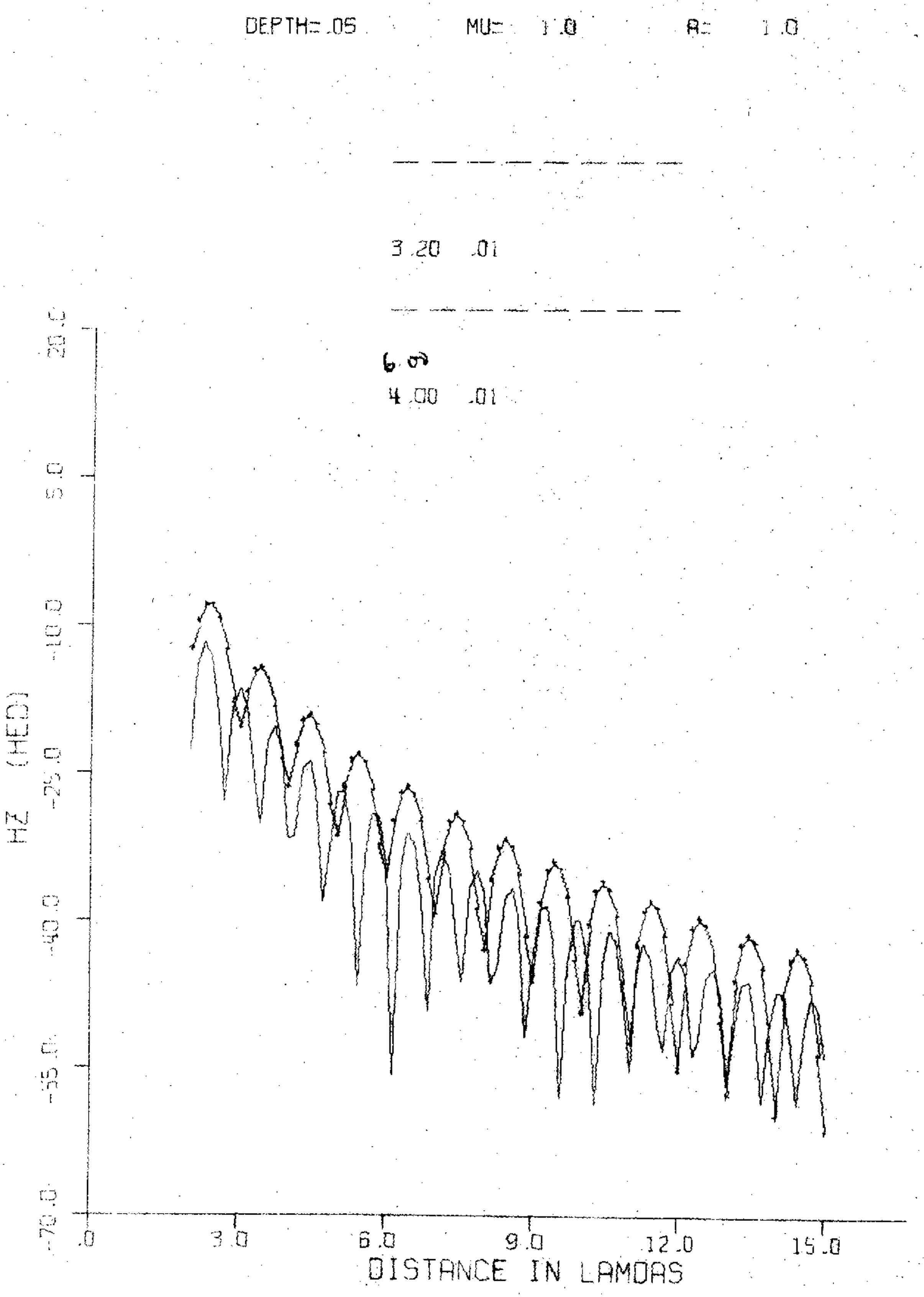



DEPTH=.05 MU= 1.0 R= 1.0
3.20 .01
.01
6.00 .10
EZ (HED)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

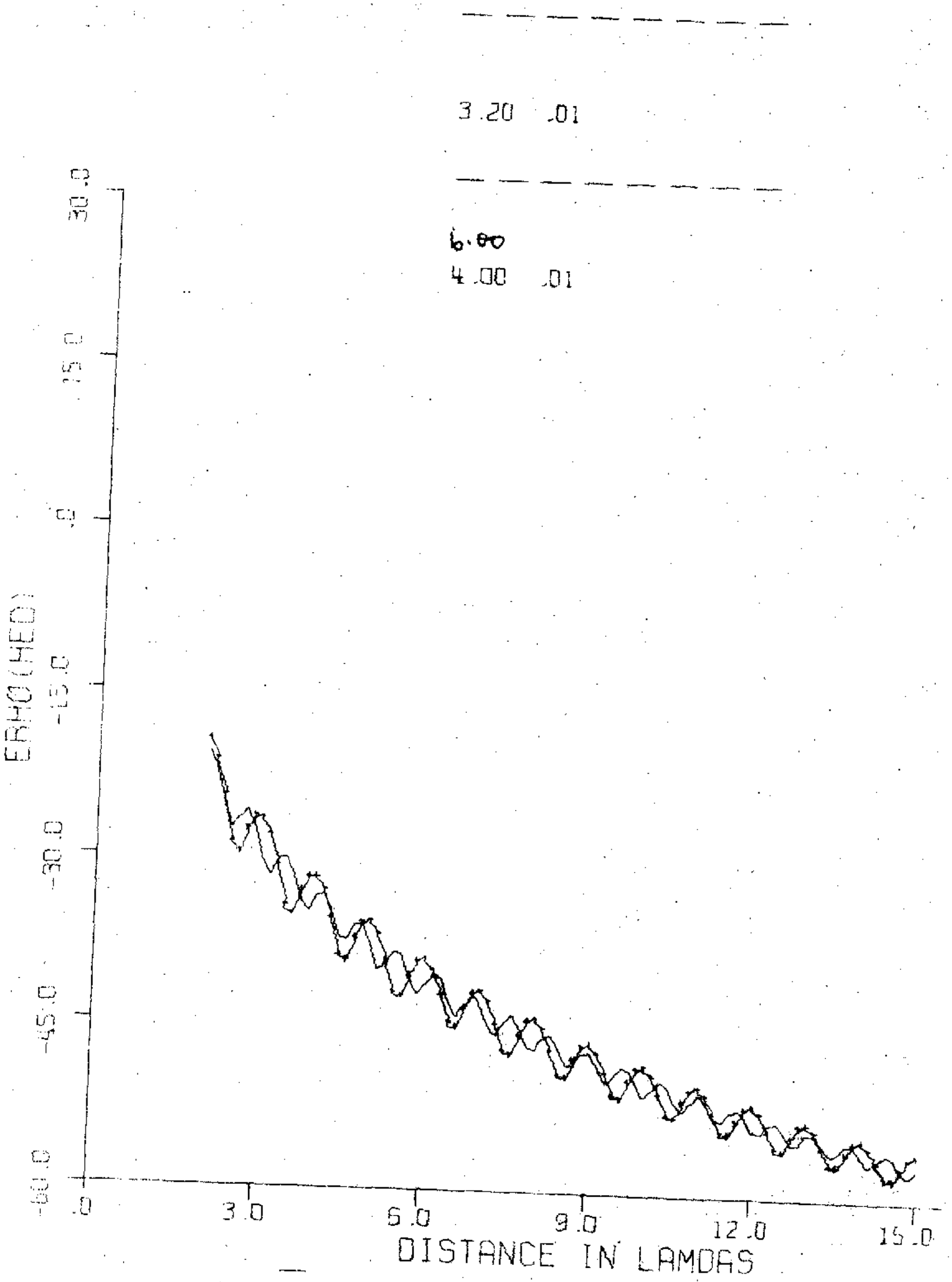

DEPTH= .05
MU= 1.0
A= 1.0
3.20 .01
.0)
6.00 .10
PHI(HED)
56.0
41.0
26.0
11.0
-4.0
-19.0
-34.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= 1.0
3.20 .01
6.00
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI(HED)
.0
3.0
5.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

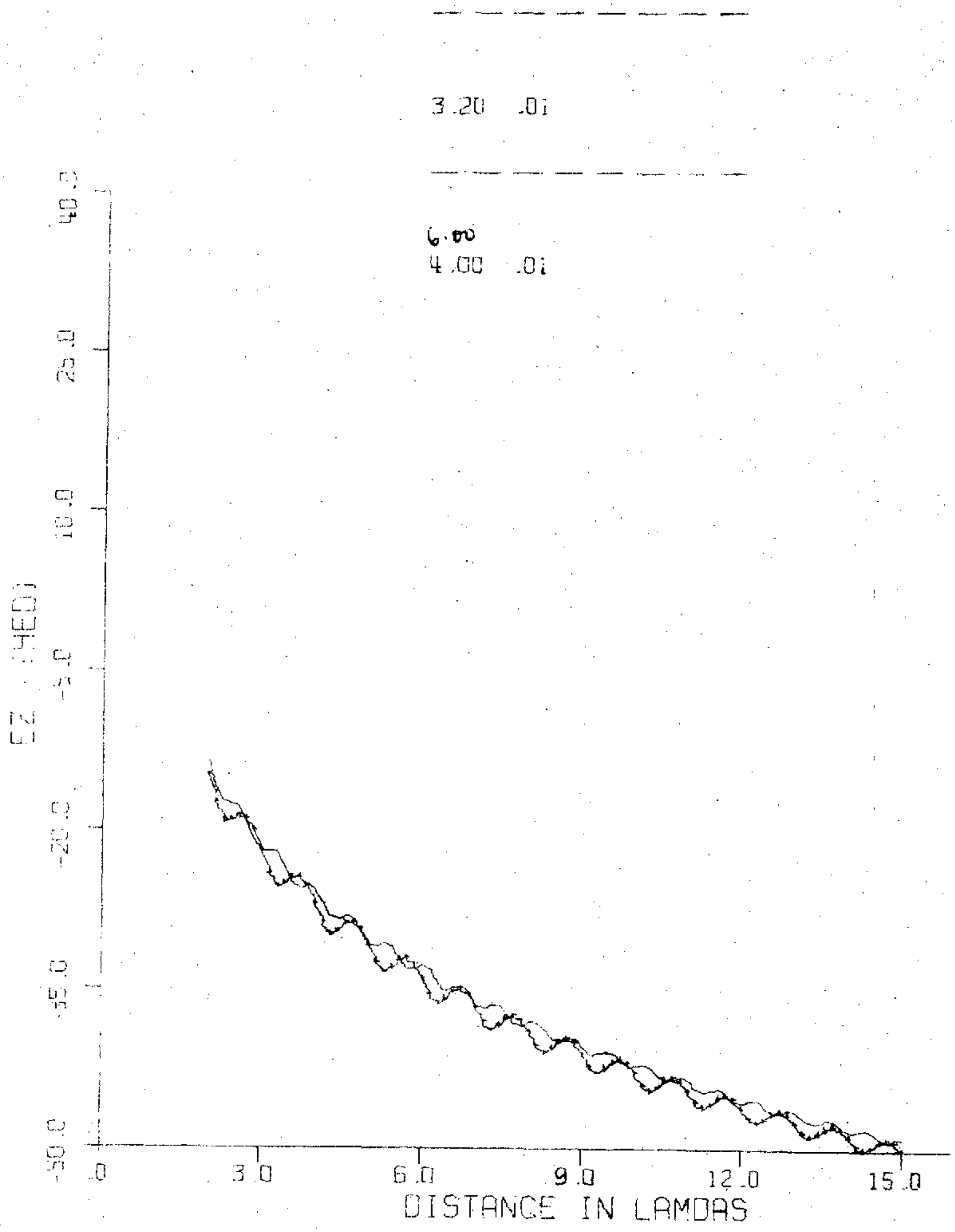

DEPTH=.05
MU= 1.0
A= 1.0
3.20 .01
6.00
4.00 .01
HAHO(HED)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05 MU= 1.0 A= 1.0
3.20 .01
6.09
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
HZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

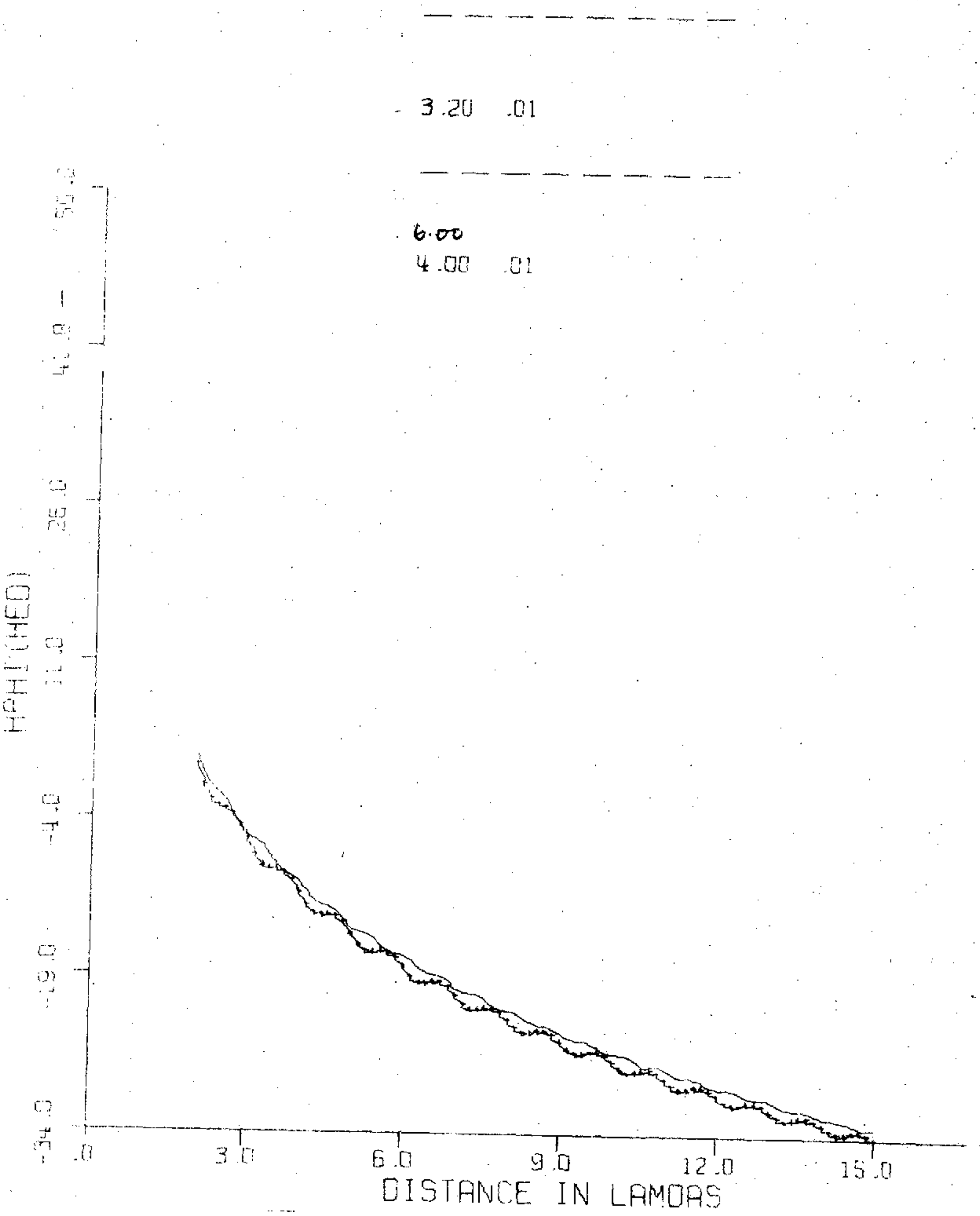
DEPTH= .05 MU= 1.0 A= 1.0

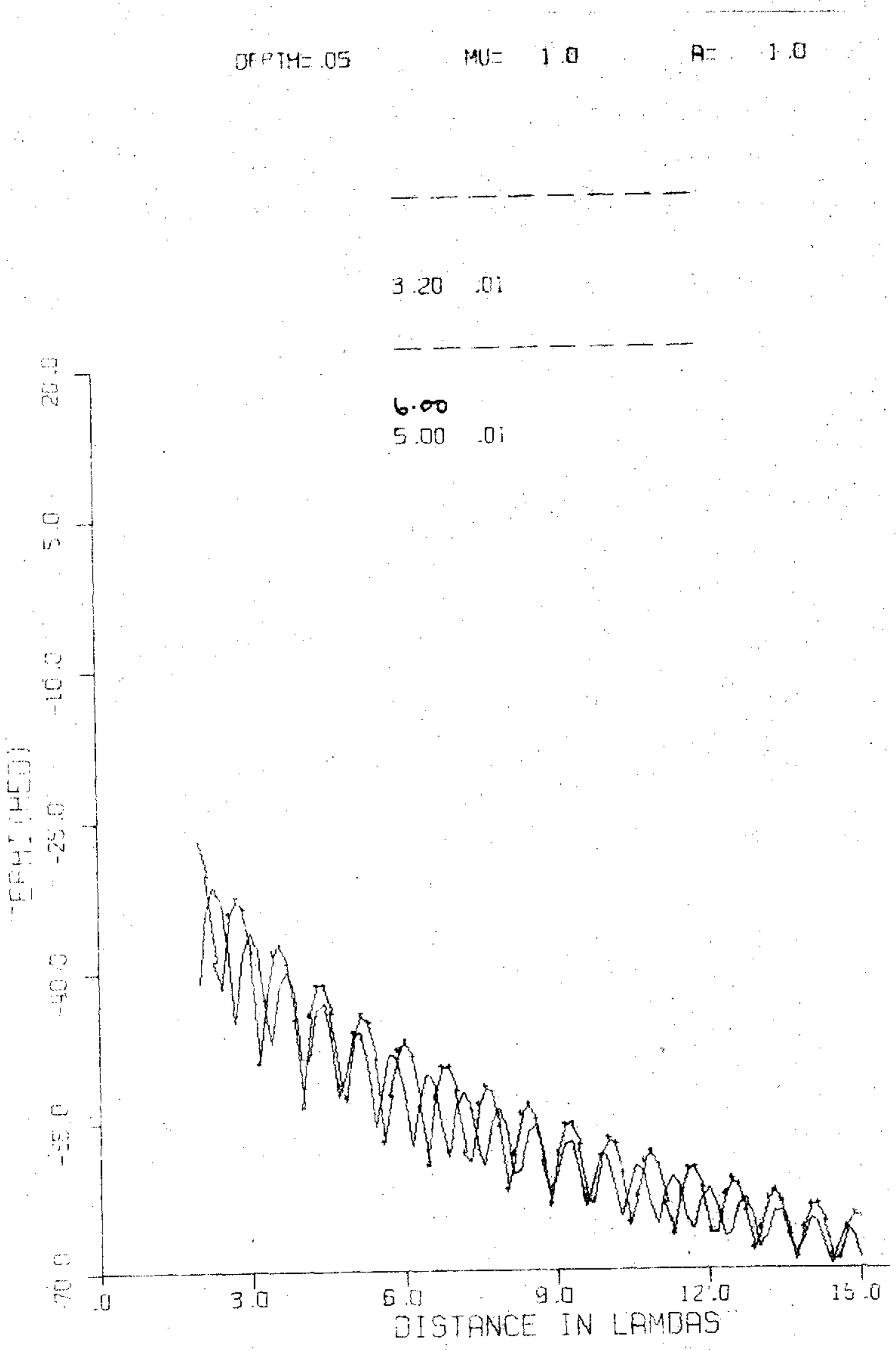


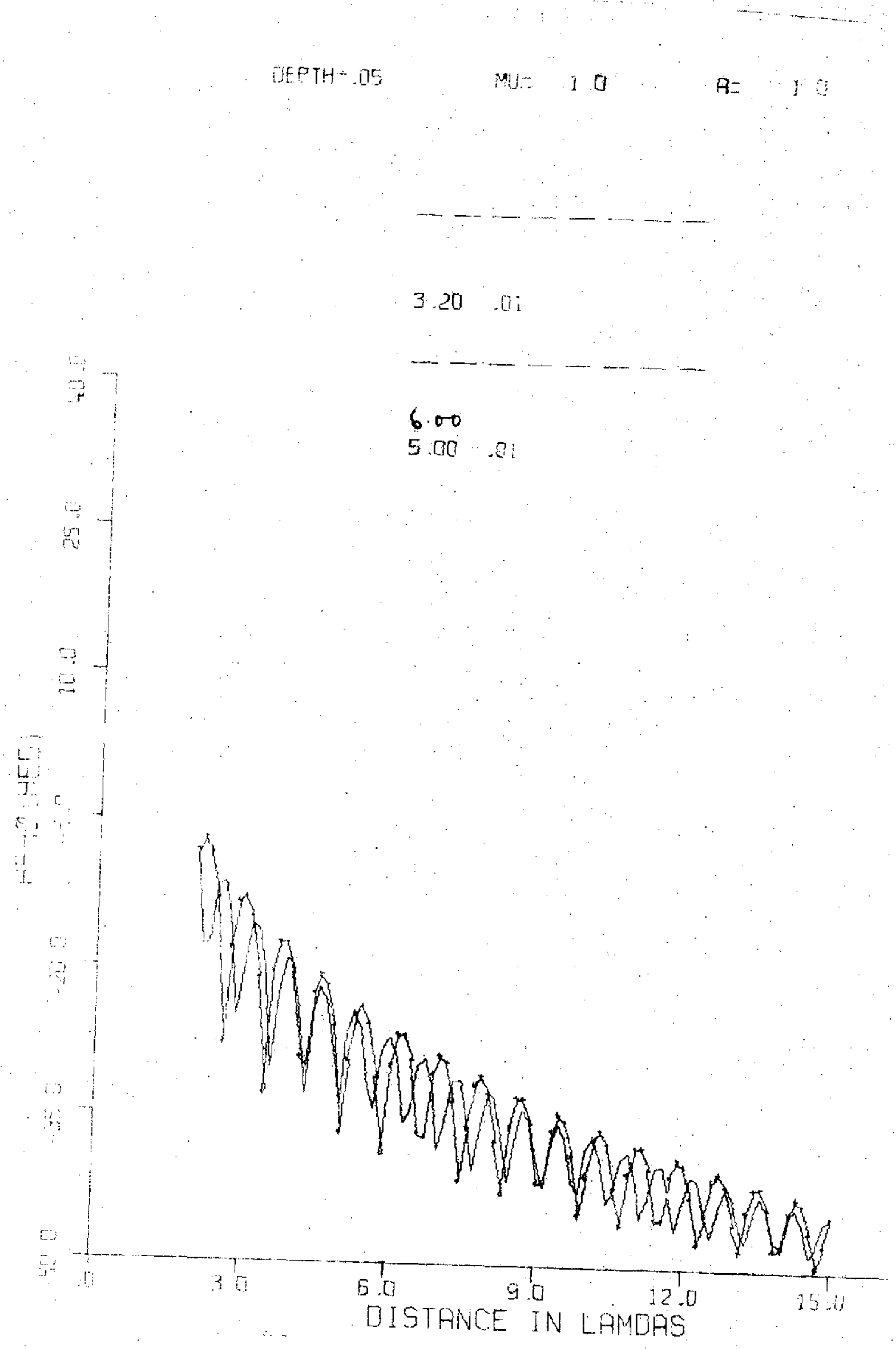
DEPTH=.05 MU= 1.0 A= 1.0



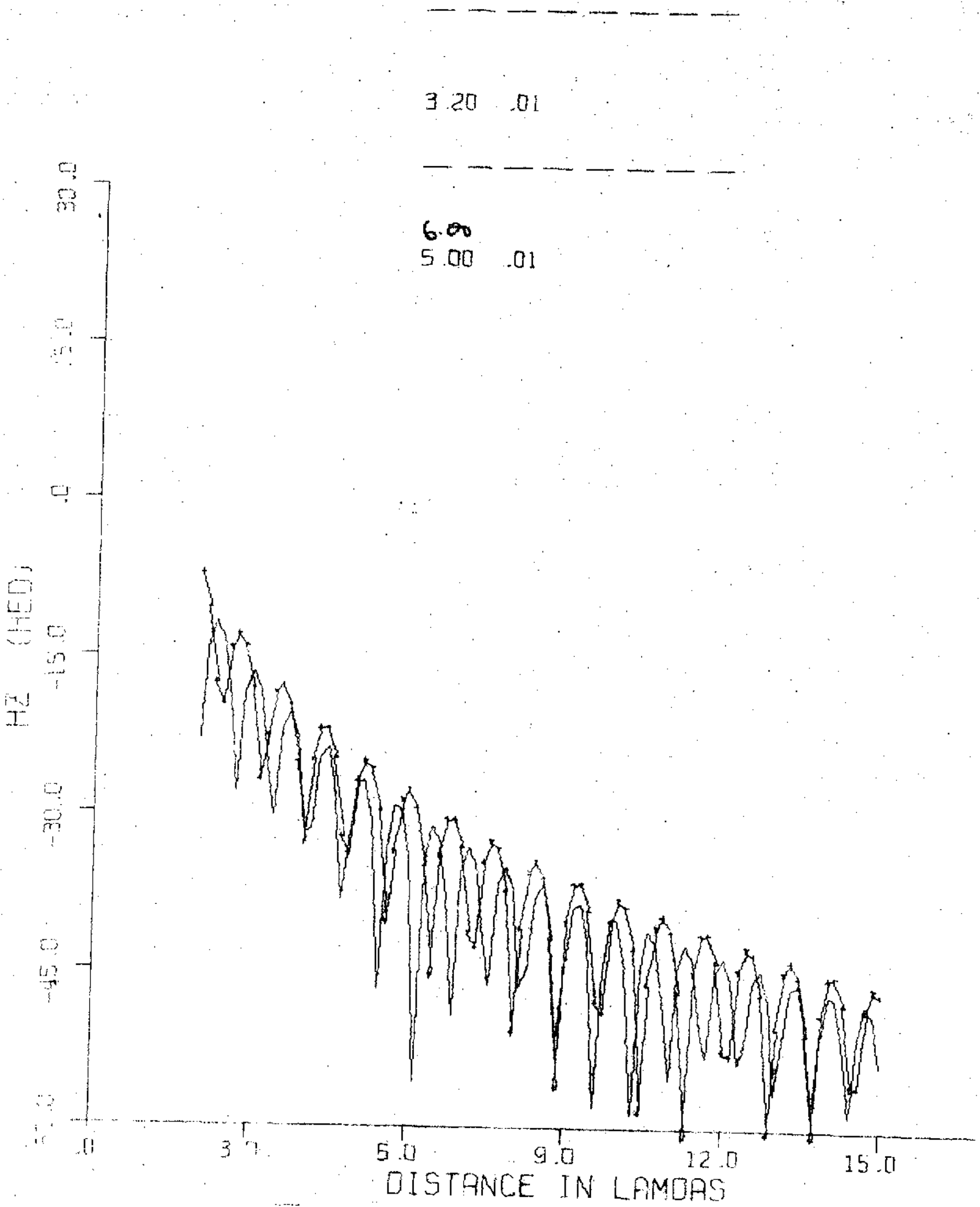
DEPTH=.05 MU= 1.0 A= 1.0

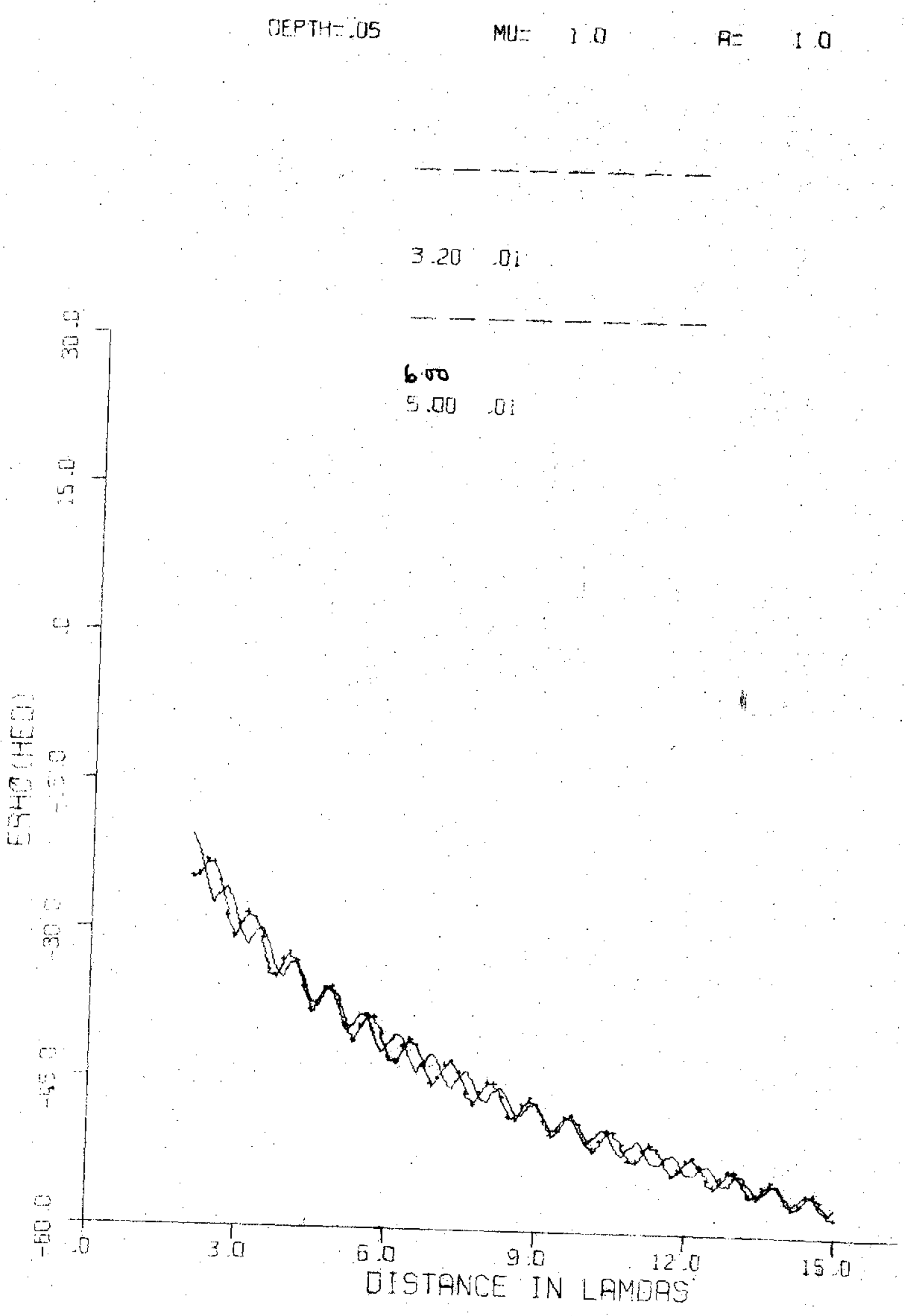



DEPTH=.05
MU= 1.0
A= 1.0
3.20 .01
6.00
5.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

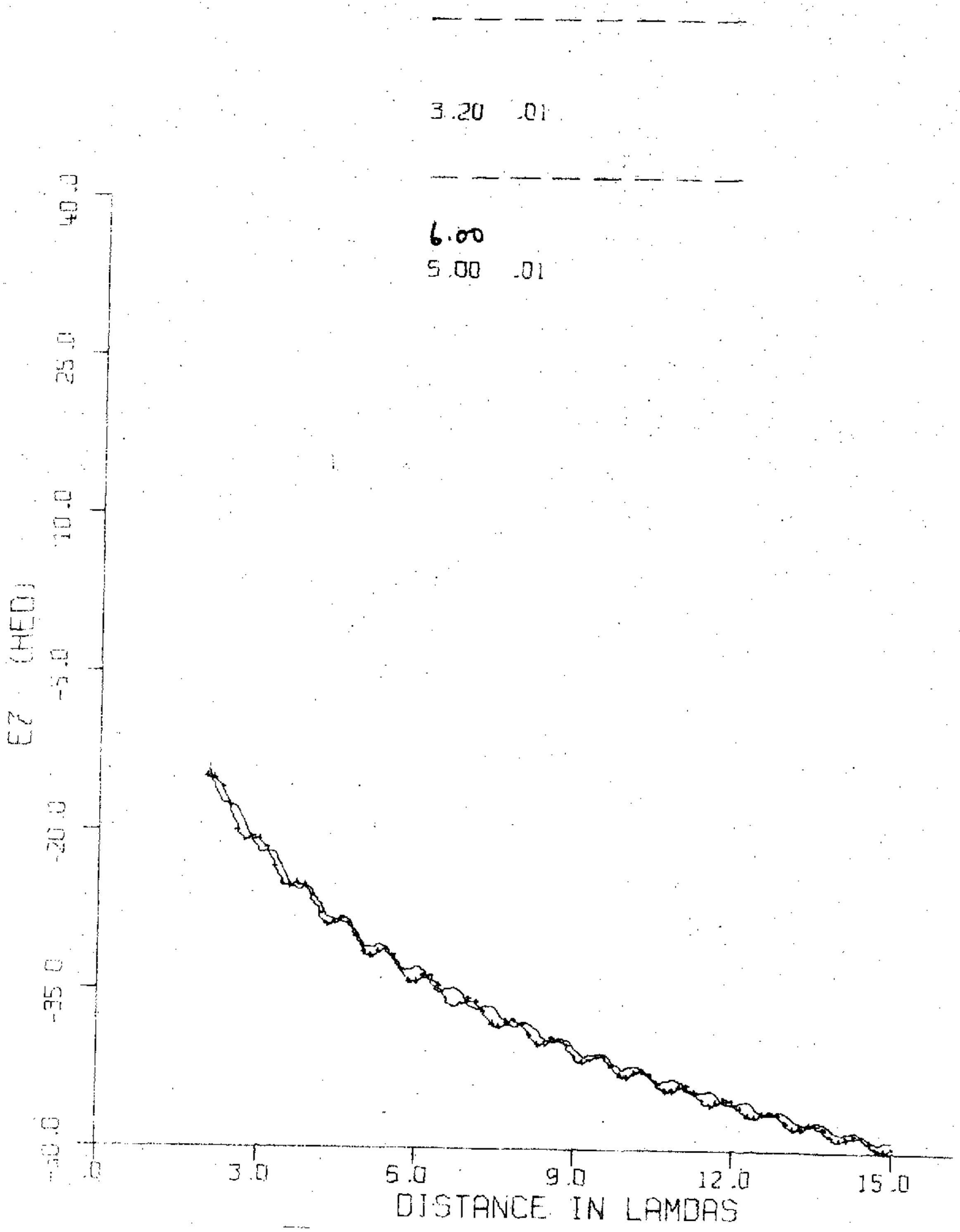

DEPTH=.05
MU= 1.0
A= 1.0
3.20 .01
6.00
5.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

DEPTH=.05 MU= 1.0 A= 1.0

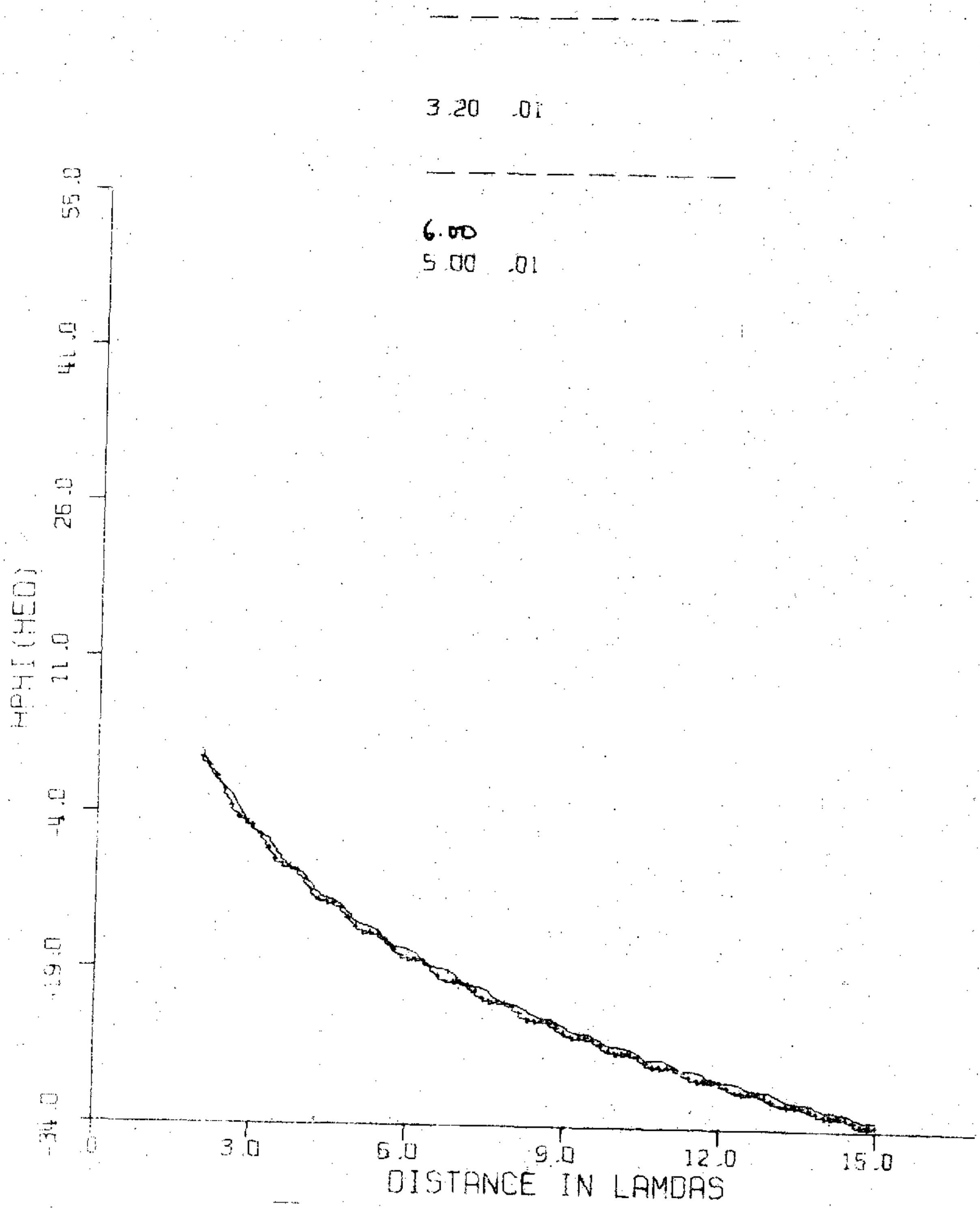



DEPTH=.05
MU= 1.0
R= 1.0
3.20 .01
6.00
5.00 .01
ERHO (HED)
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

DEPTH=.05 MU= 1.0 R= 1.0

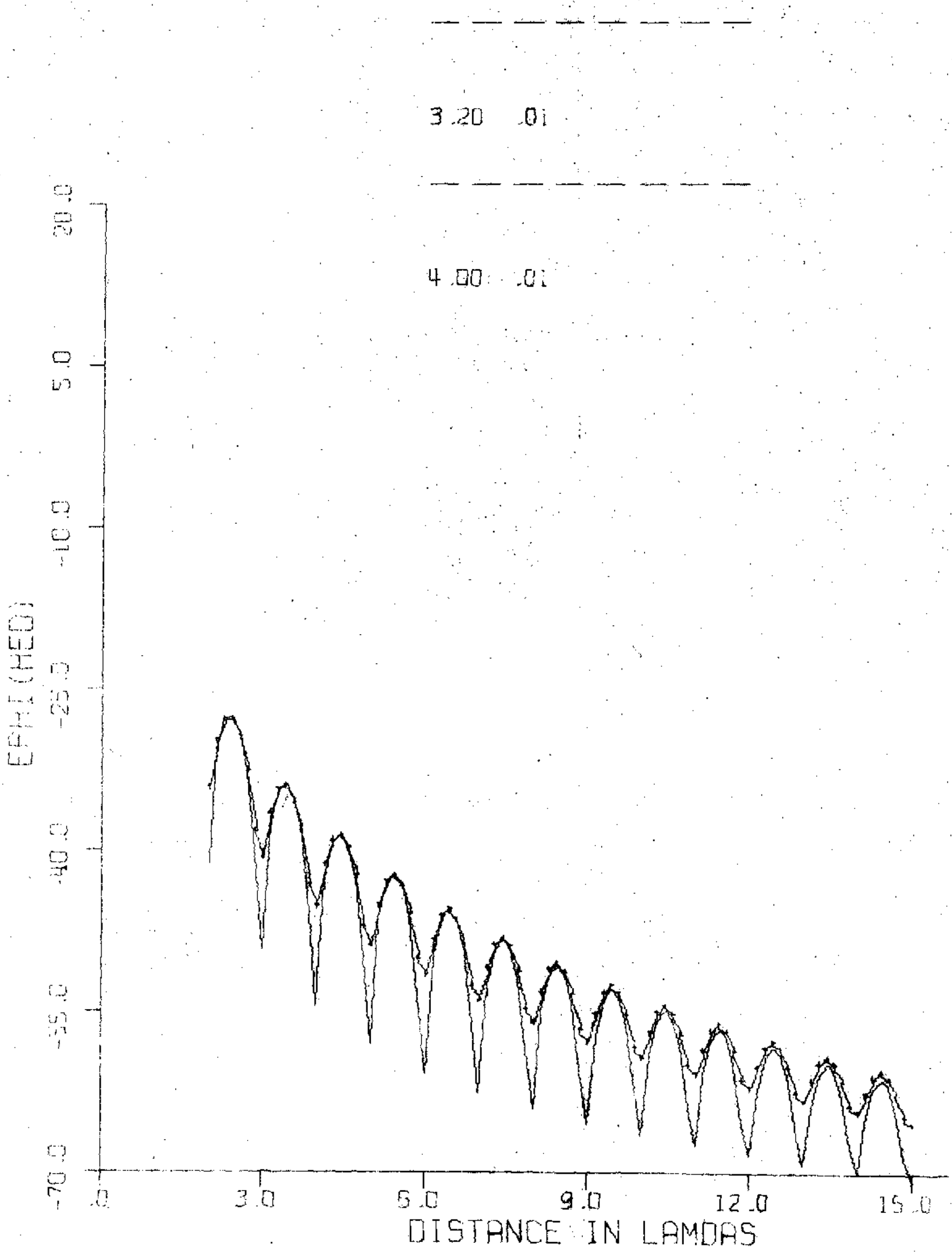


DEPTH=.05 MU= 1.0 A= 1.0



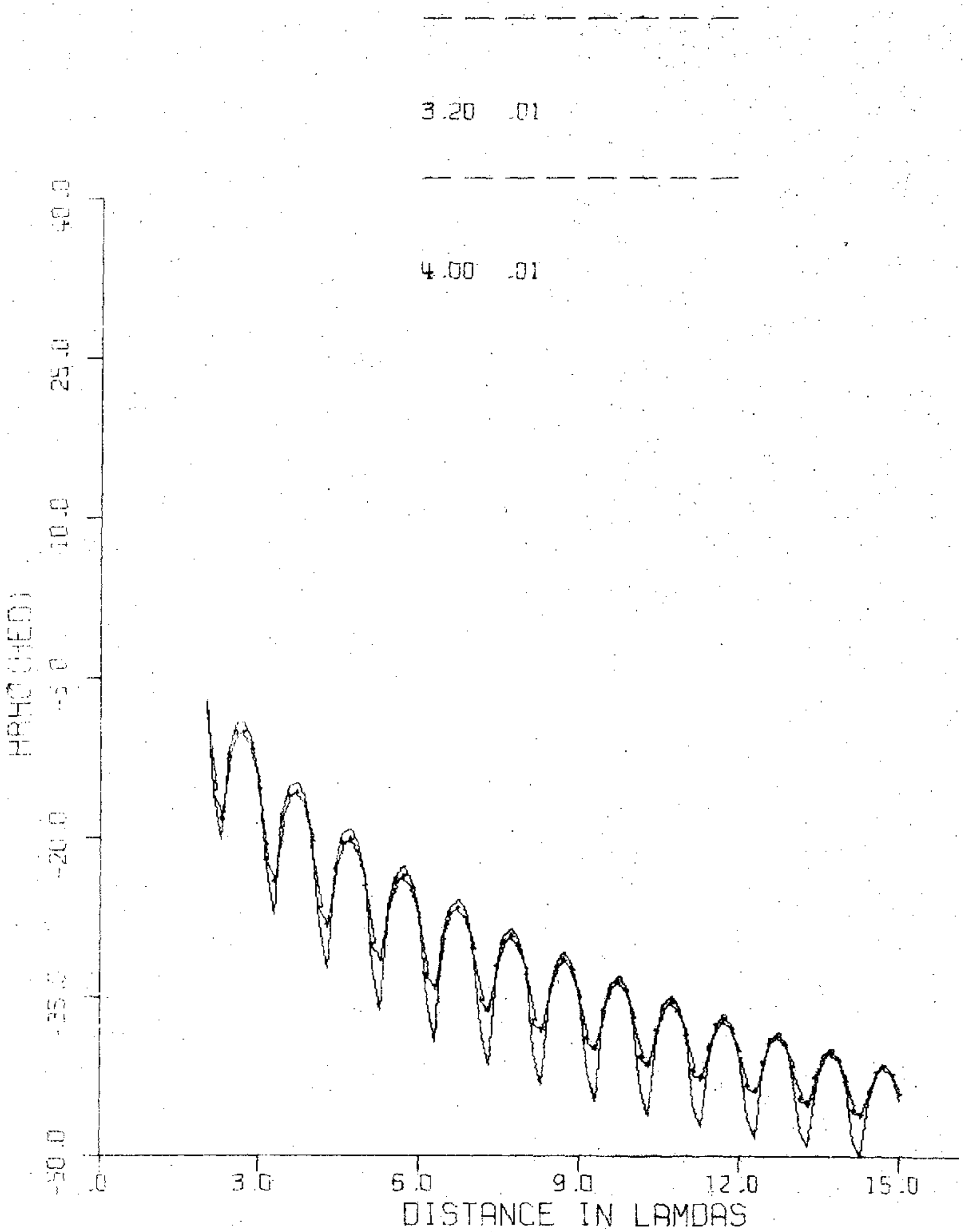
.05

DEPTH=.10 MU= 1.0 A= .8

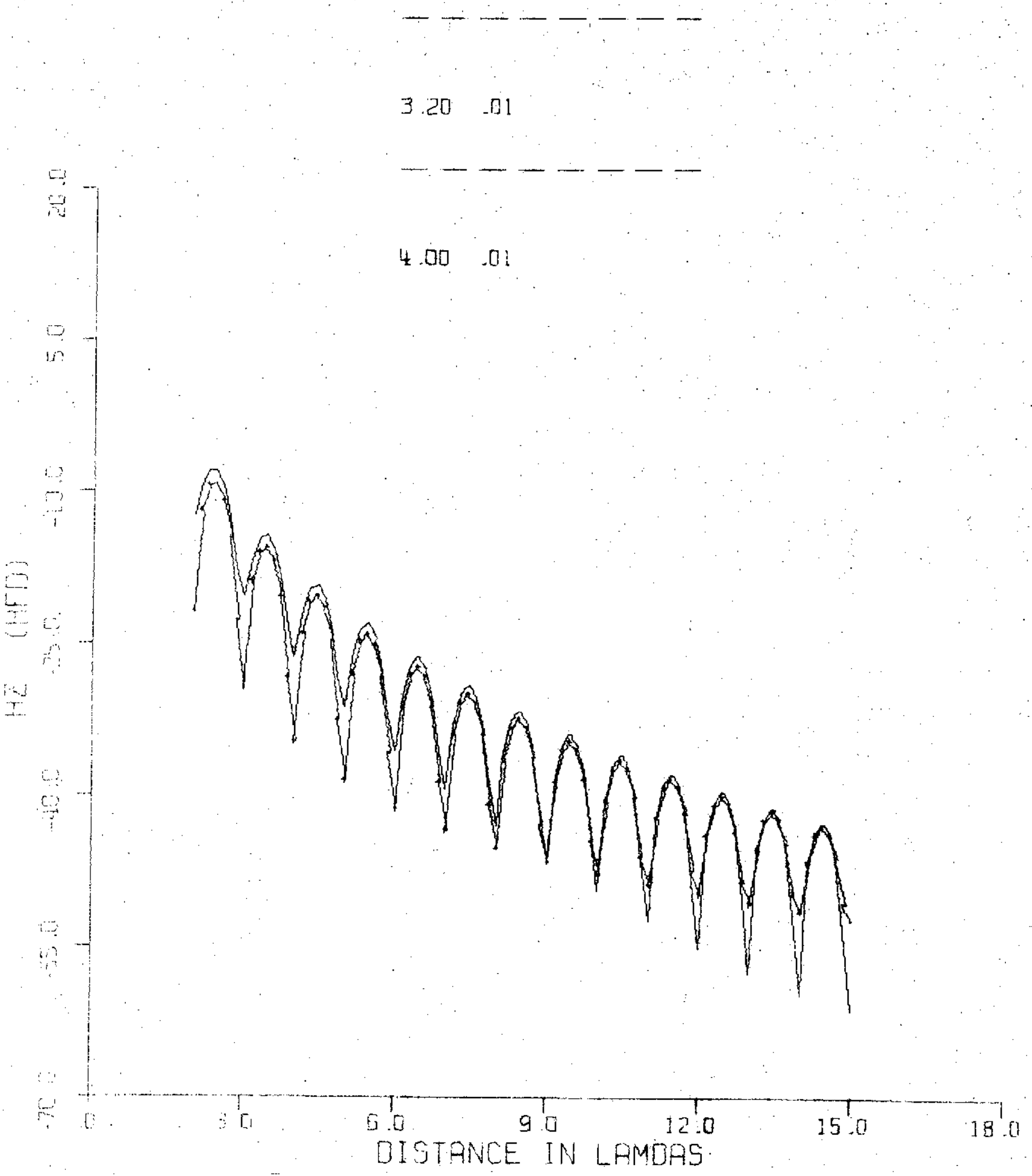


.05

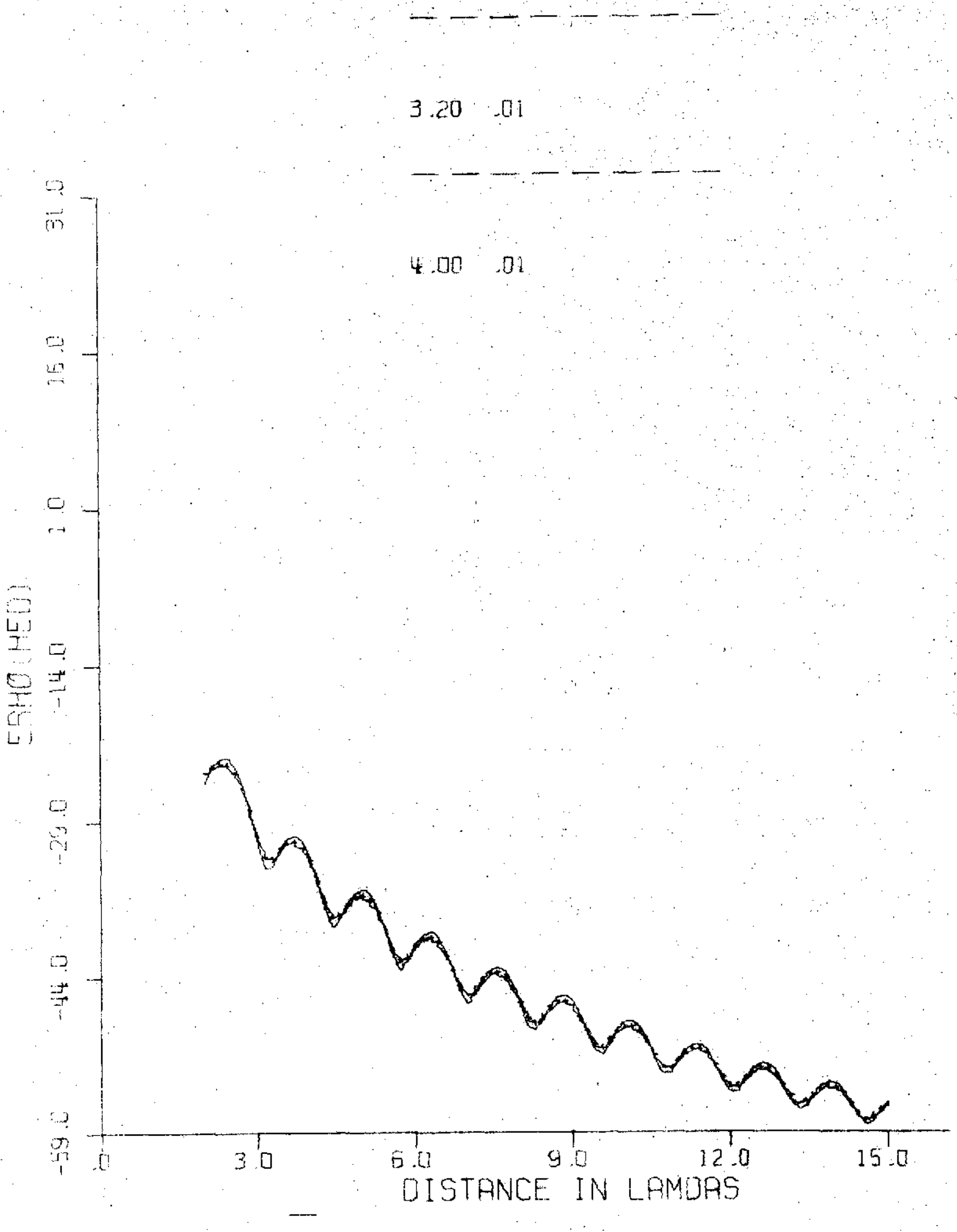
DEPTH=.10 MU= 1.0 R= .8

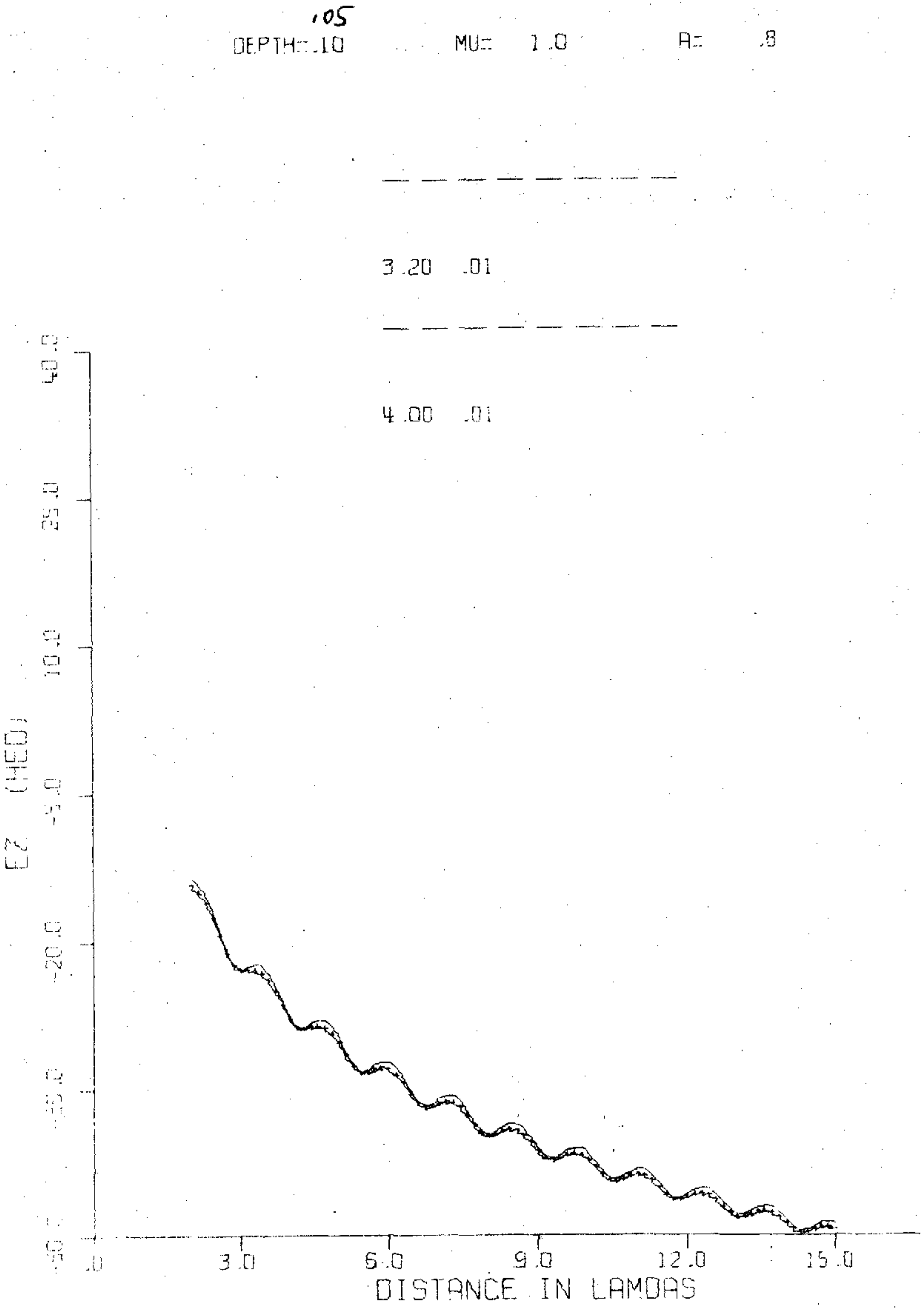


.05
DEPTH=.10 MU= 1.0 A= .8

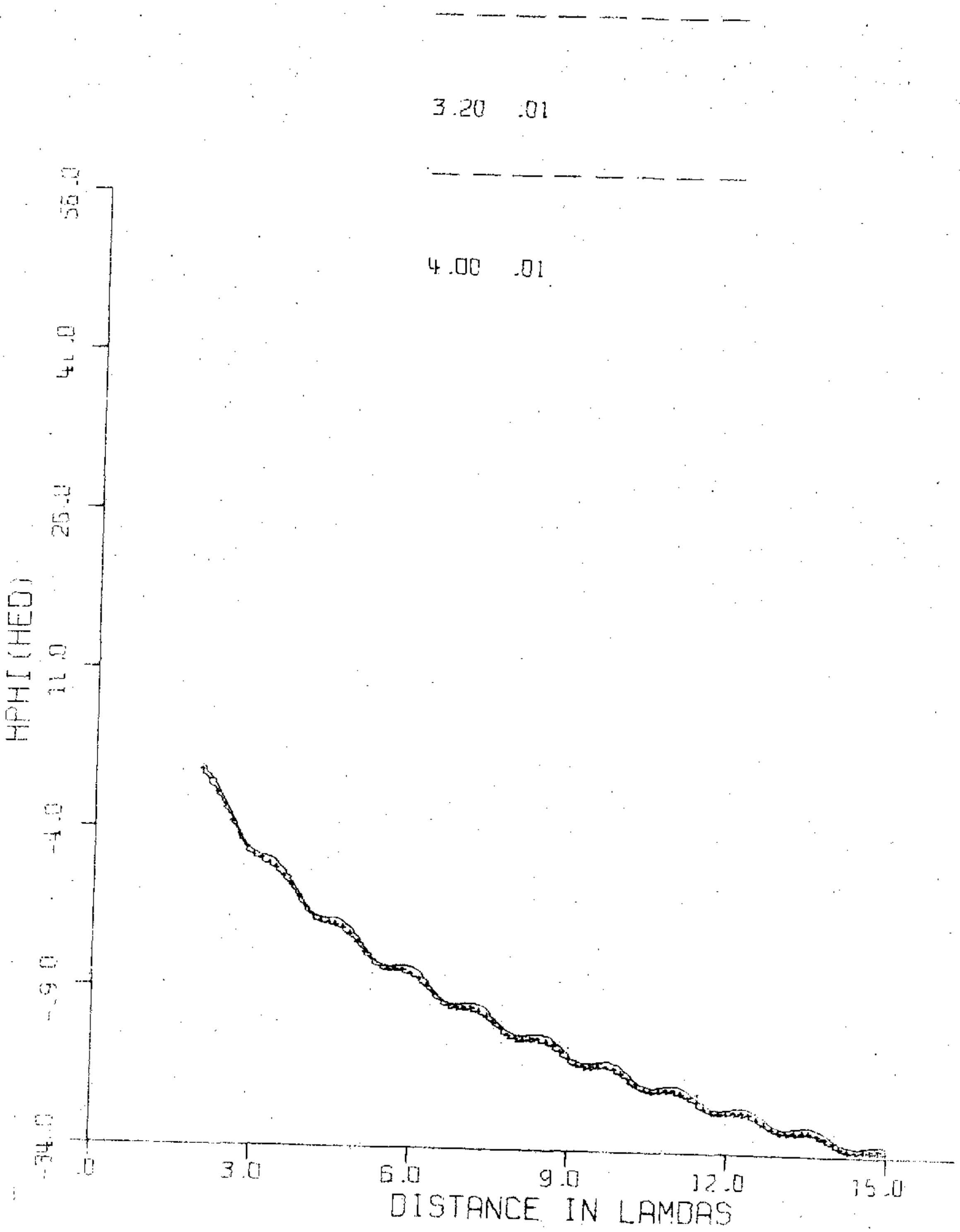


.05
DEPTH=.10 MU= 1.0 A= .8

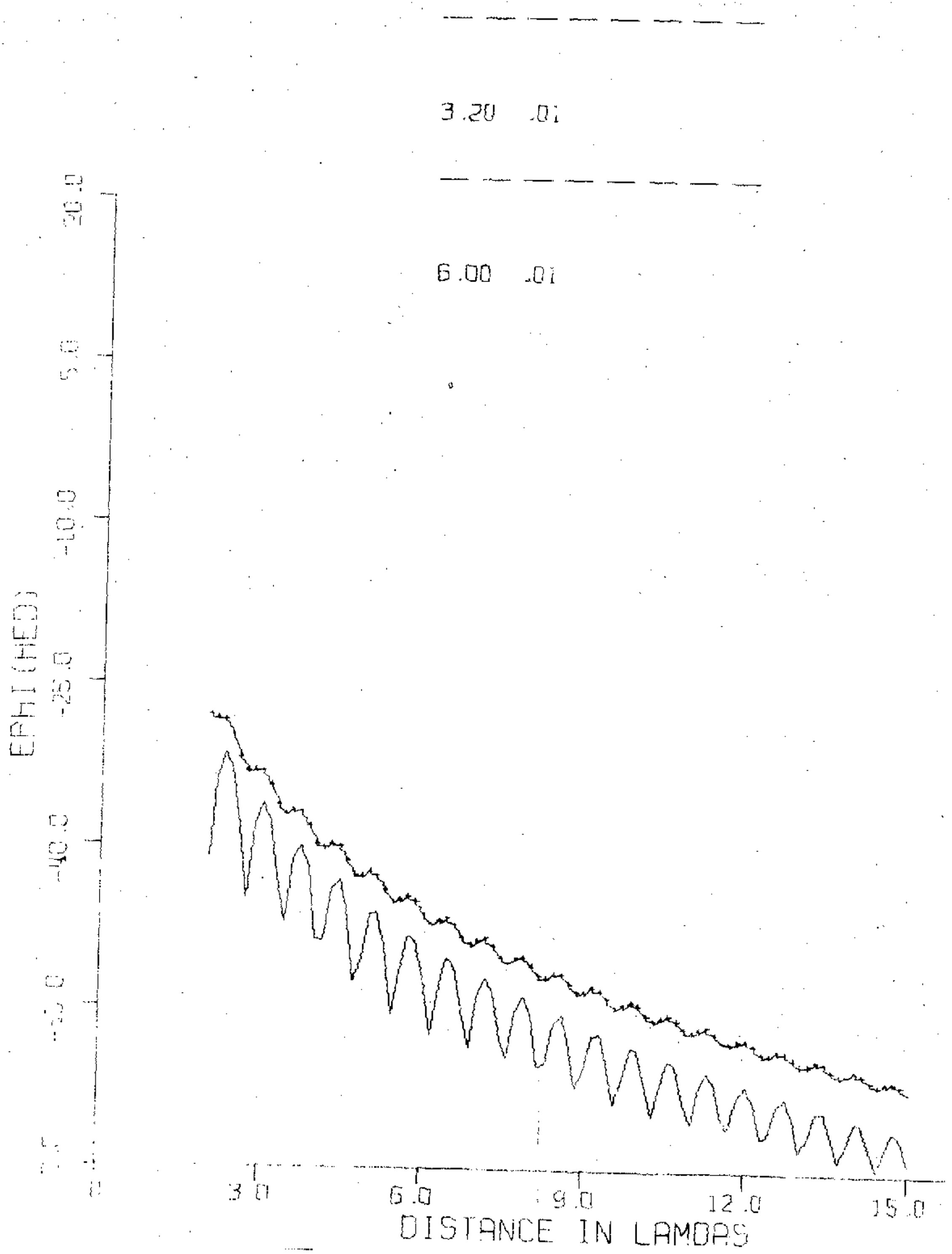


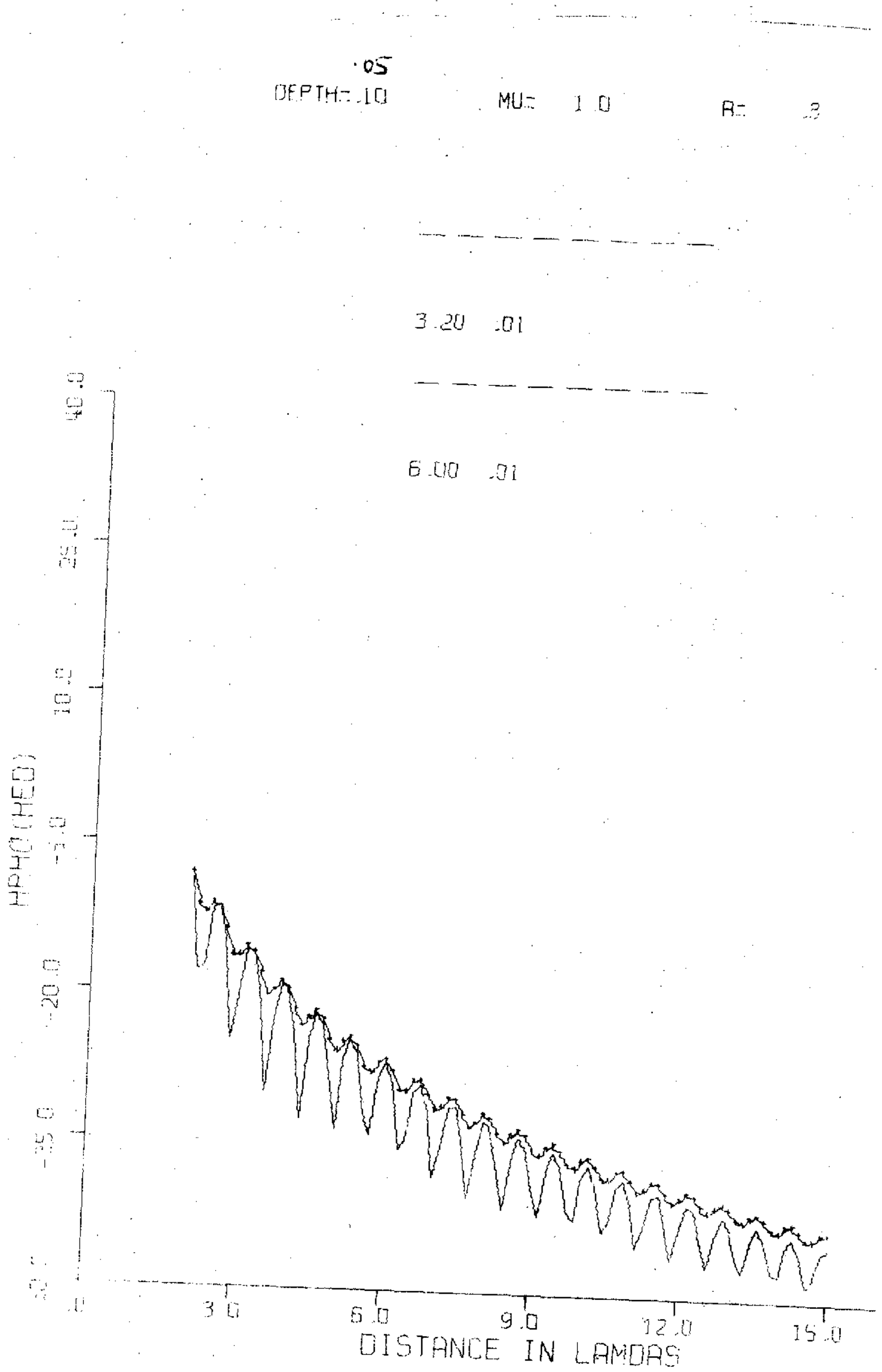

105
DEPTH=.10
MU= 1.0
A= .8
3.20 .01
4.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

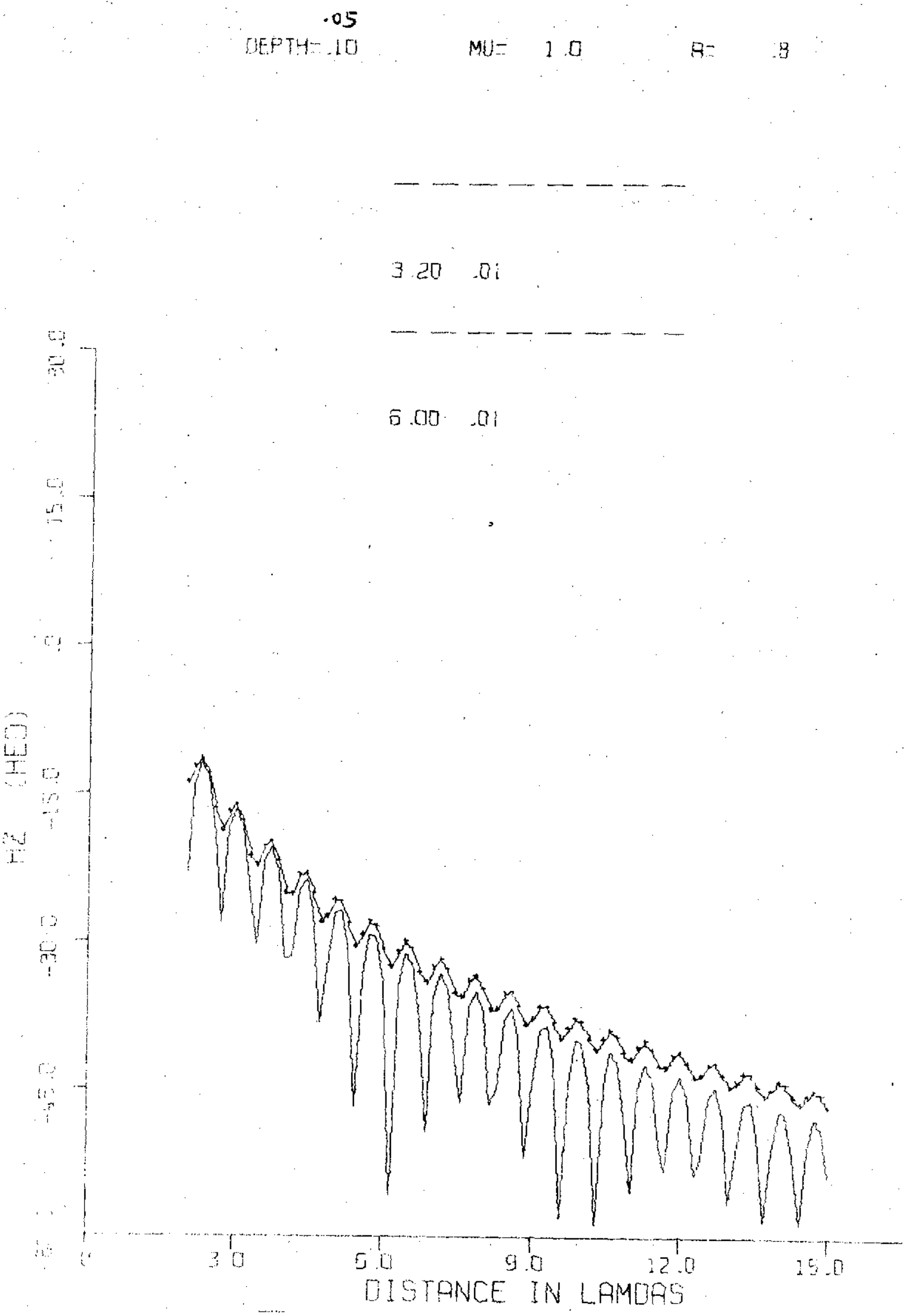
.05
DEPTH=.10 MU= 1.0 A= .8



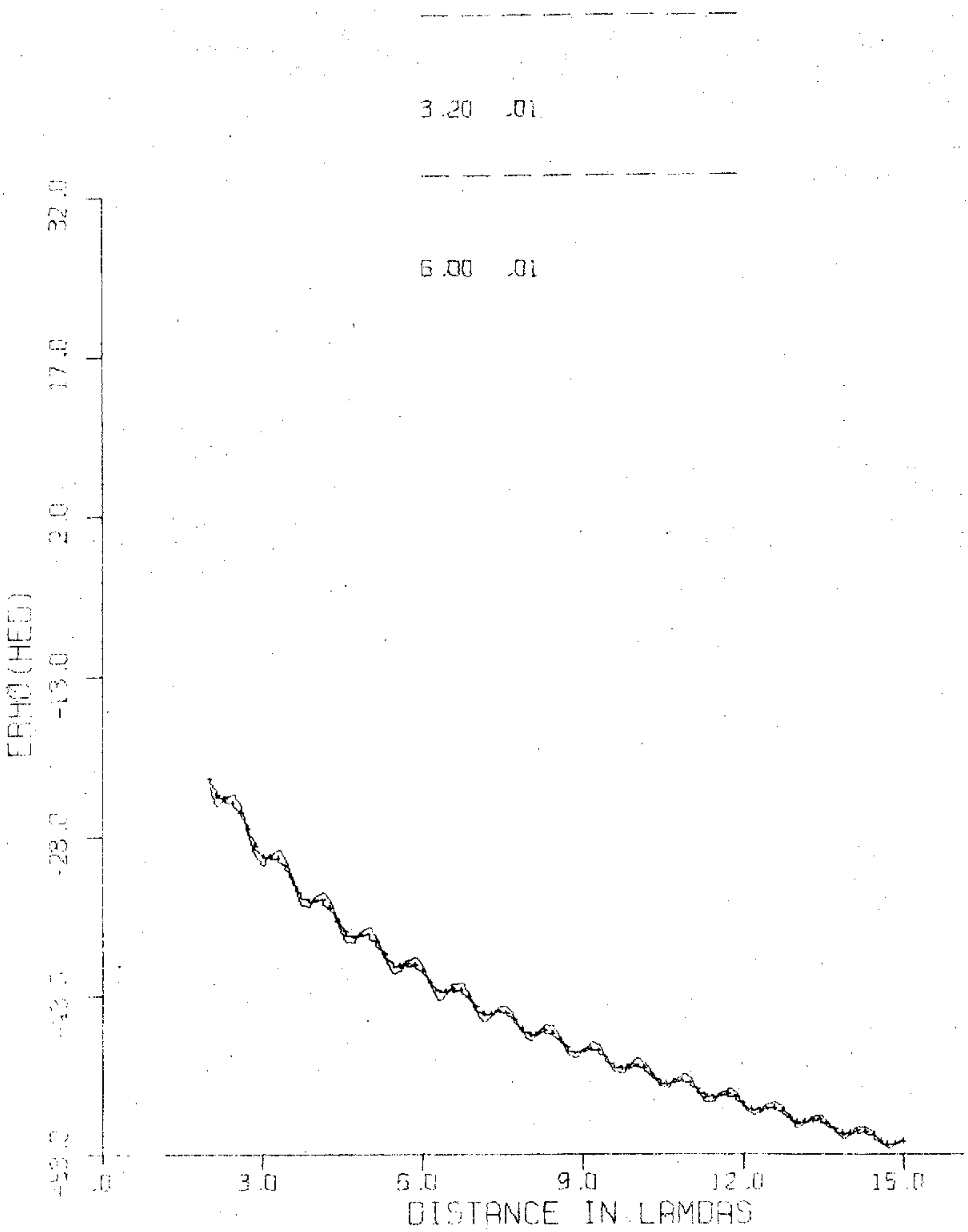
·05
DEPTH=.10 MU= 1.0 R= .8

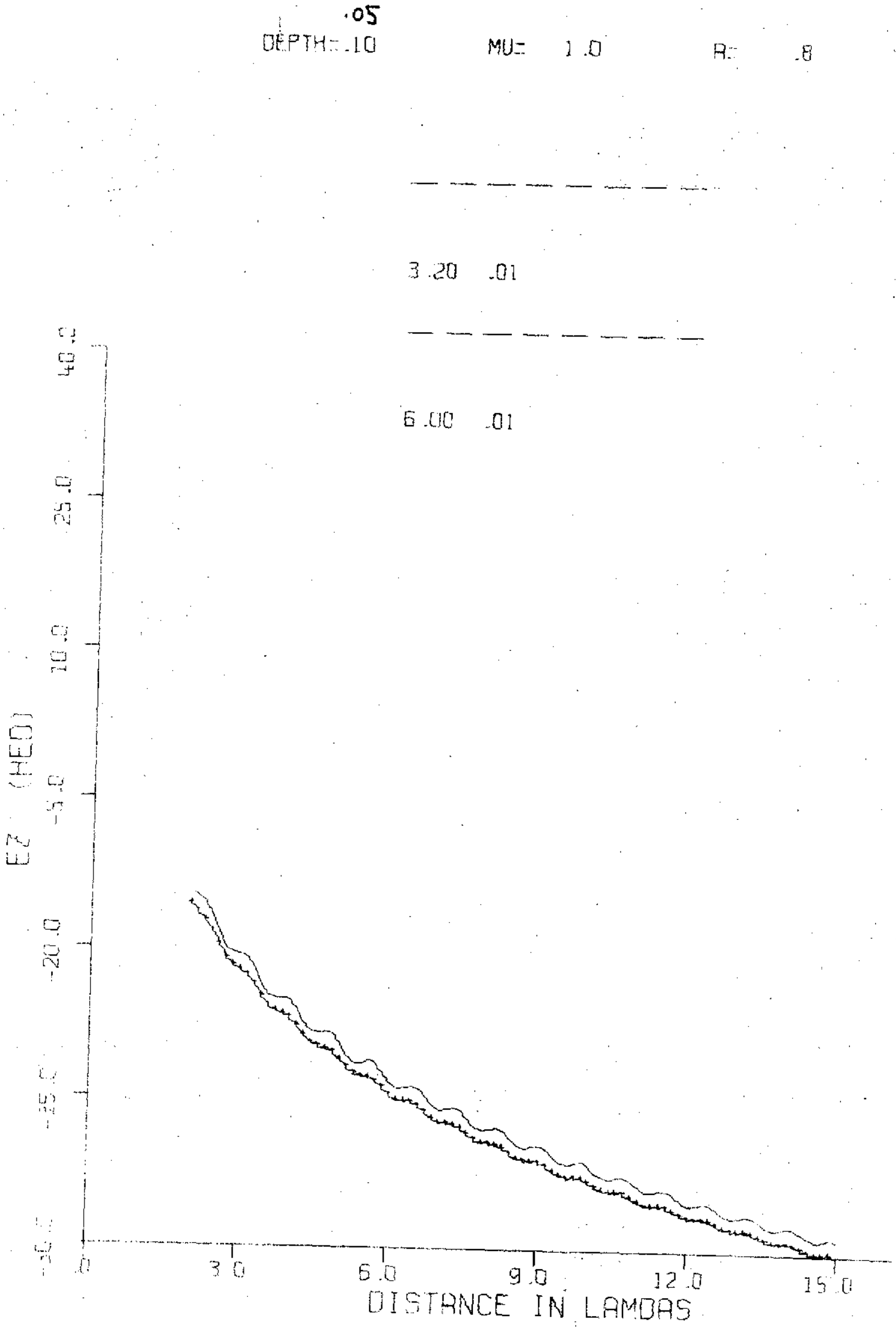



.05
DEPTH=.10
MU= 1.0
R= .3
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
APHO(RED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


.05
DEPTH=.10
MU= 1.0
A= .8
3.20 .01
6.00 .01
30.0
15.0
0
-15.0
-30.0
-45.0
HZ (HED)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

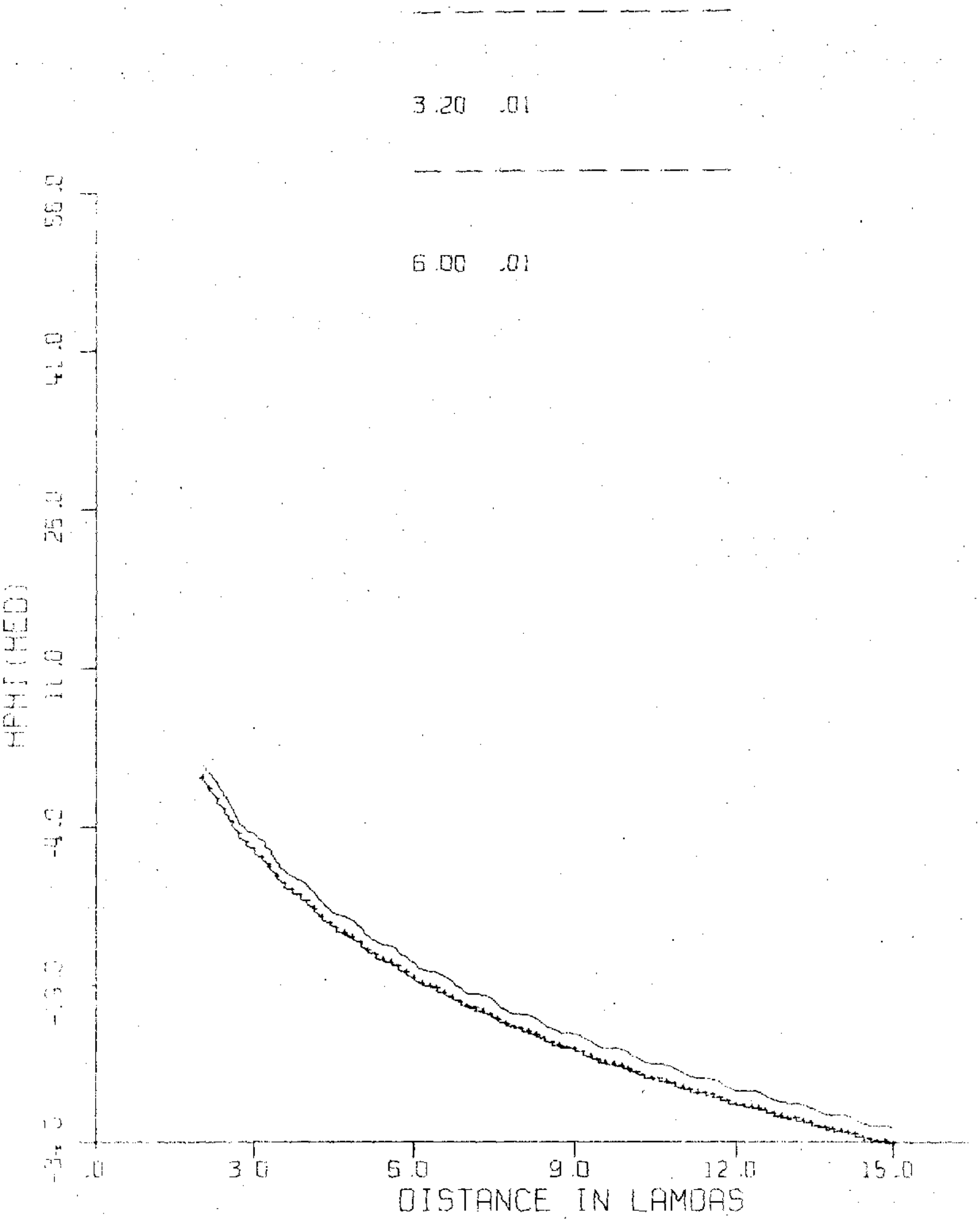
.05
DEPTH=.10 MU= 1.0 A= .8

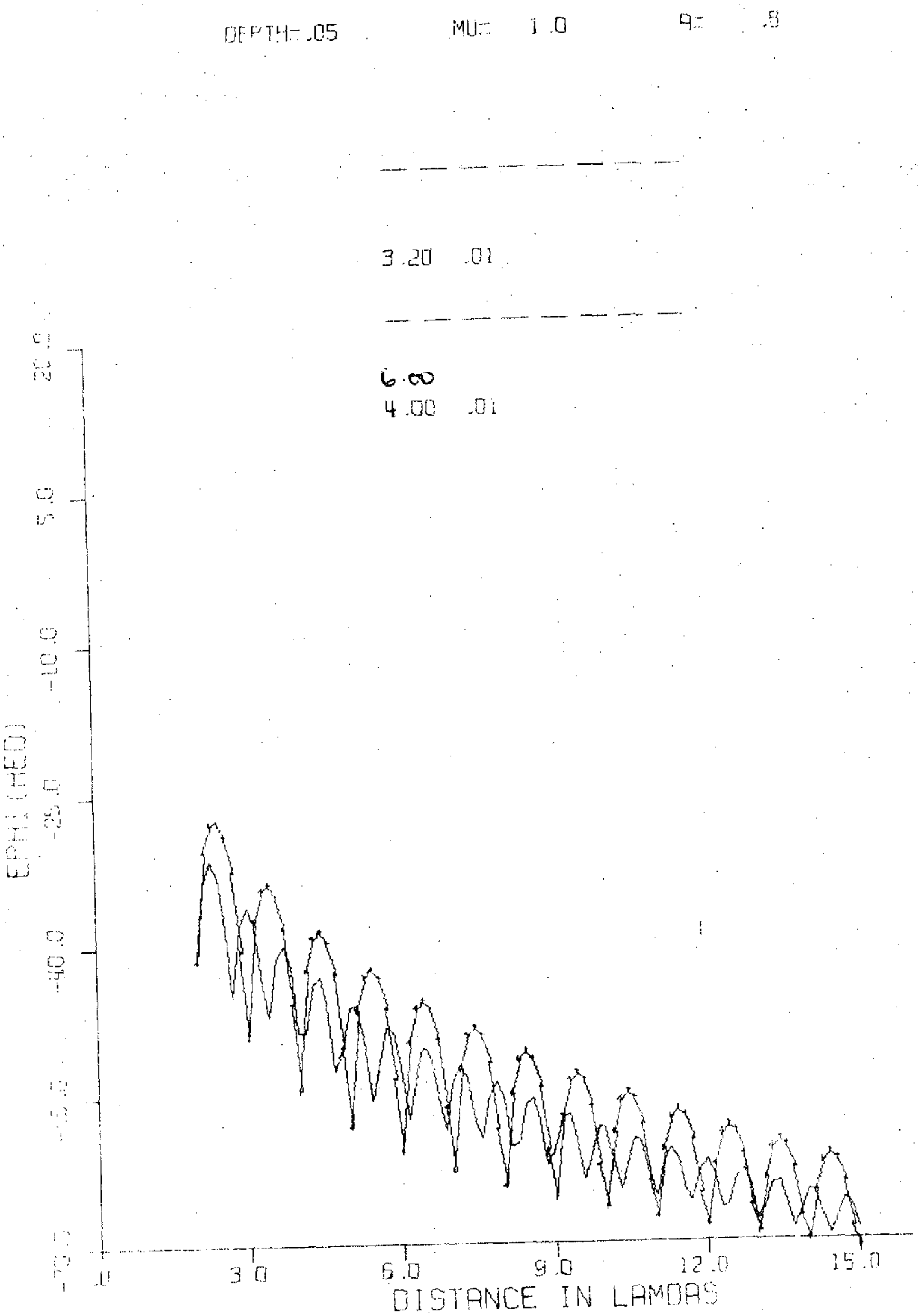


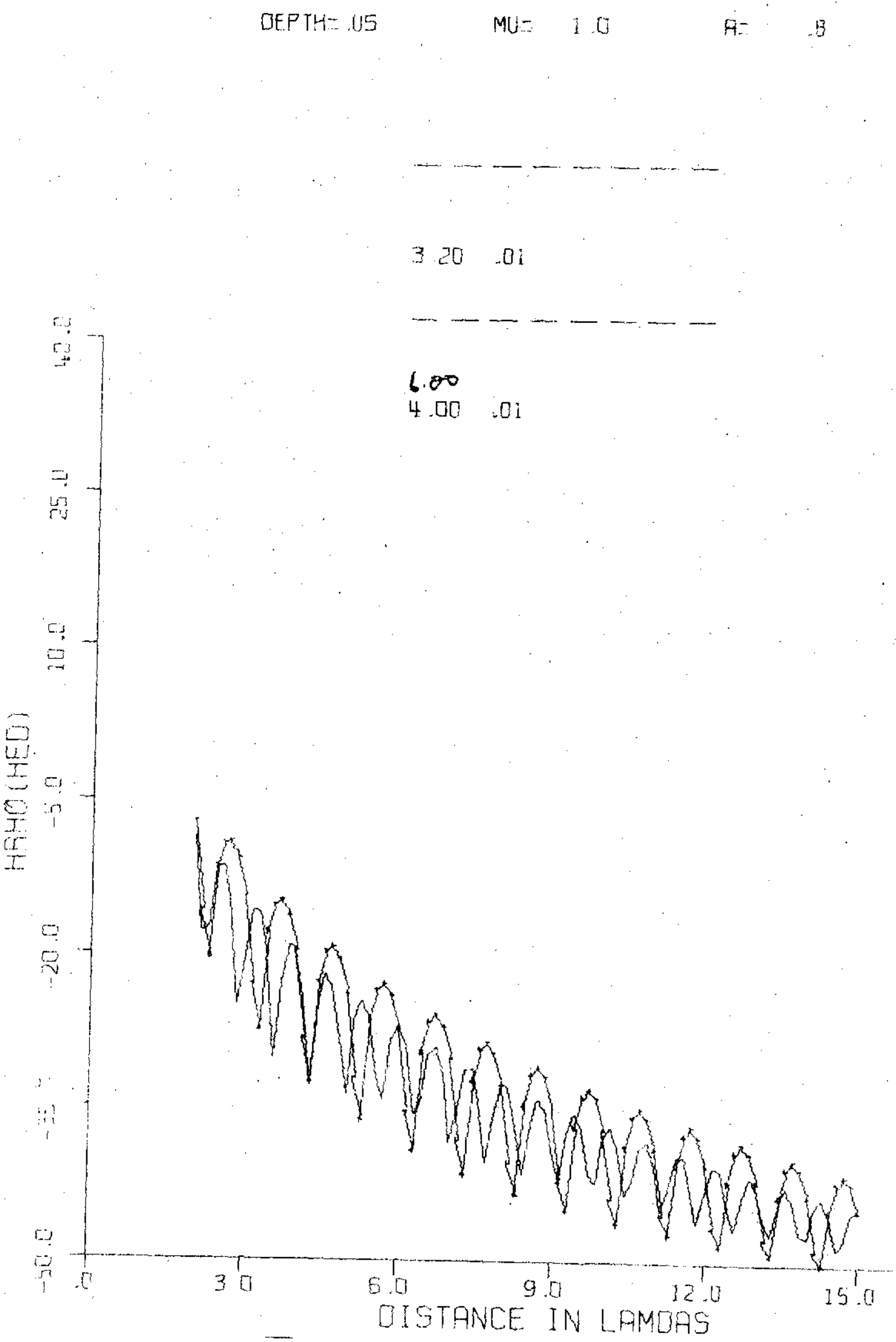

.05
DEPTH=.10
MU= 1.0
R= .8
3.20 .01
6.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMBDAS

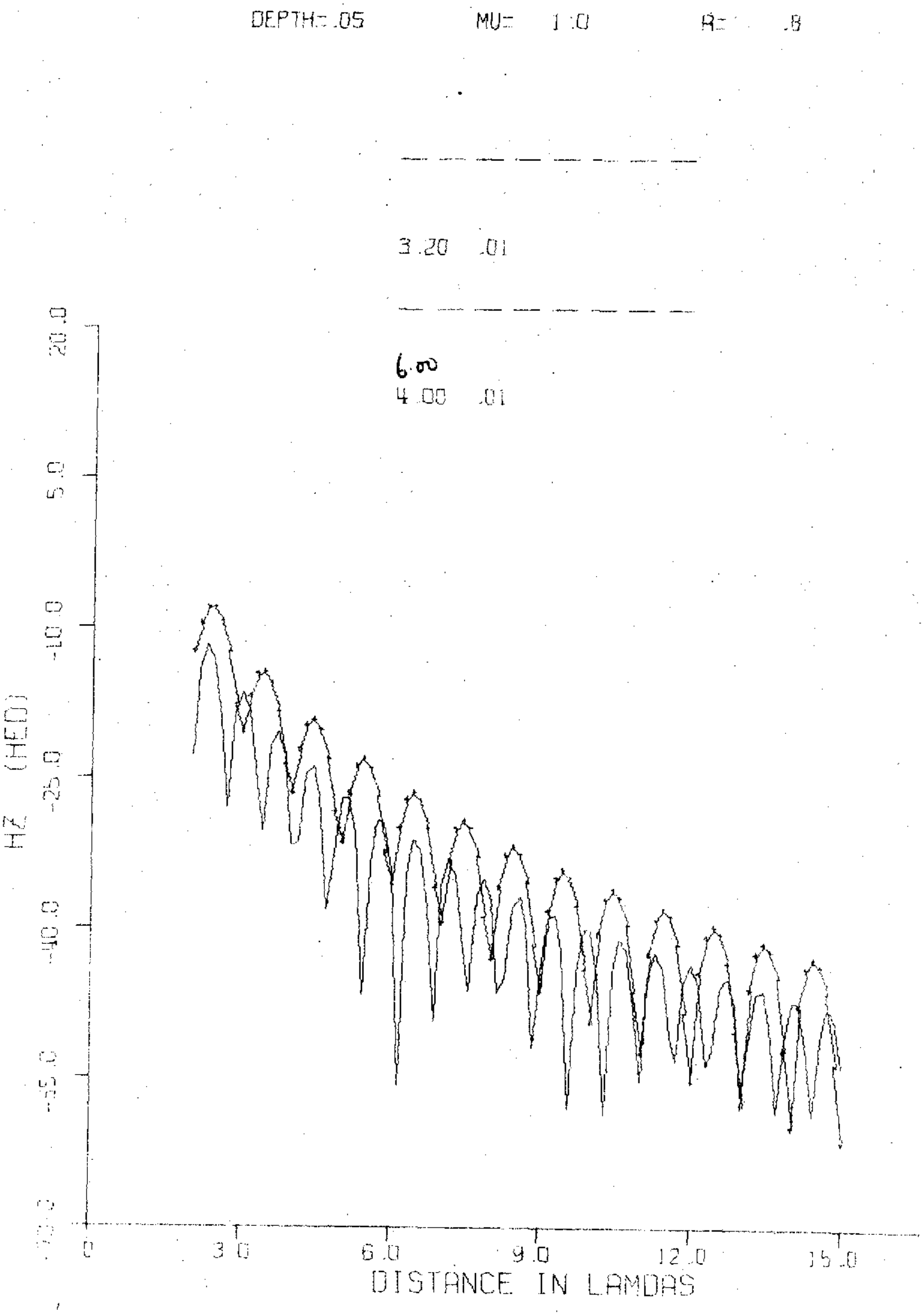
.05

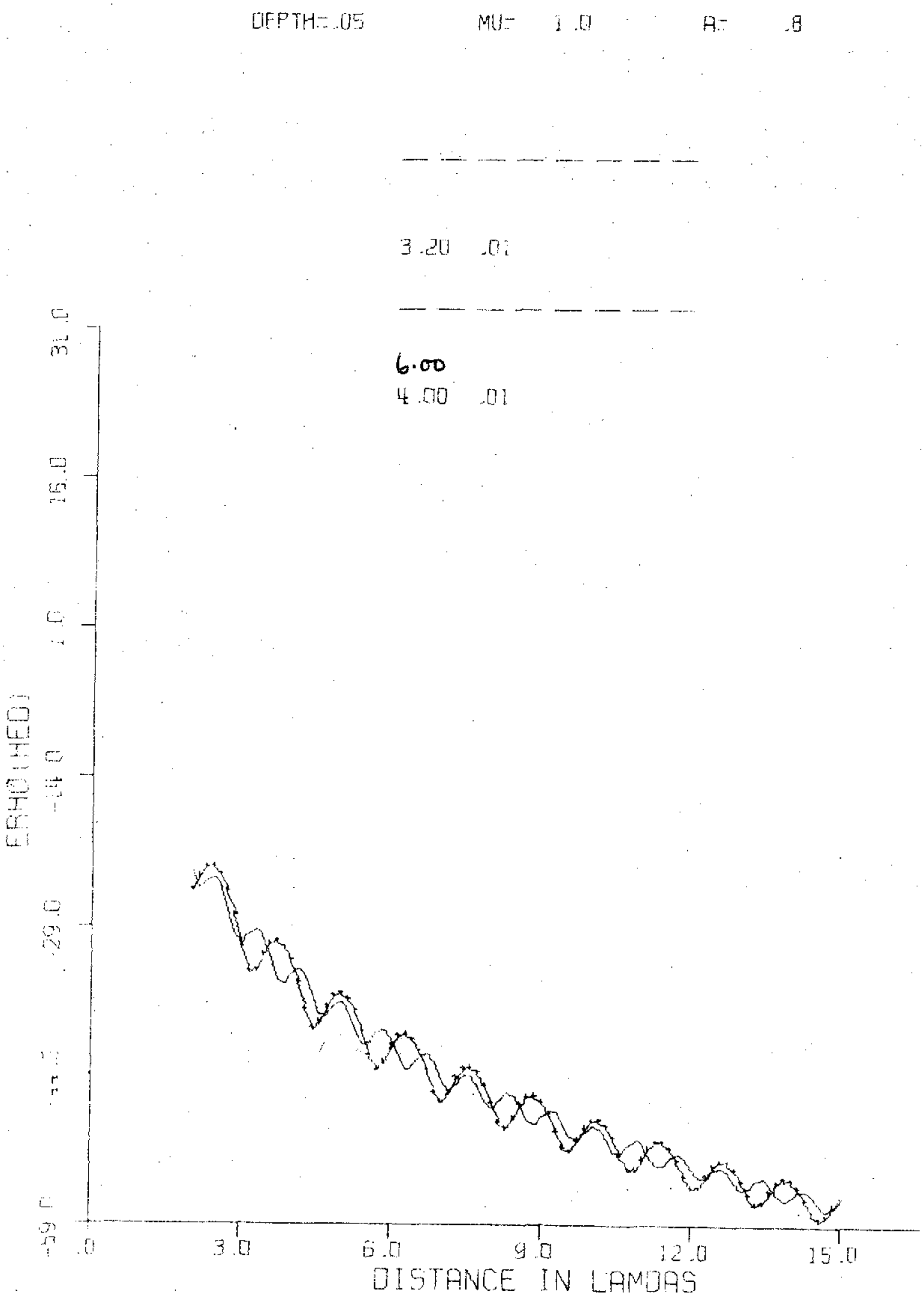
DEPTH= .10 MU= 1.0 A= .8



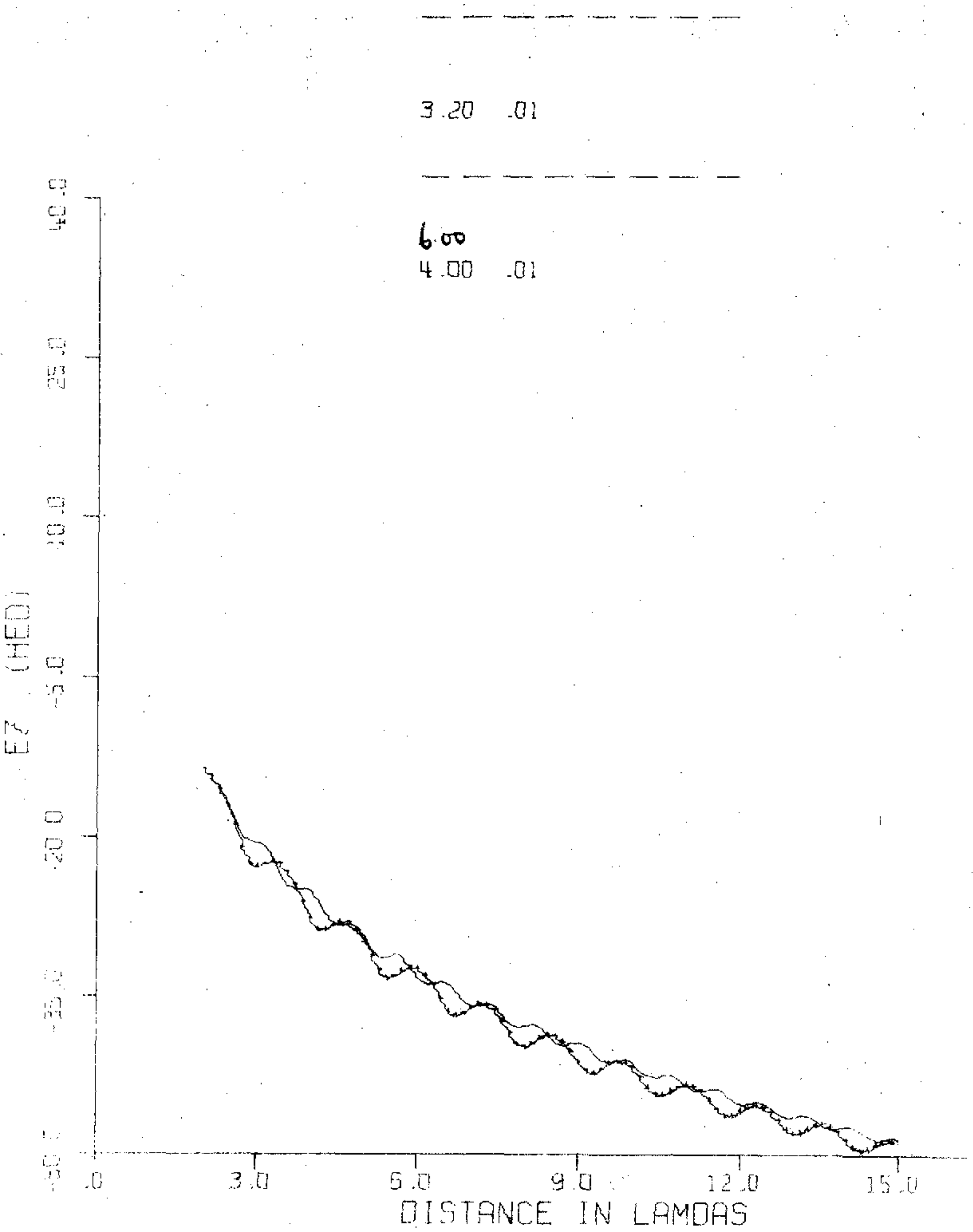

DEPTH=.05
MU= 1.0
A= .8
3.20 .01
6.00
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI (RED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH= .05
MU= 1.0
A= .8
3.20 .01
6.00
4.00 .01
HAHO(HED)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

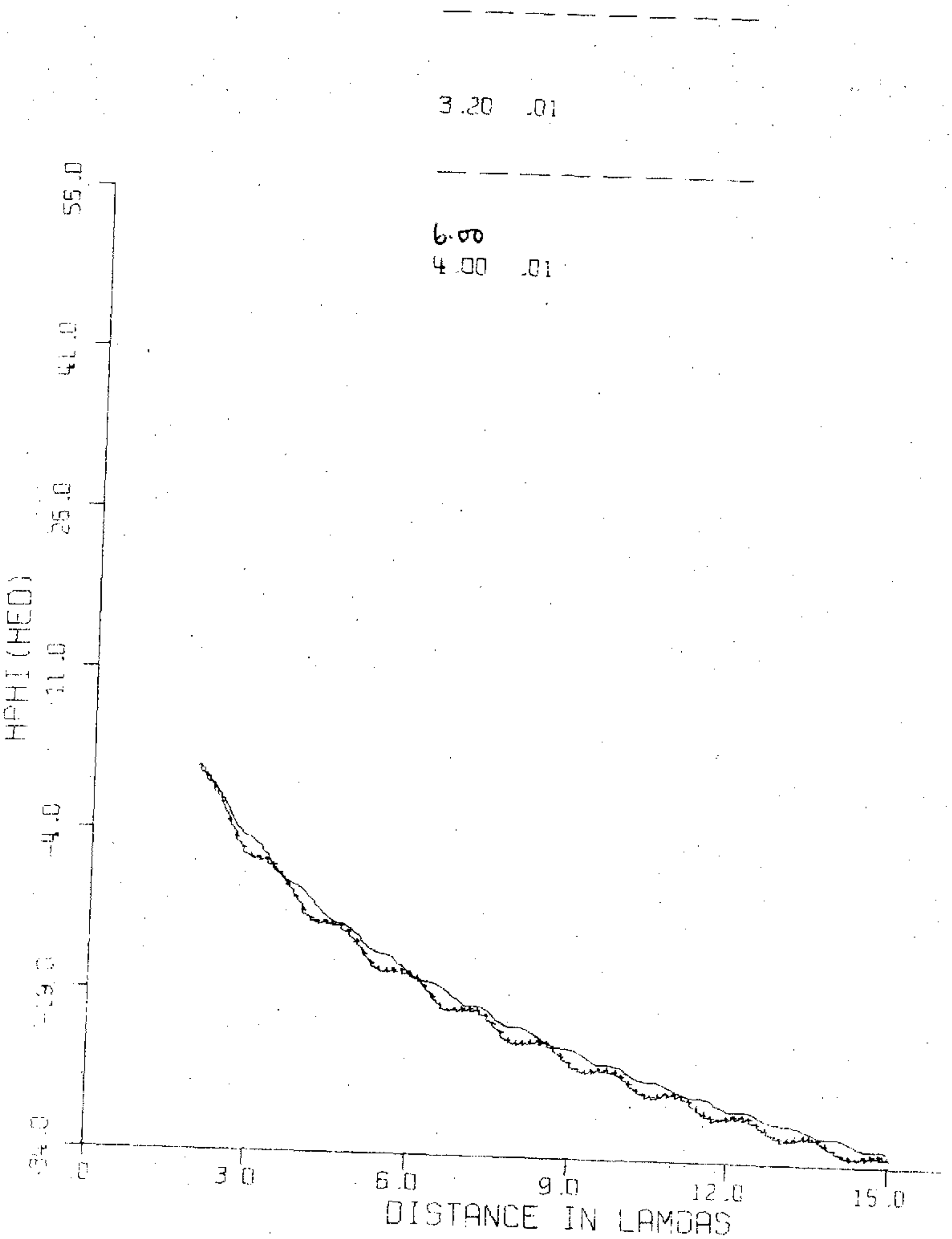

DEPTH=.05
MU= 1.0
R= .8
3.20 .01
6.00
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
HZ (HED)
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= .8
3.20 .01
6.00
4.00 .01
31.0
16.0
1.0
-14.0
-29.0
-59.0
ERHO(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

DEPTH=.05 MU= 1.0 R= .5

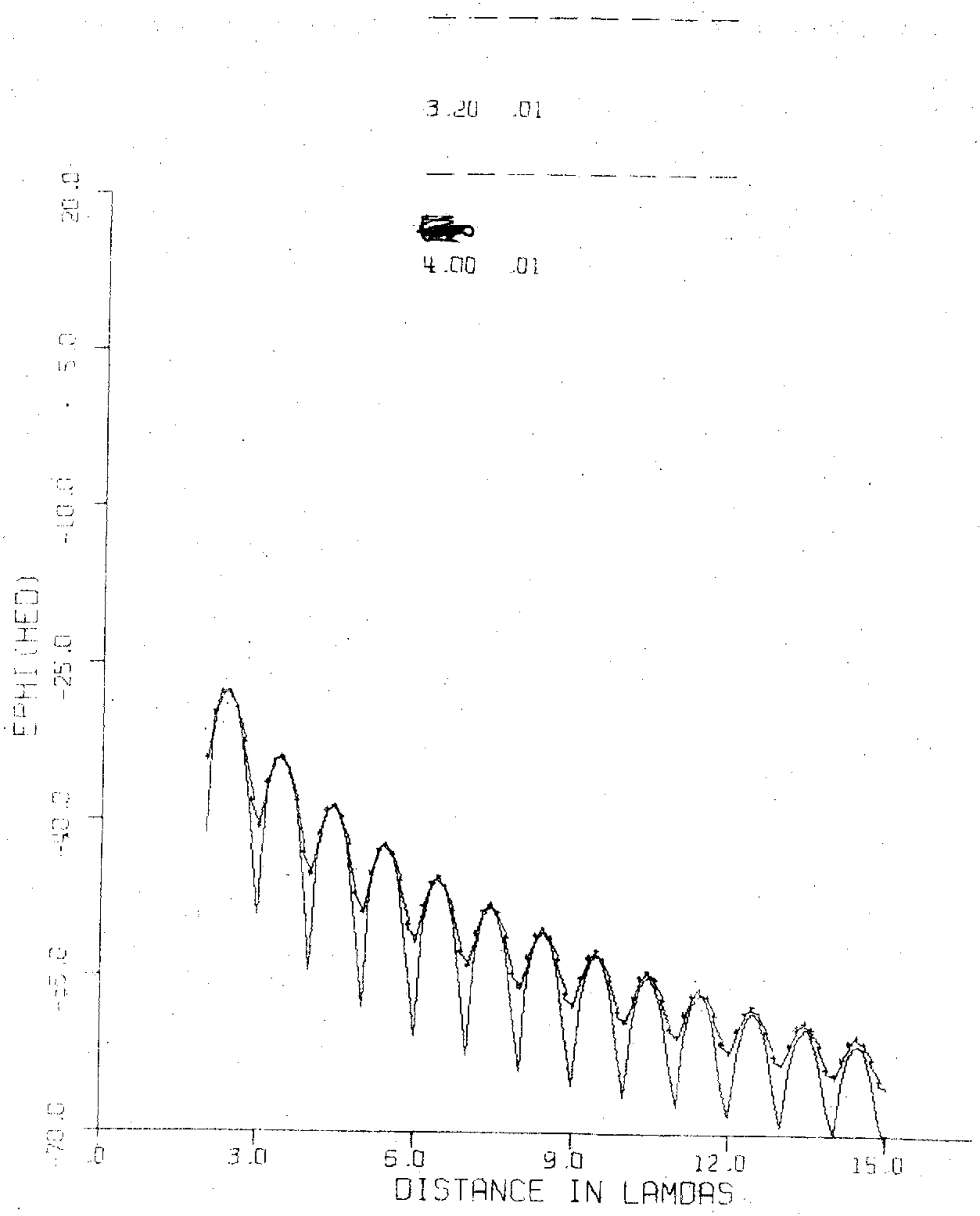


DEPTH= .05 MU= 1.0 R= .8

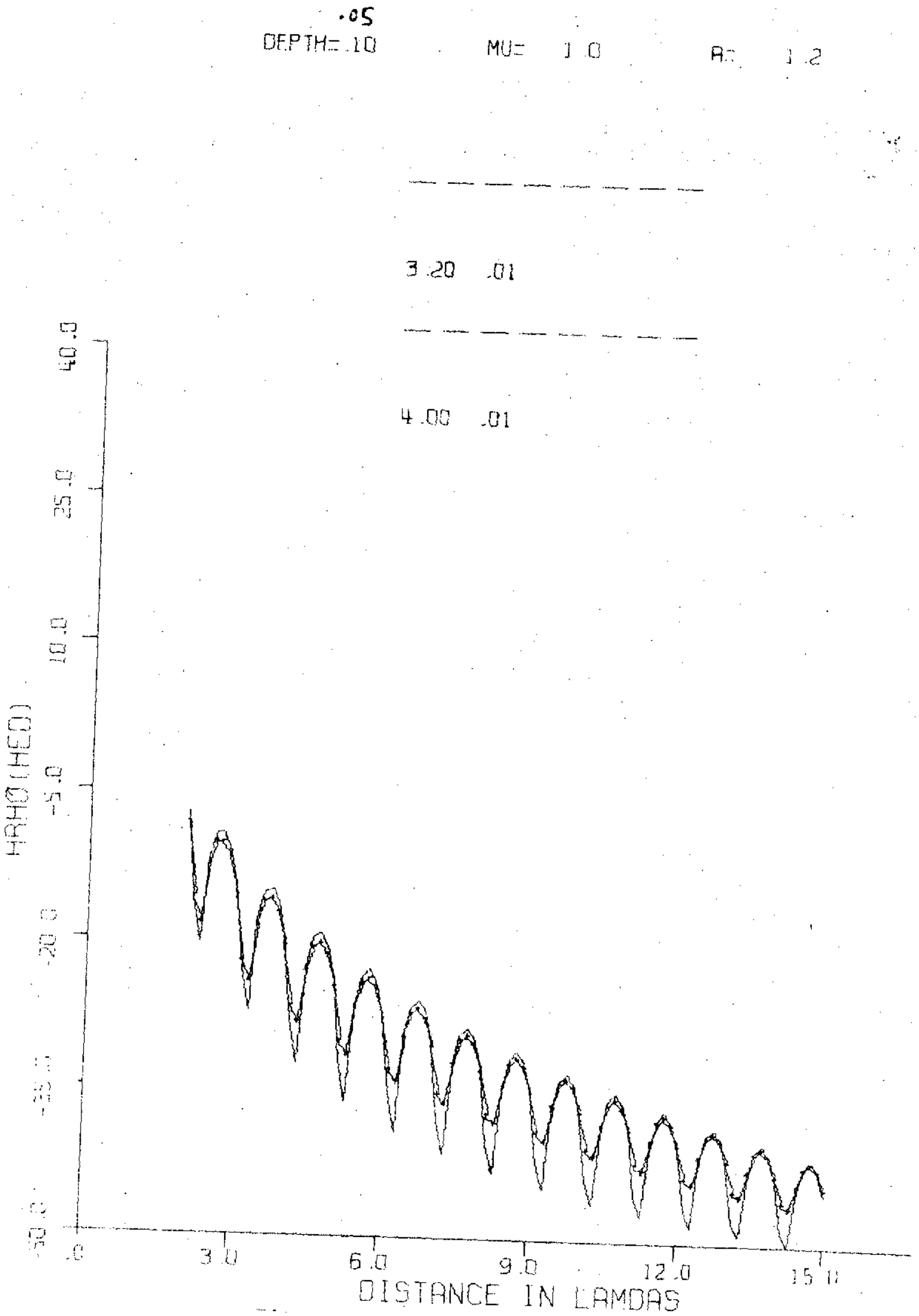


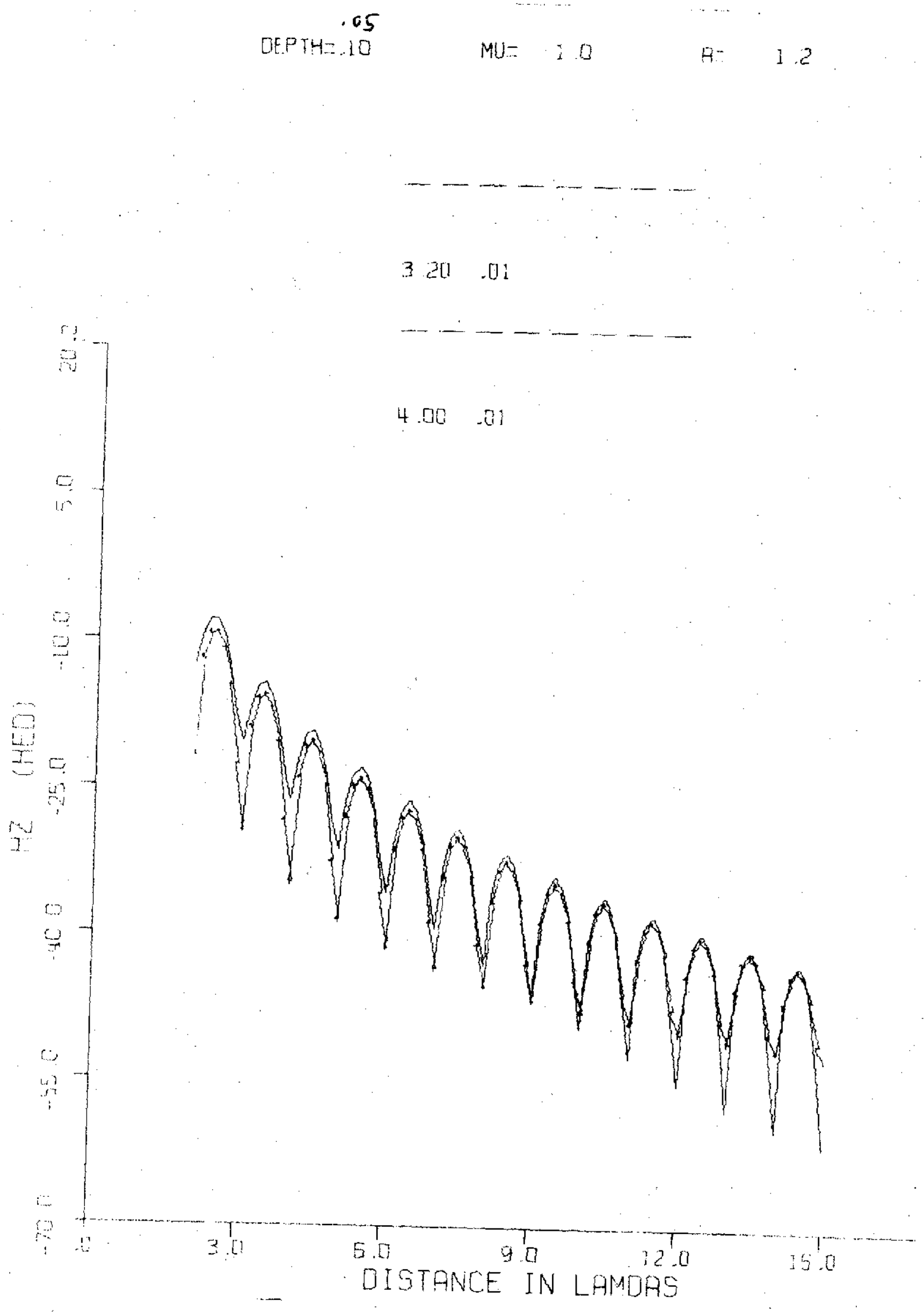
.05

DEPTH=.10 MU= 1.0 R= 1.2

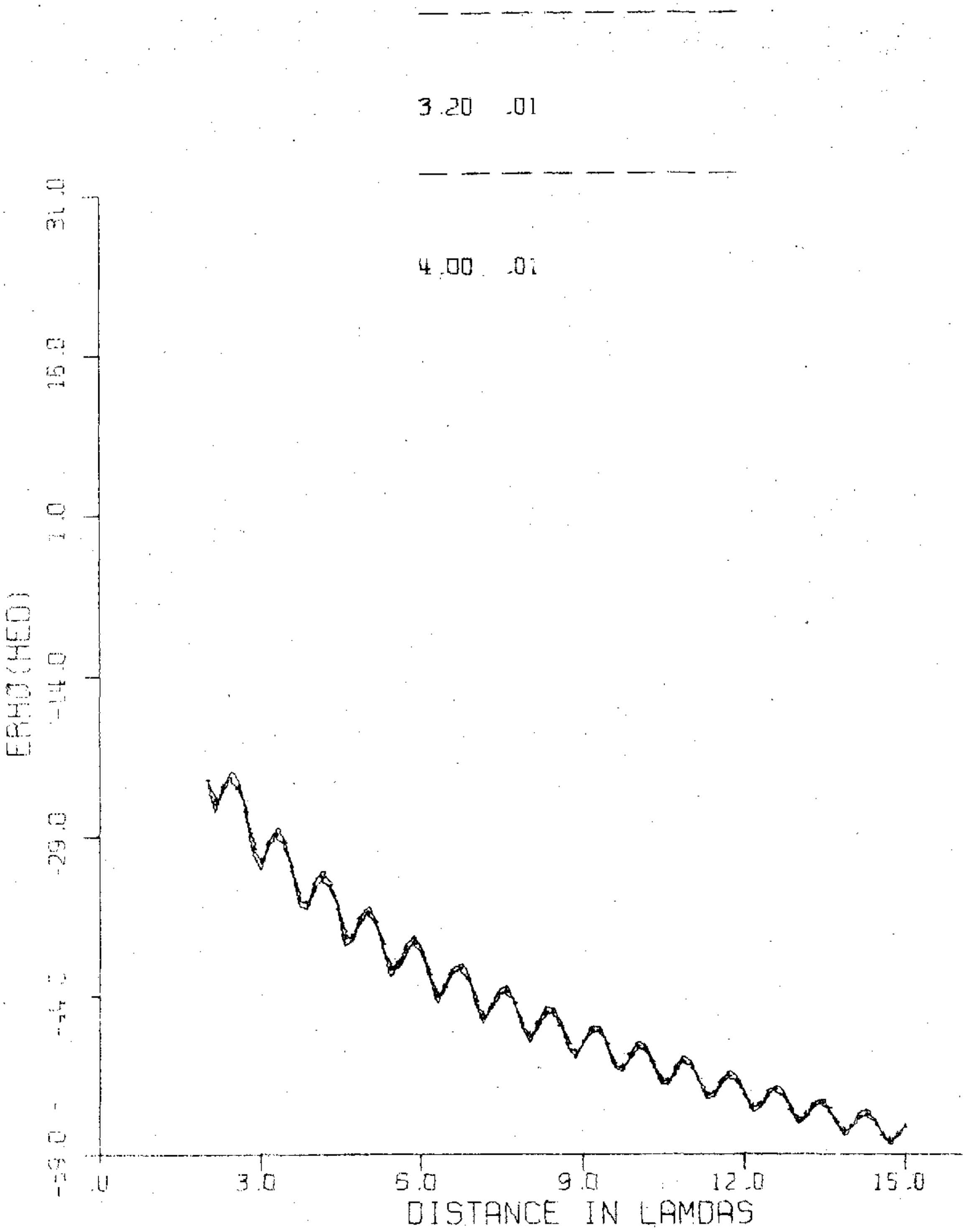


C-5


.05
DEPTH= .10
MU= 1.0
A= 1.2
3.20 .01
4.00 .01
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
HRHO(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

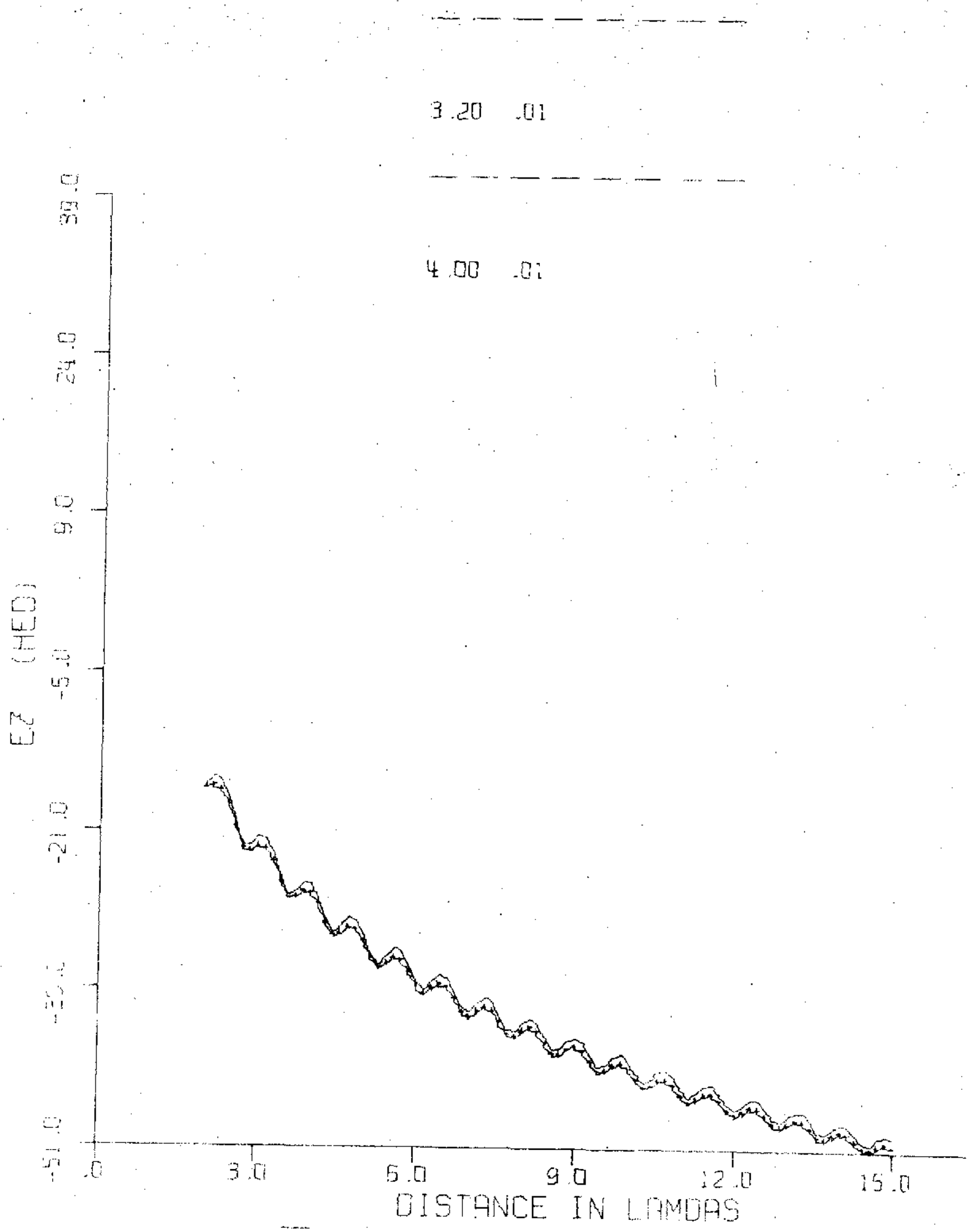

.05
DEPTH=.10
MU= 1.0
A= 1.2
3.20 .01
4.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
HZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

.05
DEPTH=.10 MU= 1.0 A= 1.2



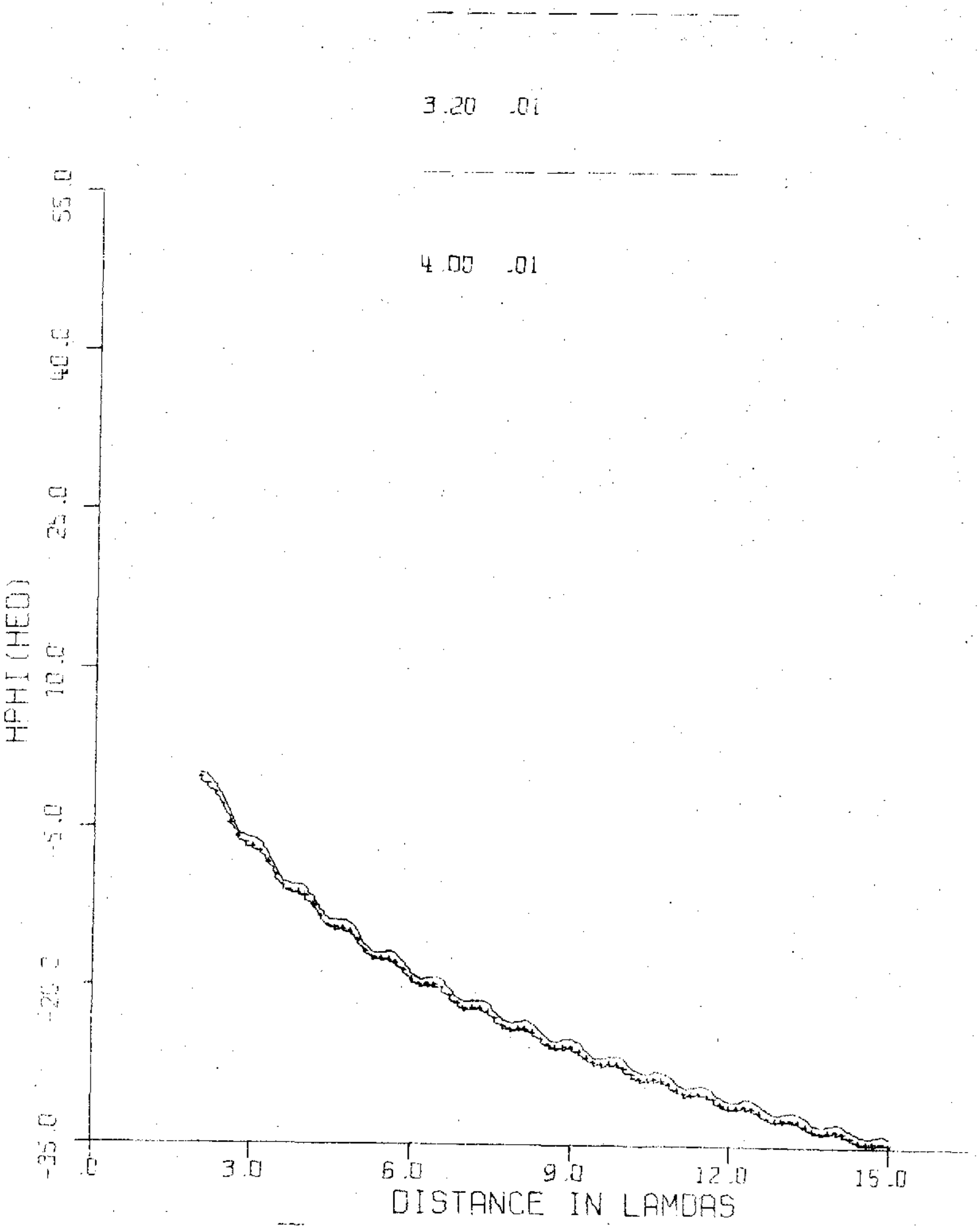
.05

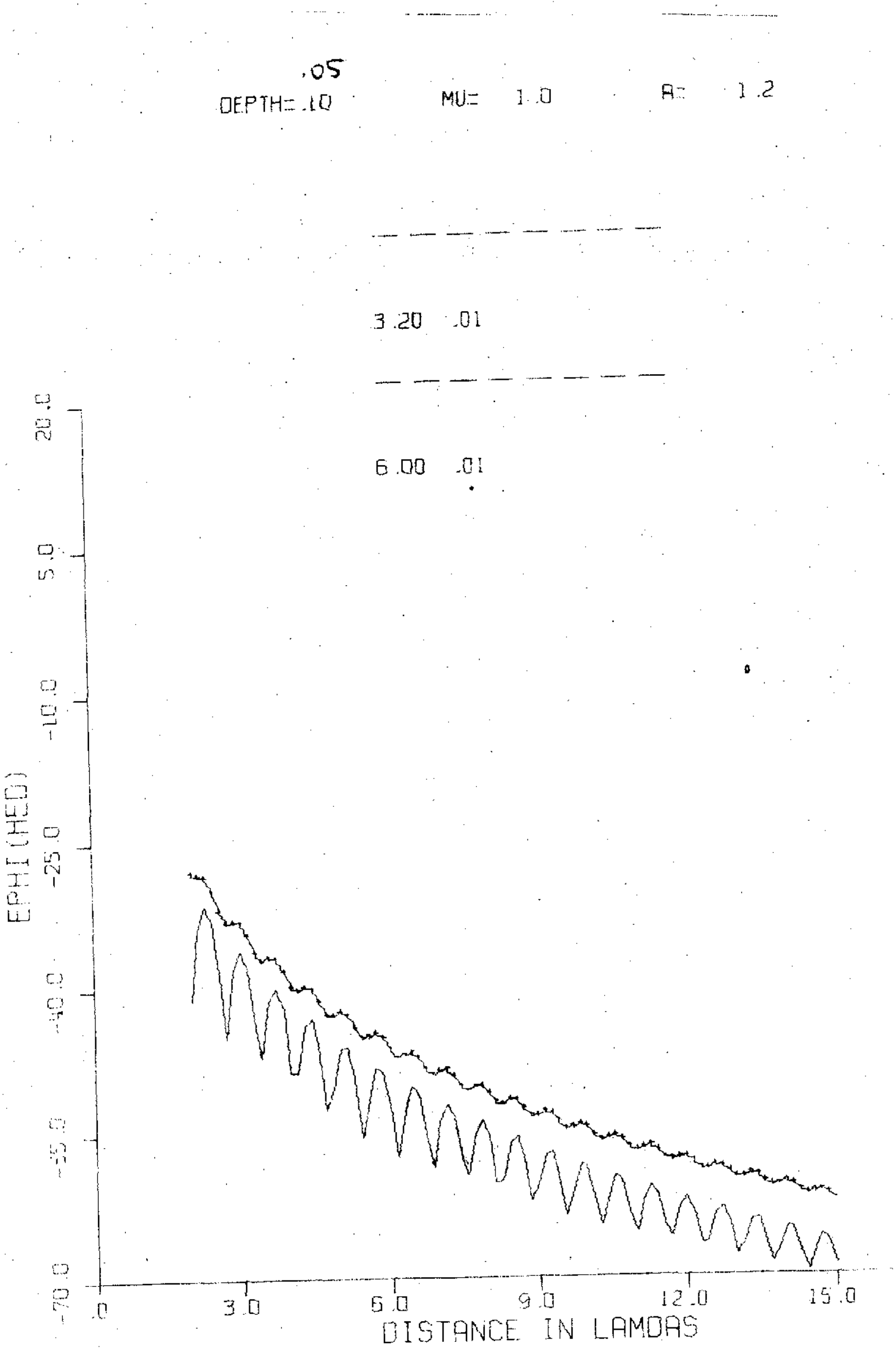
DEPTH= .10 MU= 1.0 R= 1.2



.05

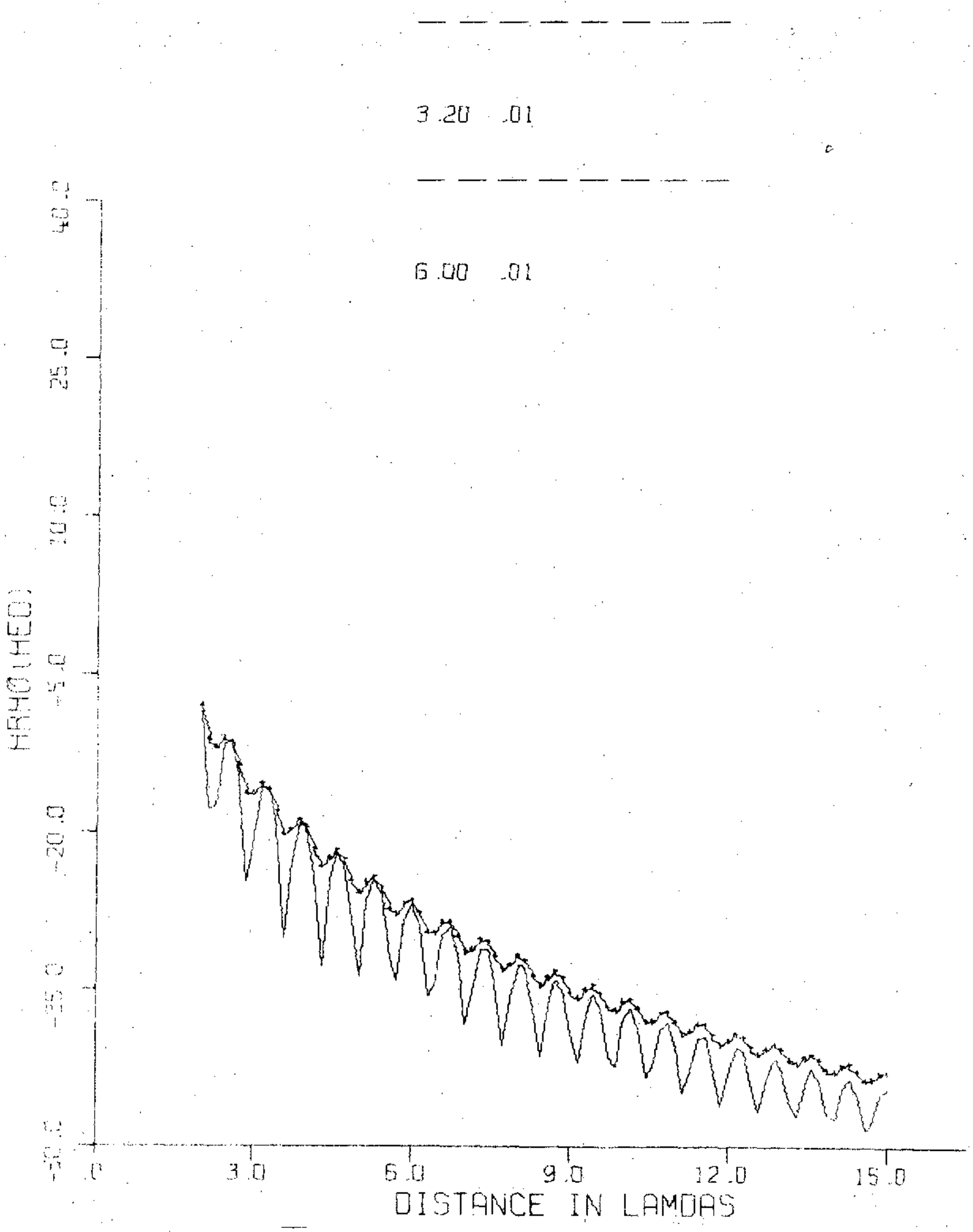
DEPTH=.10 MU= 1.0 R= 1.2




.05
DEPTH= .10
MU= 1.0
A= 1.2
3.20 .01
6.00 .01
EPHI(HED)
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

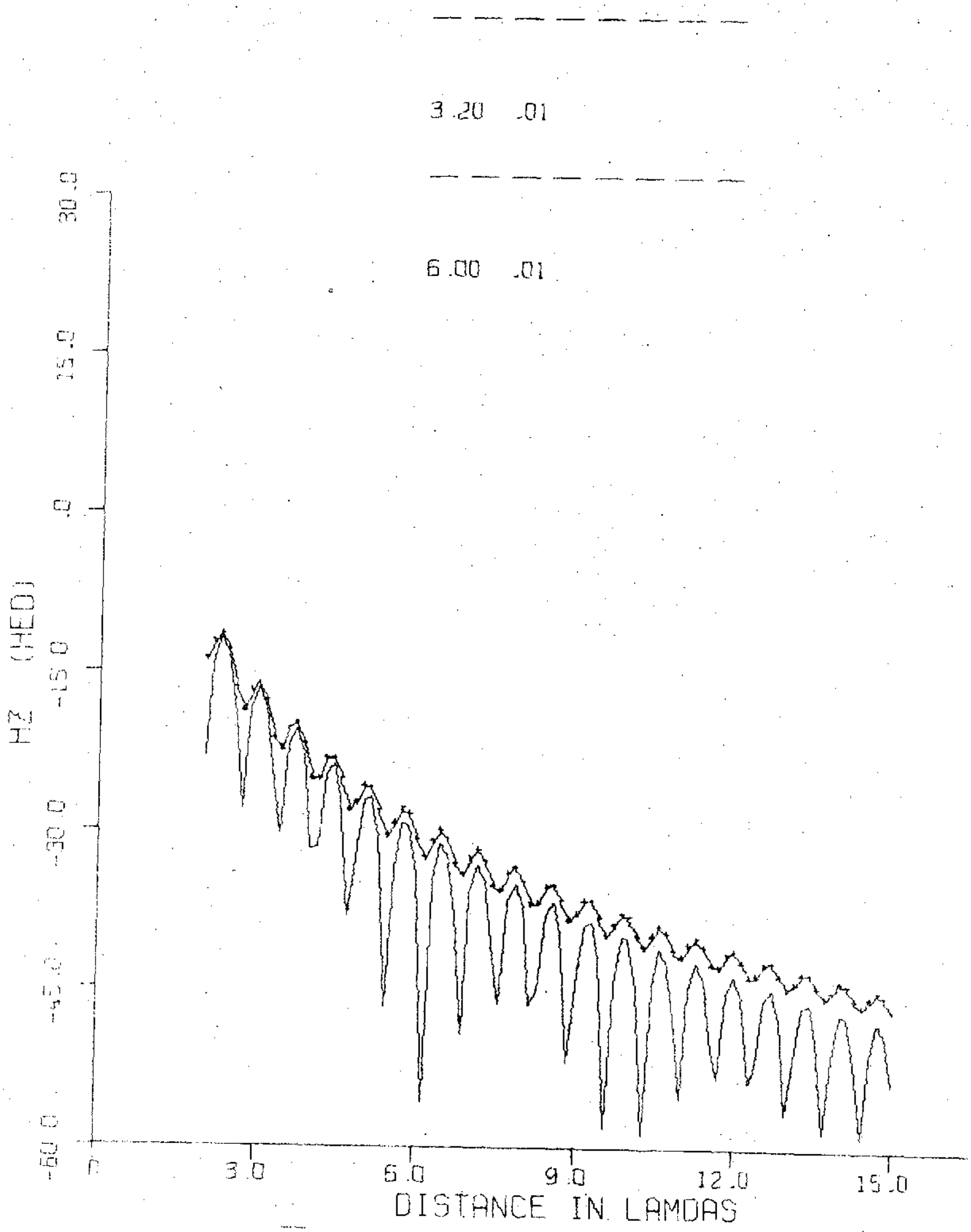
.05

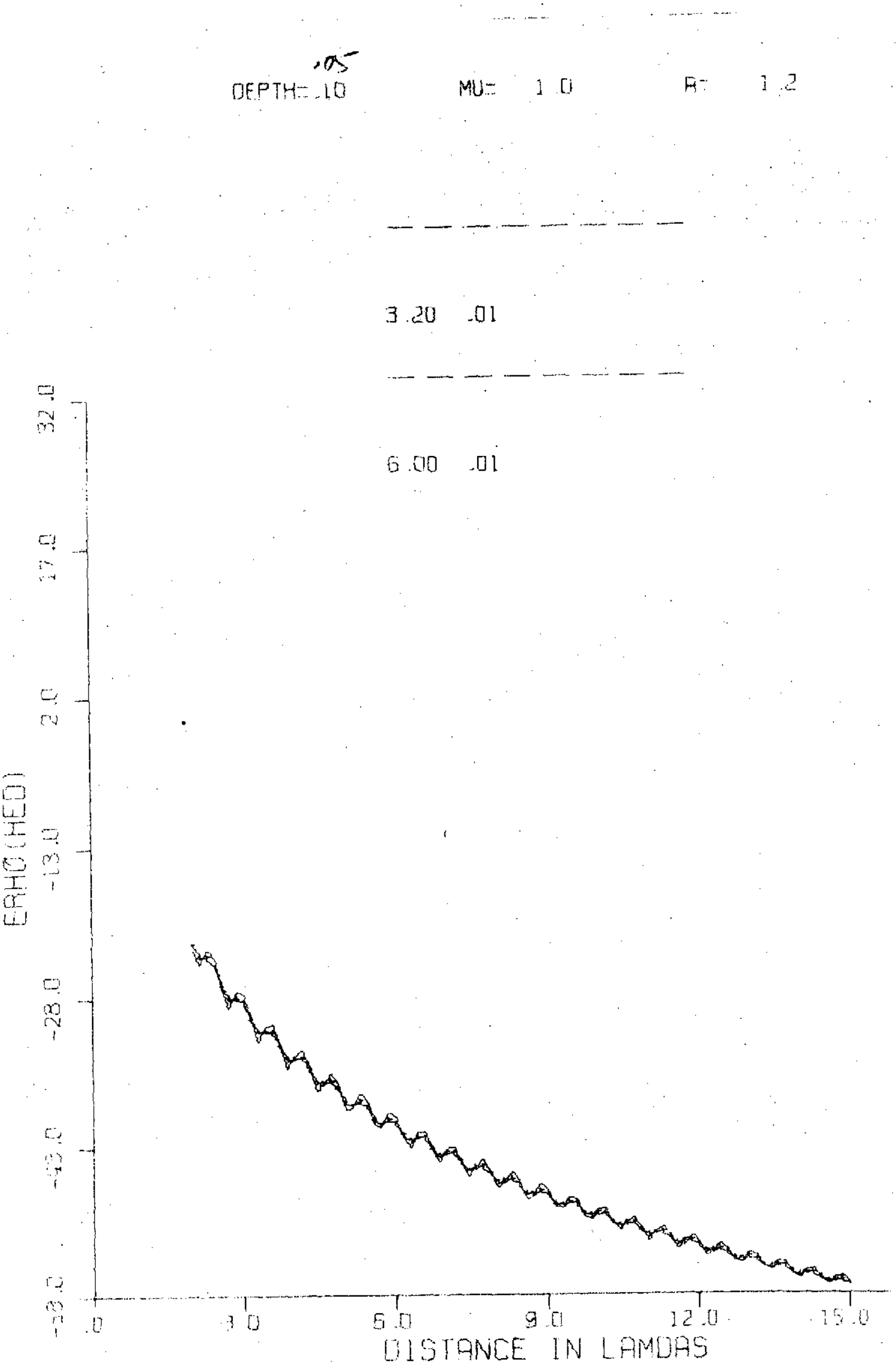
DEPTH=.10 MU= 1.0 R= 1.2



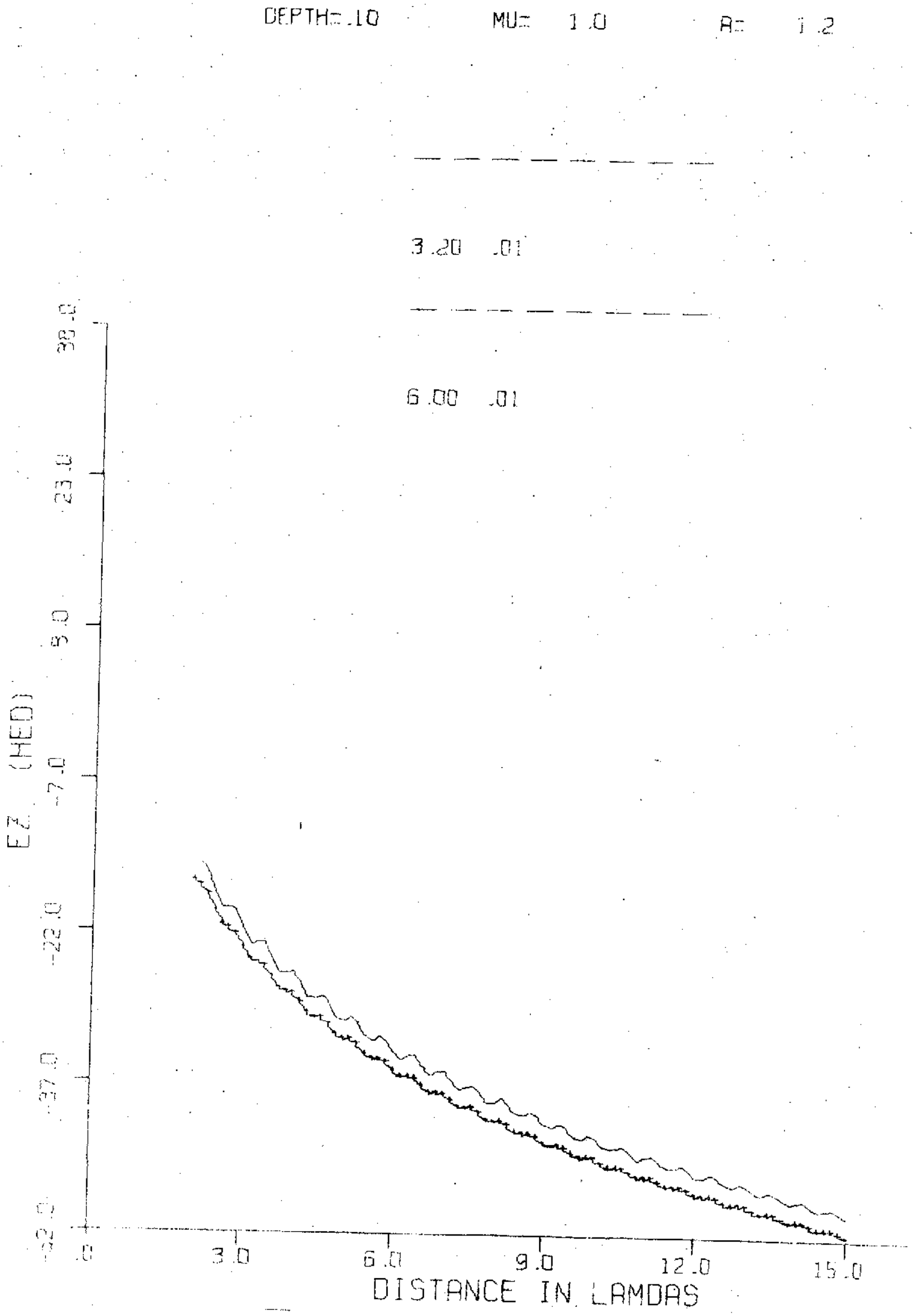
.05

DEPTH=.10 MU= 1.0 R= 1.2



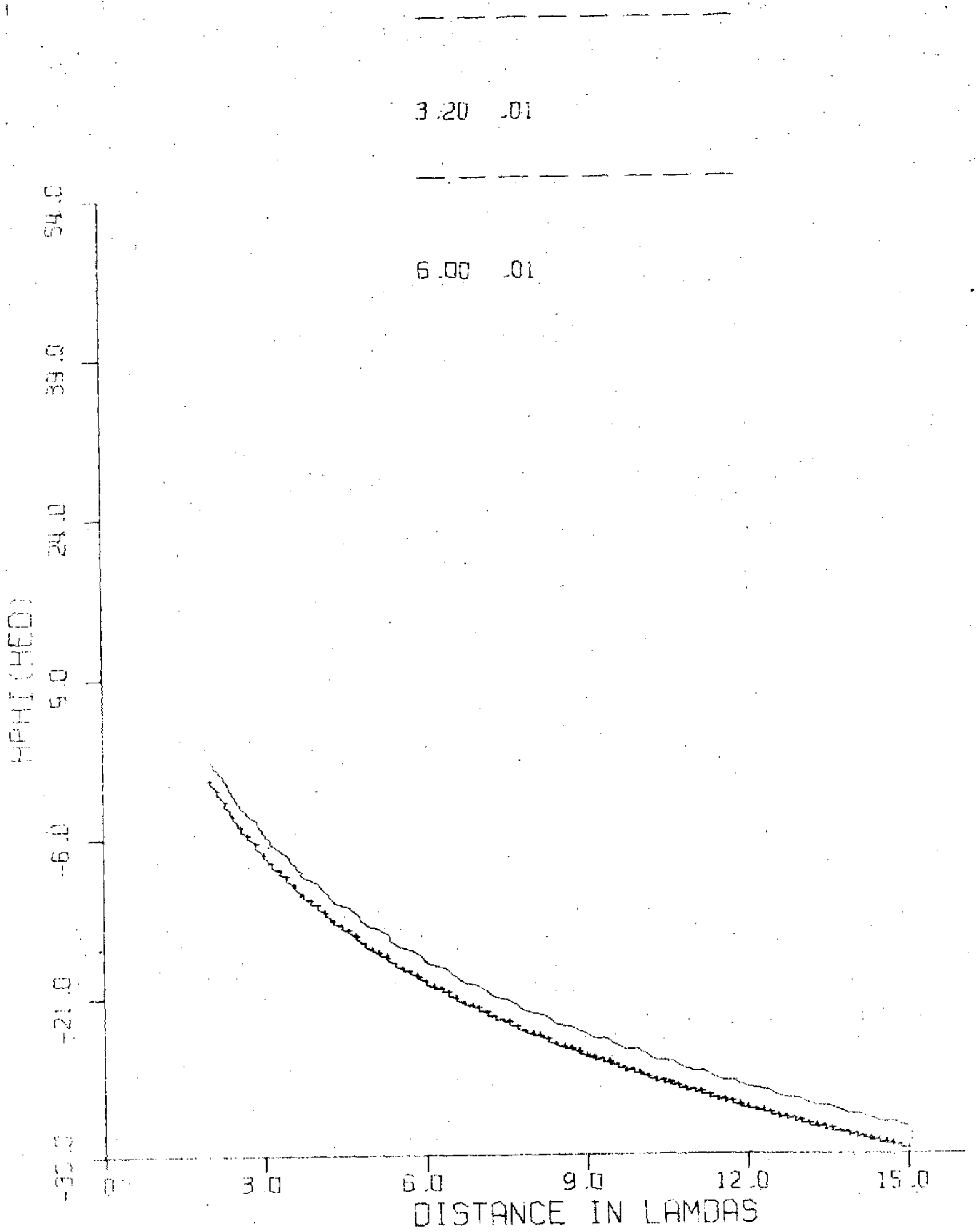

.05
DEPTH=.10
MU= 1.0
R= 1.2
3.20 .01
6.00 .01
32.0
17.0
2.0
-13.0
-28.0
-43.0
-58.0
ERHO(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

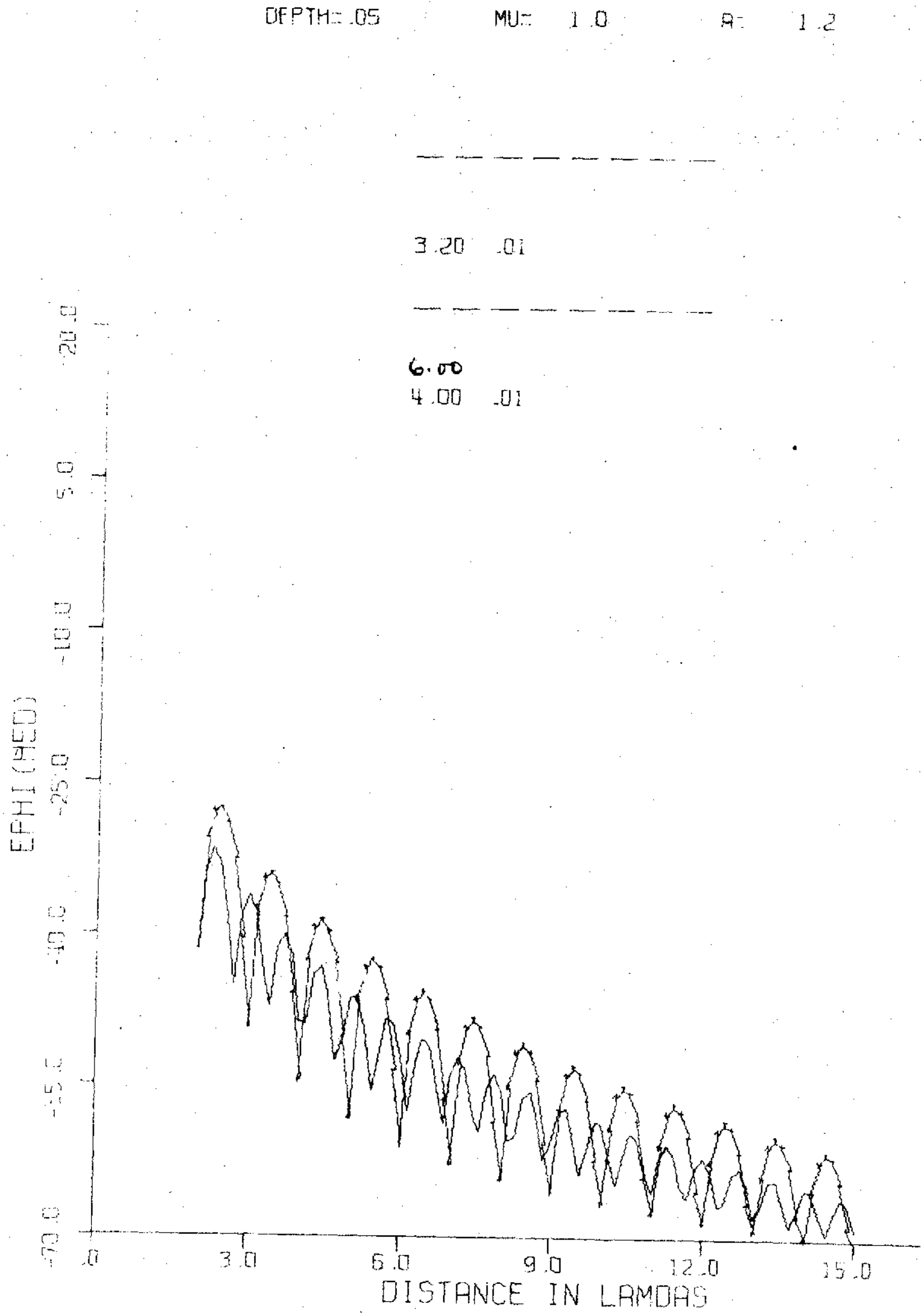
.05

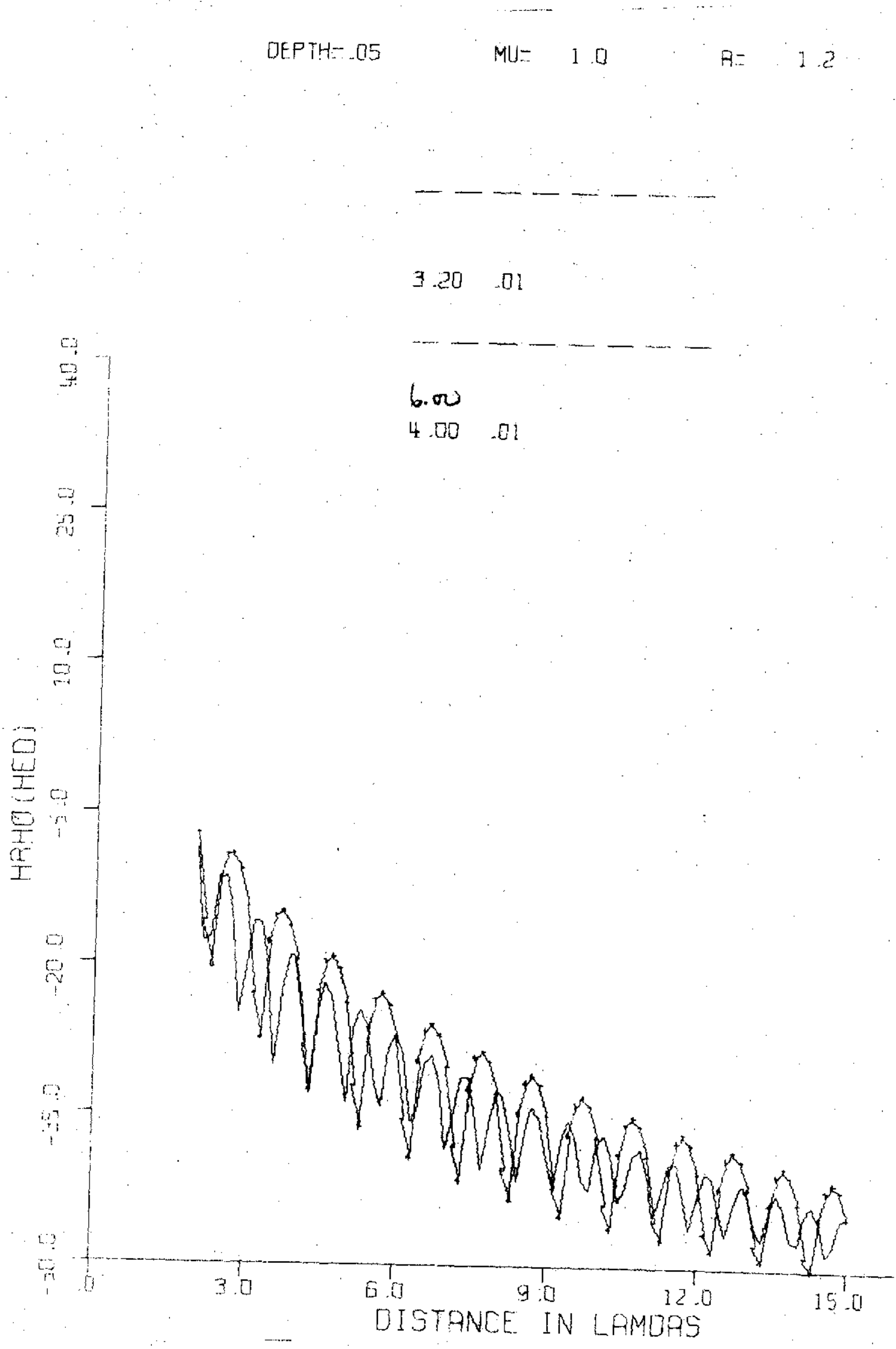

DEPTH=.10
MU= 1.0
A= 1.2
3.20 .01
6.00 .01
38.0
23.0
8.0
-7.0
-22.0
-37.0
-52.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

.05

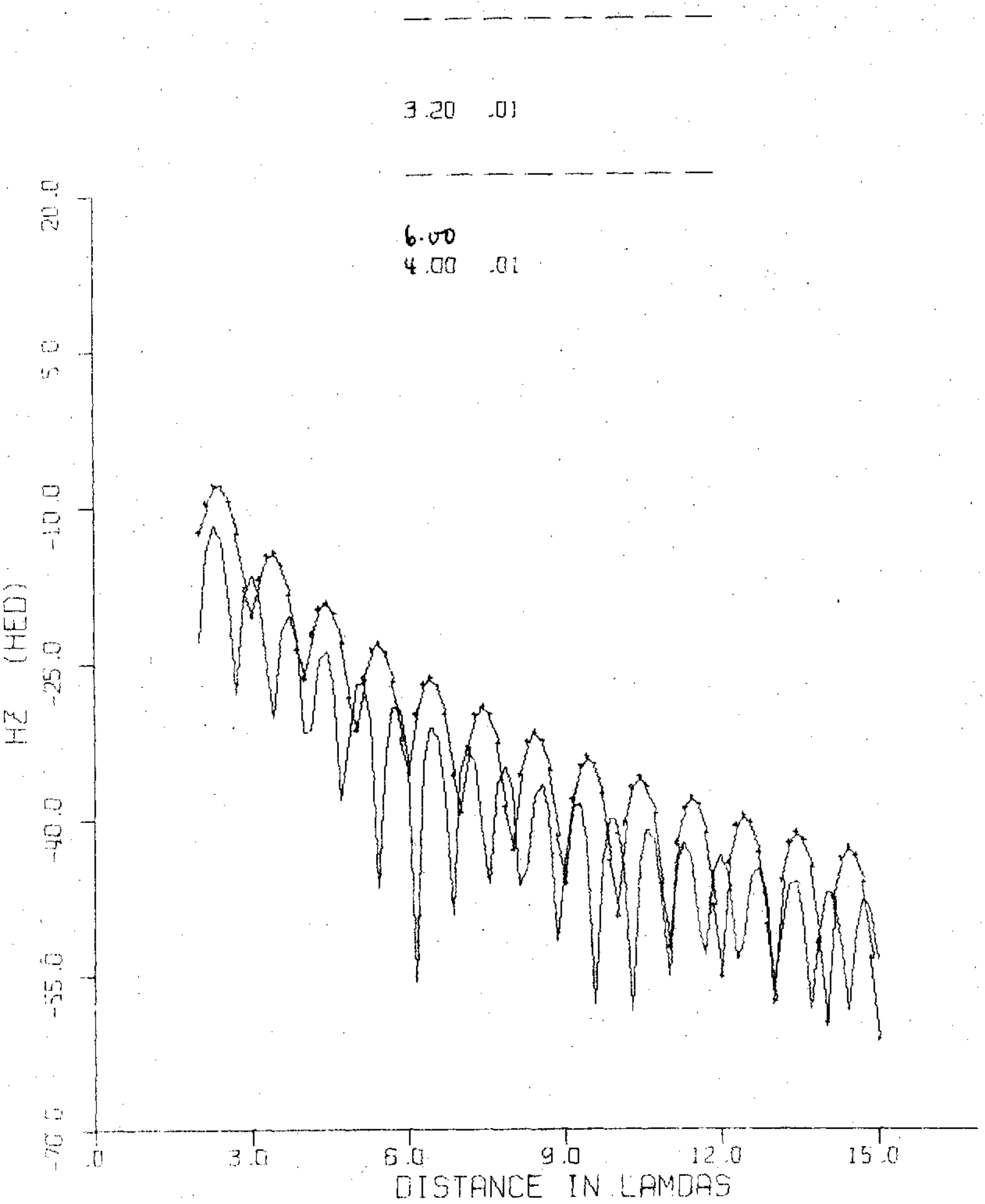
DEPTH=.10 MU= 1.0 R= 1.2



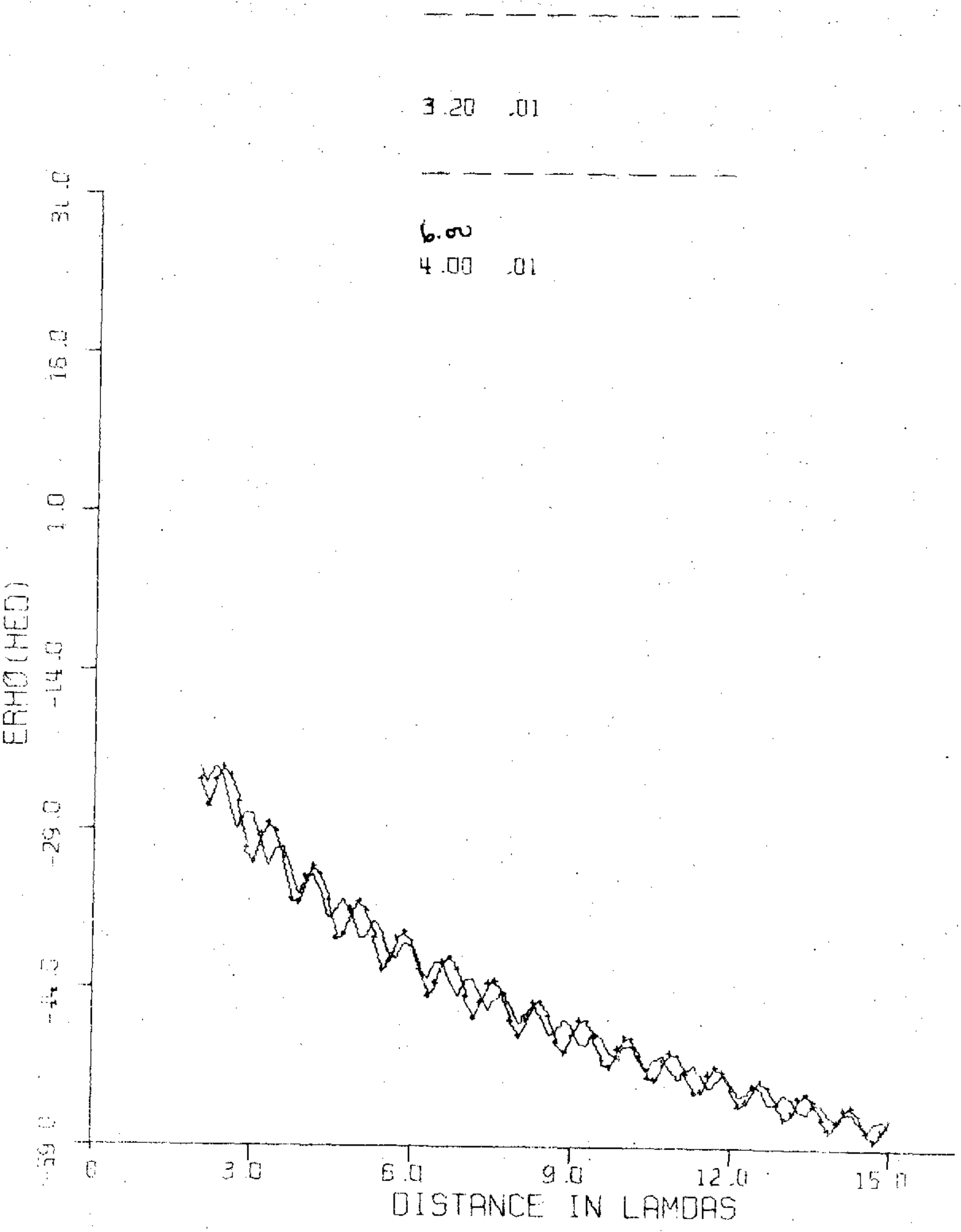

DEPTH=.05
MU= 1.0
A= 1.2
3.20 .01
6.00
4.00 .01
EPHI(AED)
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


DEPTH=.05
MU= 1.0
A= 1.2
3.20 .01
6.00
4.00 .01
HRHO(HED)
40.0
25.0
10.0
-5.0
-20.0
-35.0
-50.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

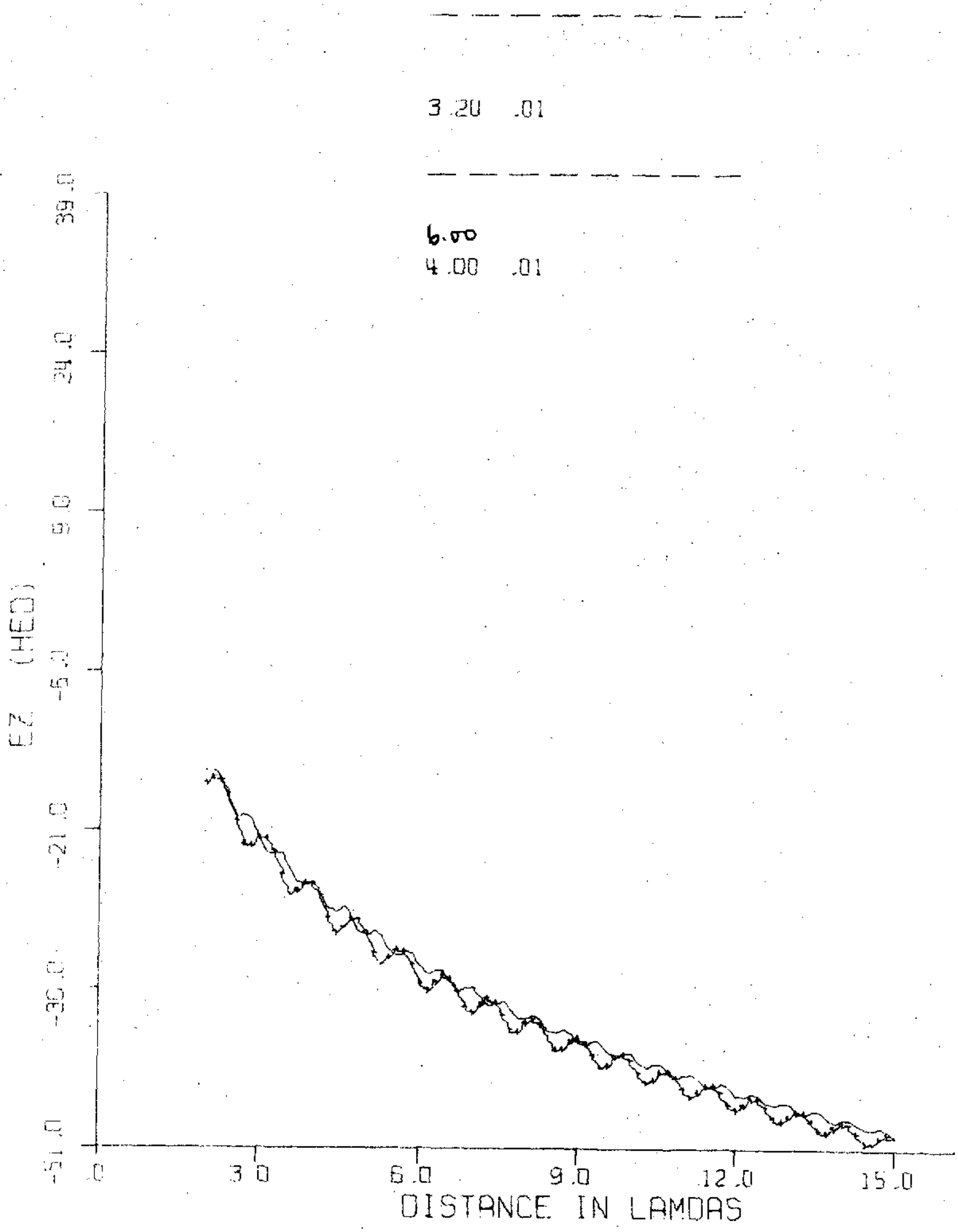
DEPTH=.05 MU= 1.0 A= 1.2

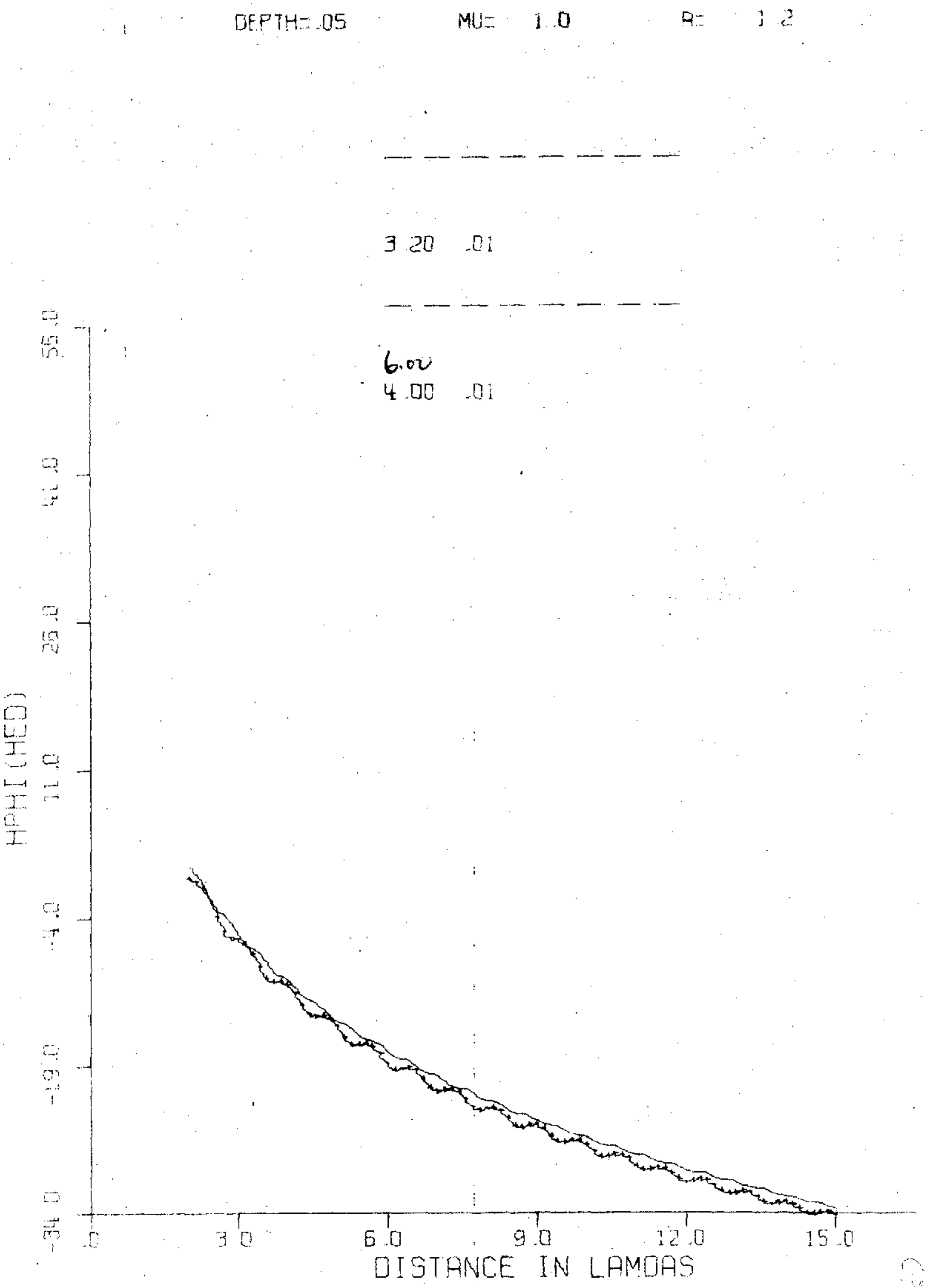


DEPTH=.05 MU= 1.0 A= 1.2



DEPTH=.05 MU= 1.0 R= 1.2




DEPTH=.05
MU= 1.0
R= 1.2
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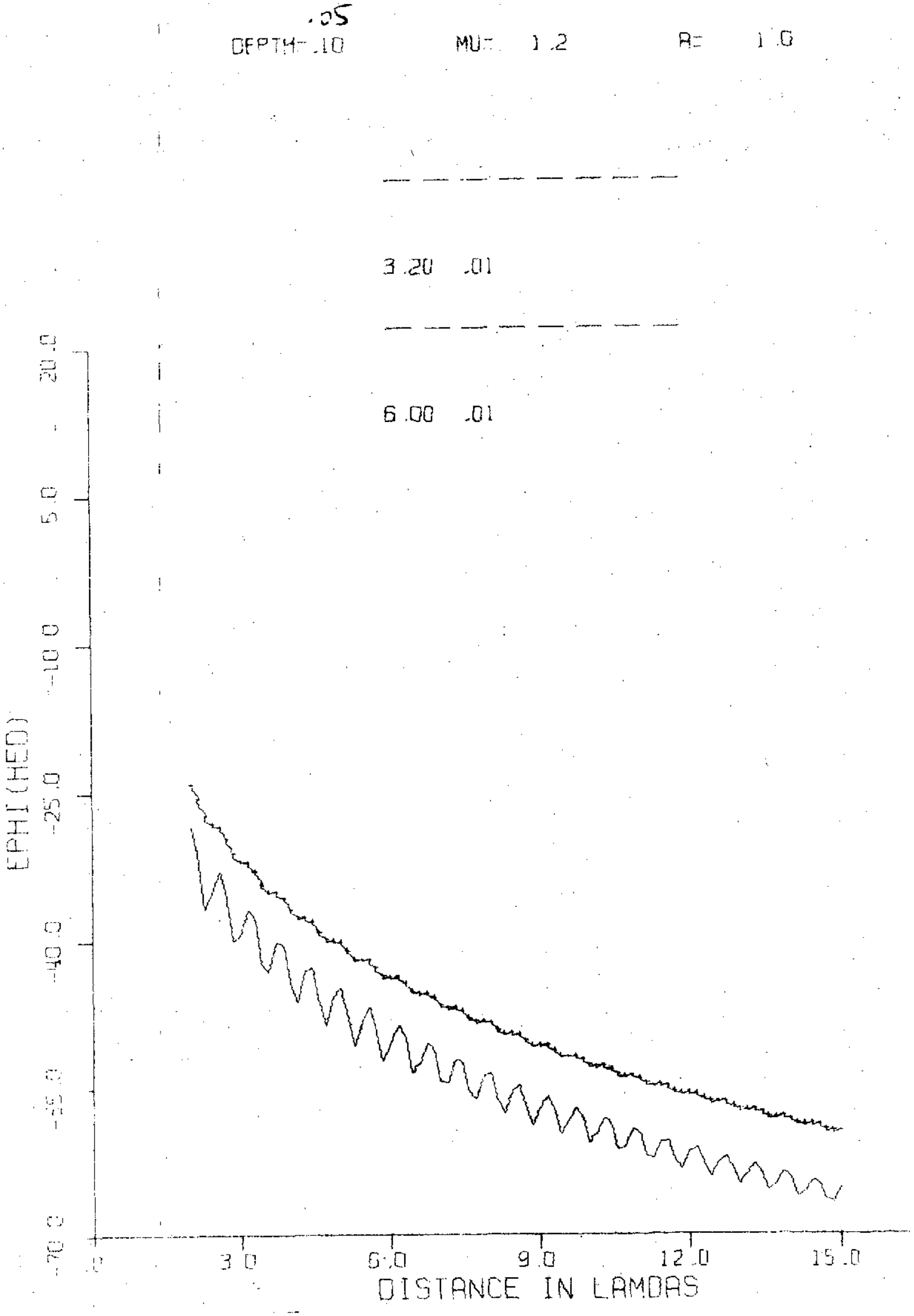
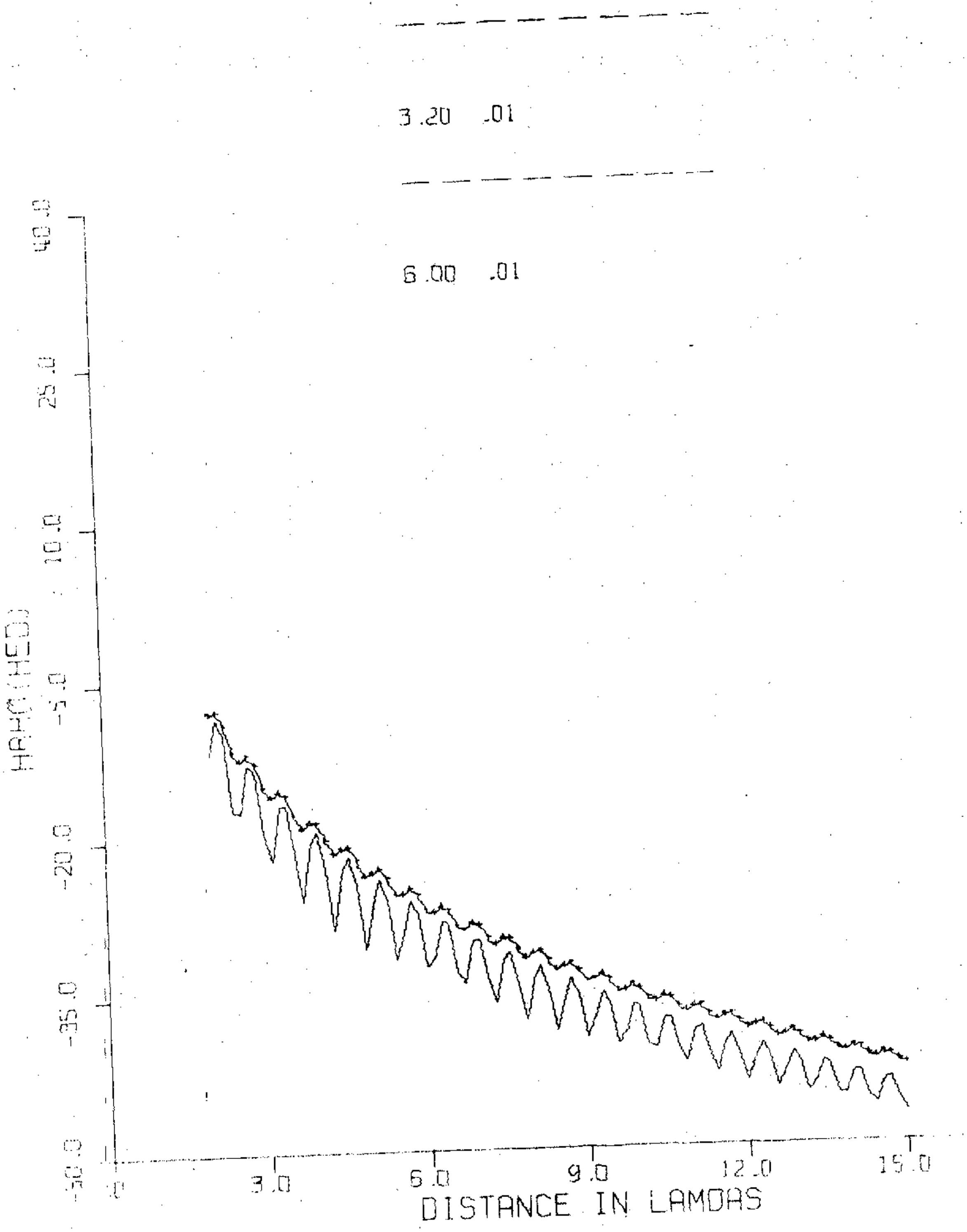
6.00
4.00 .01
56.0
41.0
26.0
11.0
-4.0
-19.0
-34.0
HPHI(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS


.05
DEPTH=.10
MU= 1.2
R= 1.0
3.20 .01
6.00 .01
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
EPHI(HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

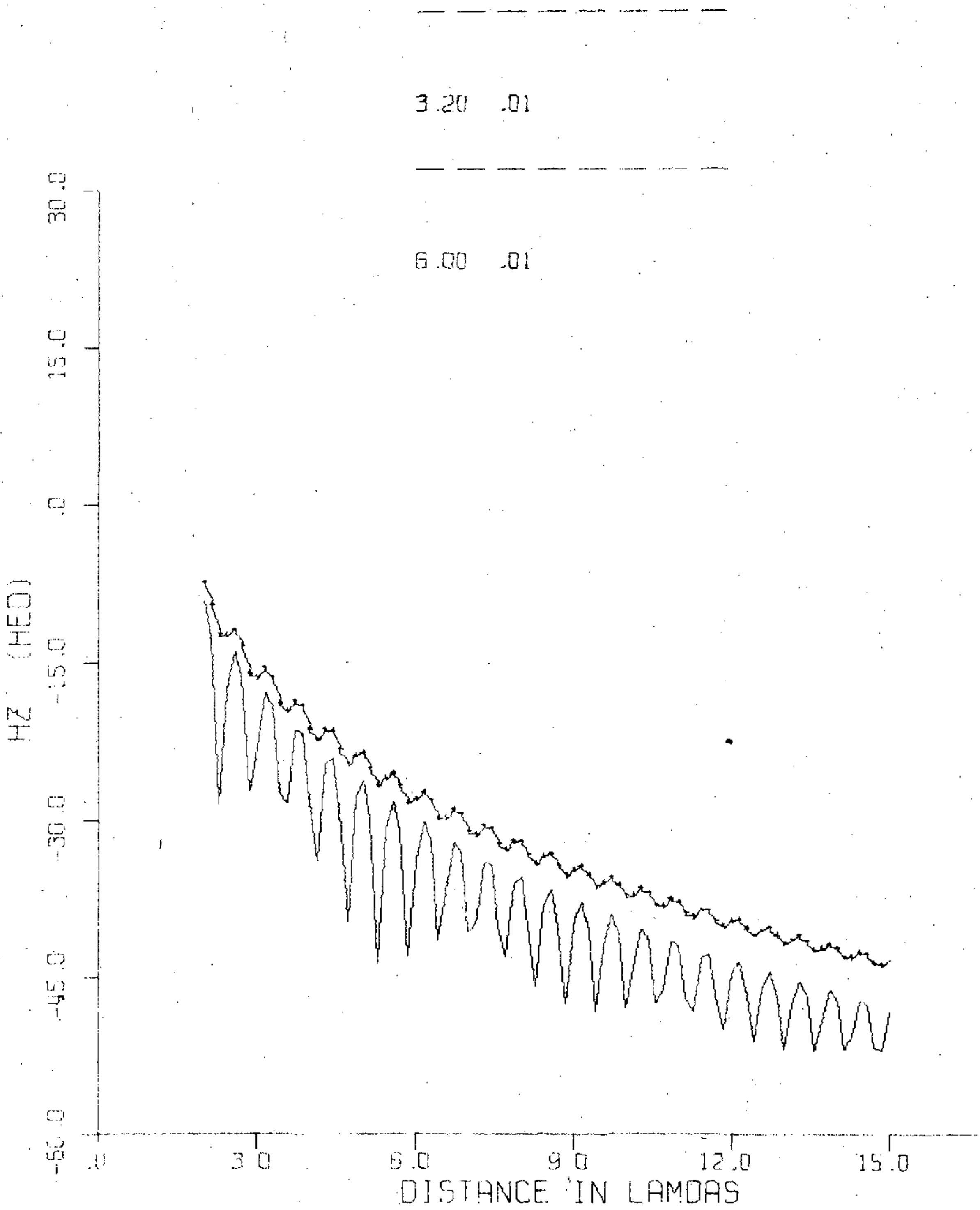
.05

DEPTH=.10 MU= 1.2 A= 1.0



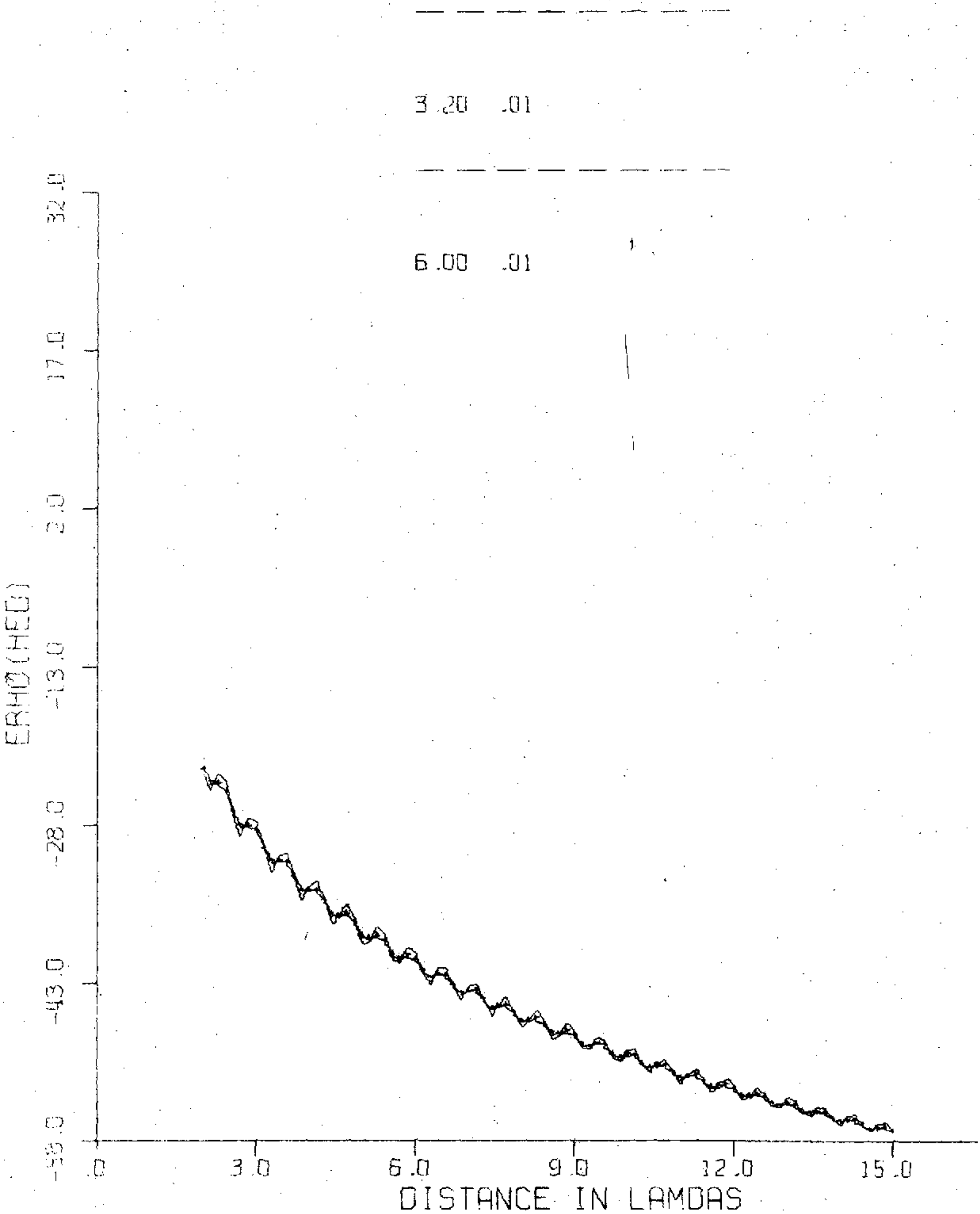
.05

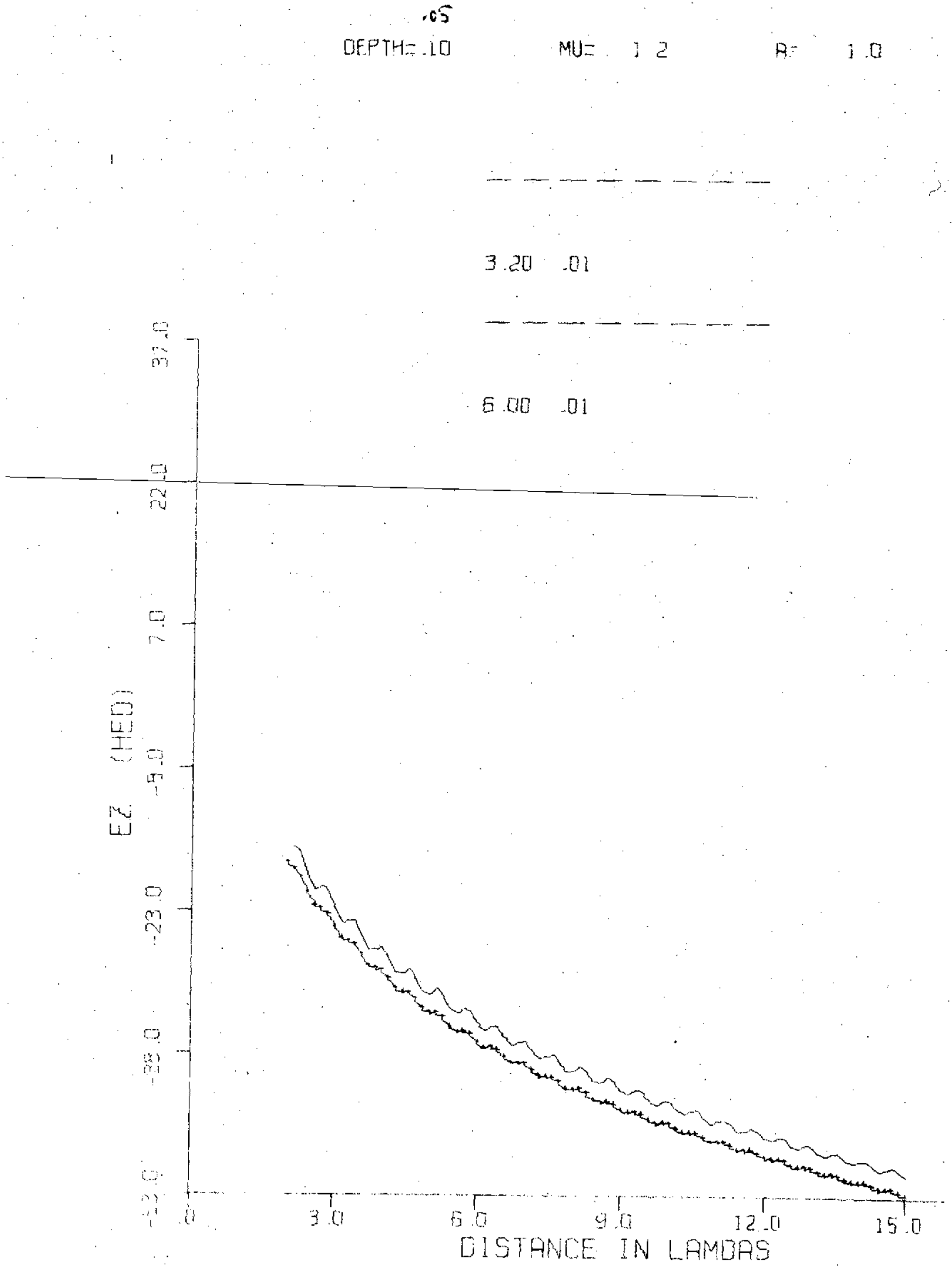
DEPTH= .10 MU= 1.2 R= 1.0

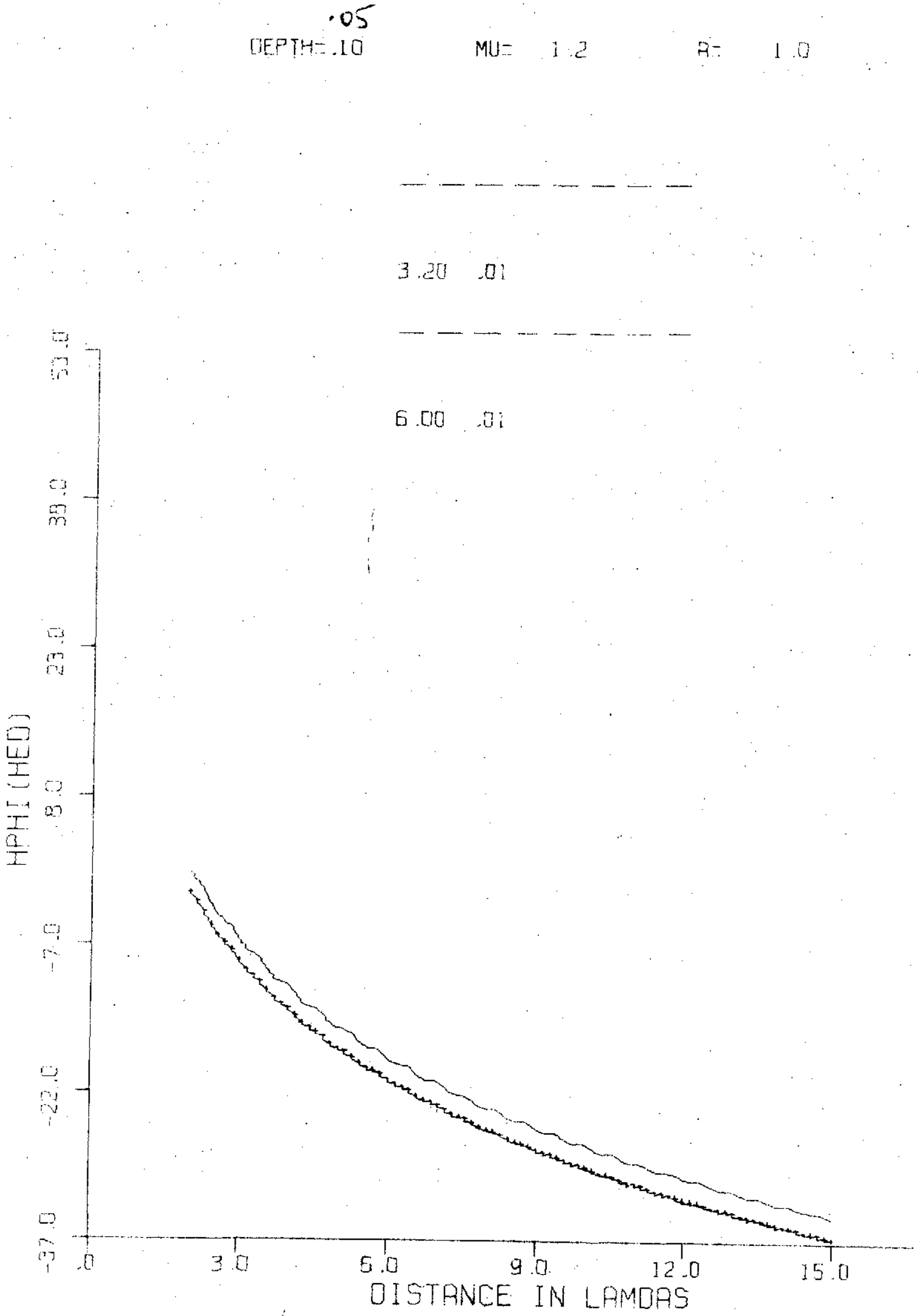


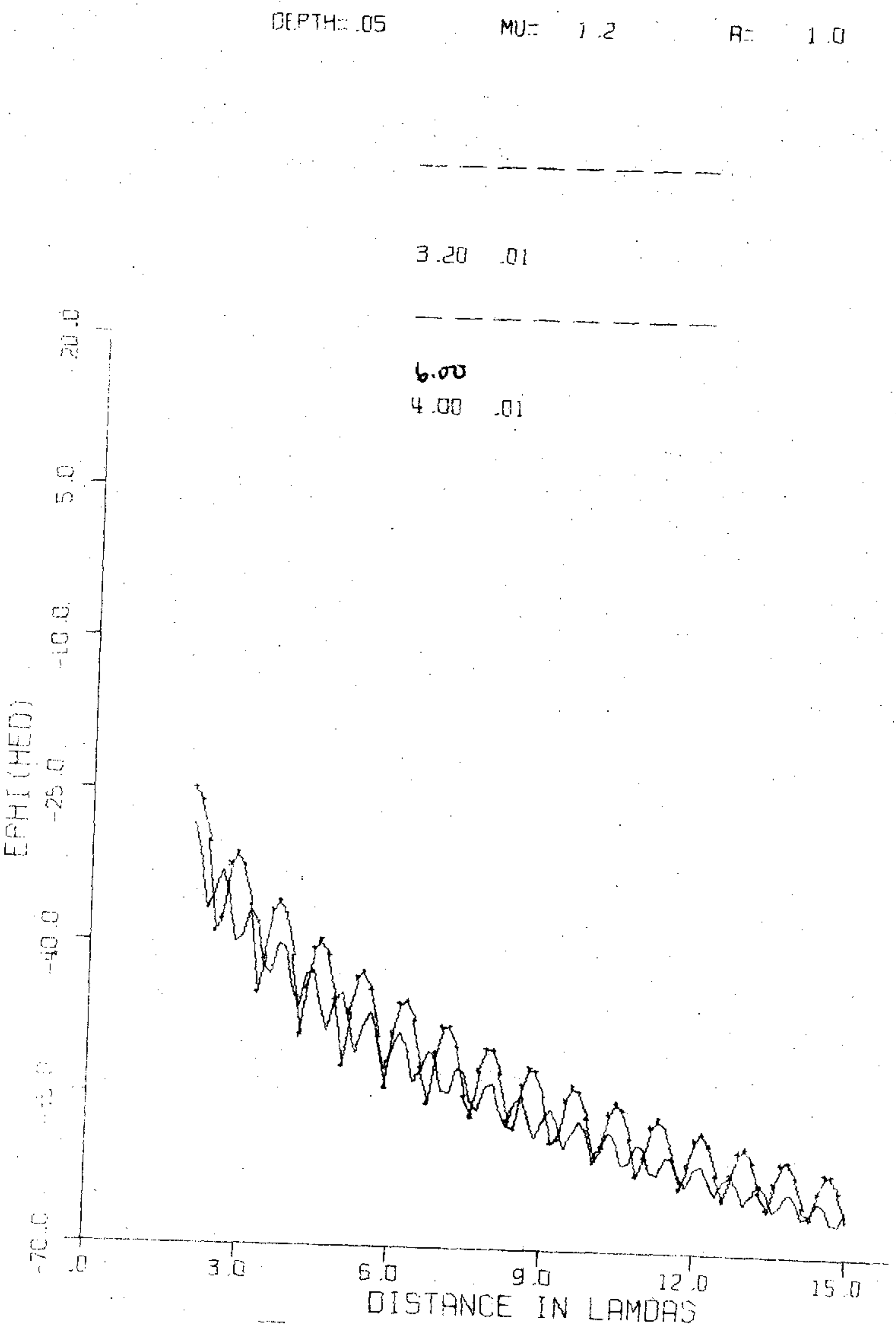
.05

DEPTH=.10 MU= 1.2 A= 1.0

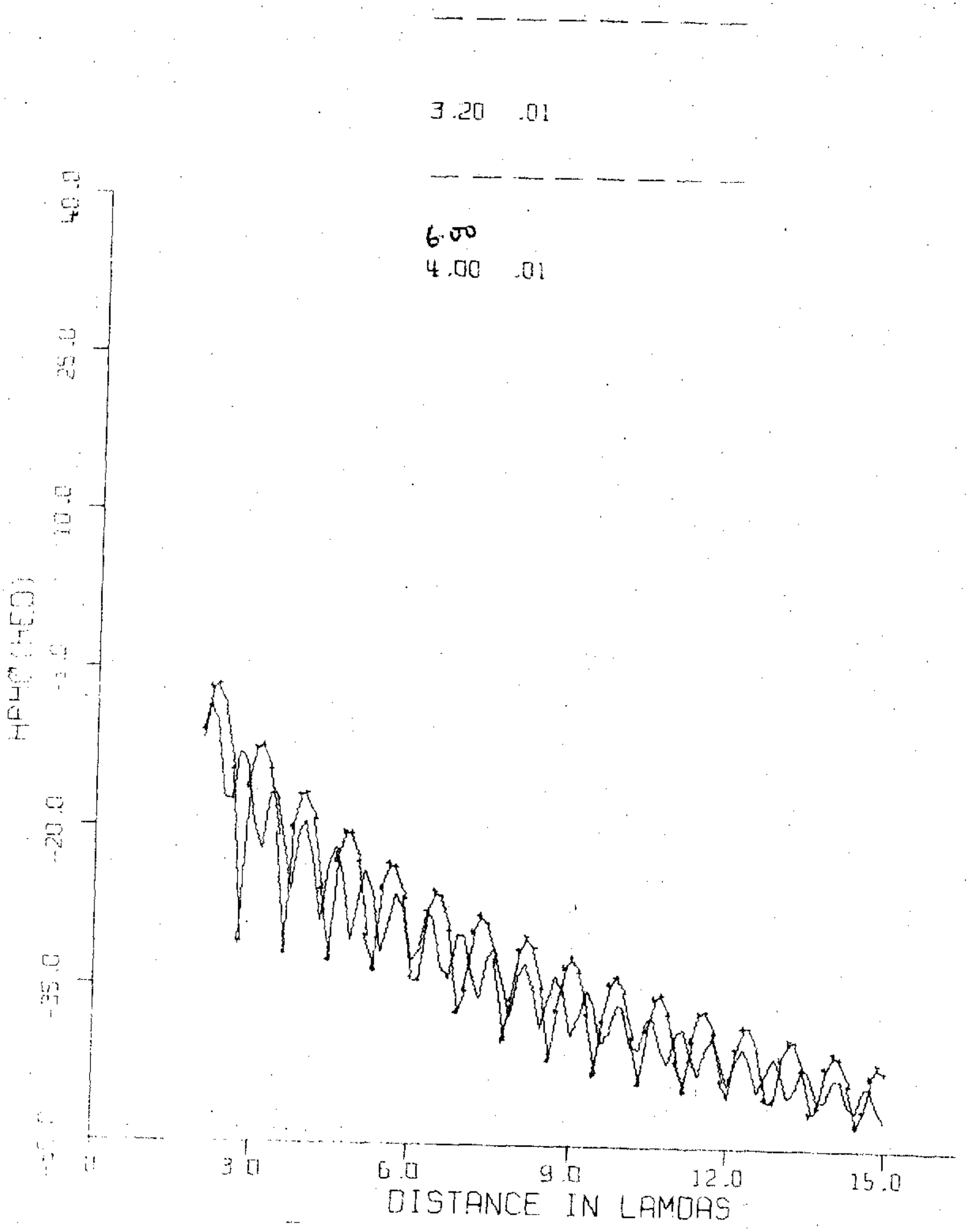


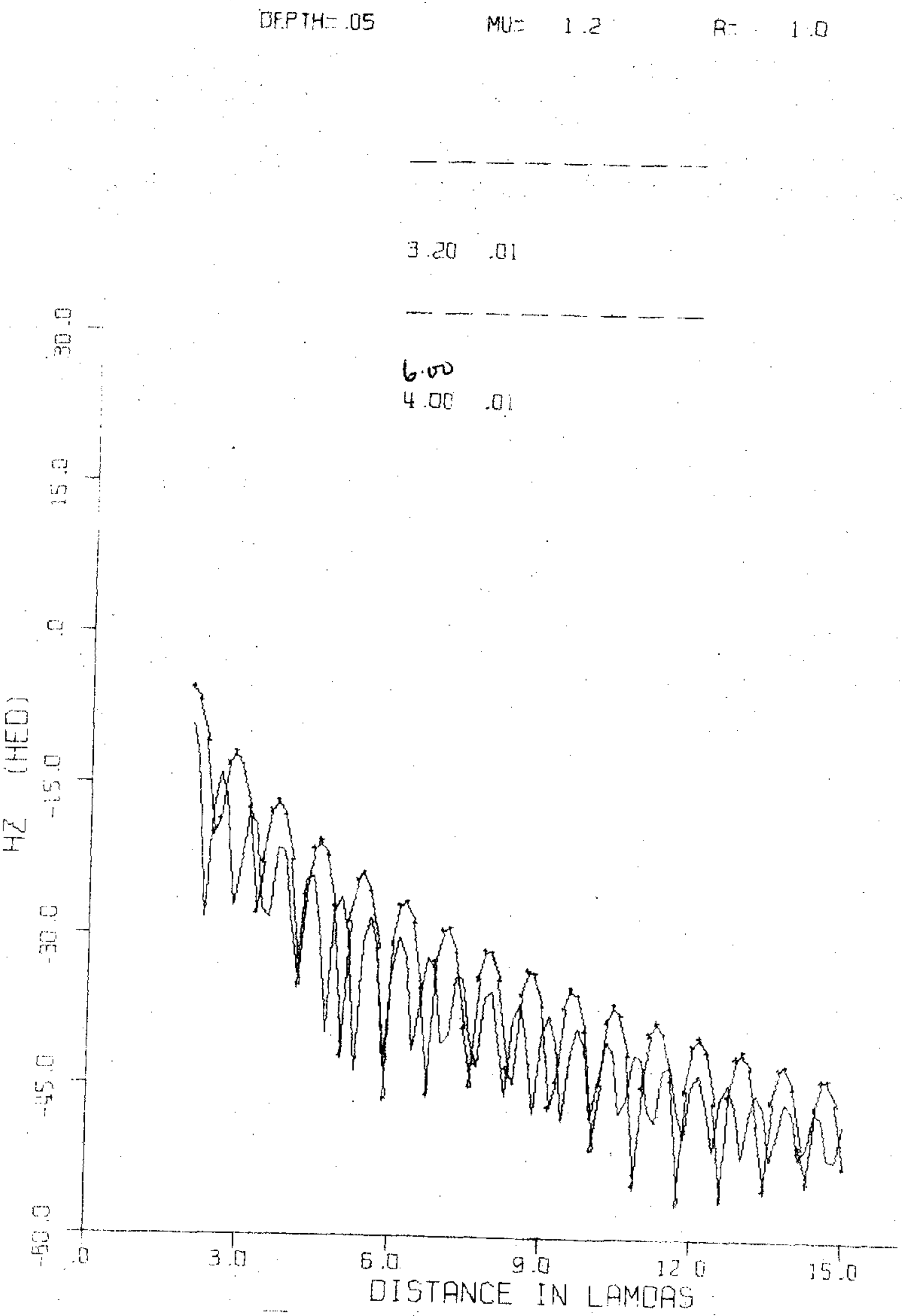

.05
DEPTH=.10
MU= 1.2
R= 1.0
3.20 .01
6.00 .01
37.0
22.0
7.0
-8.0
-23.0
-38.0
-53.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMBDAS


.05
DEPTH=.10
MU= 1.2
R= 1.0
3.20 .01
6.00 .01
HPHI(HED)
53.0
38.0
23.0
8.0
-7.0
-22.0
-37.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

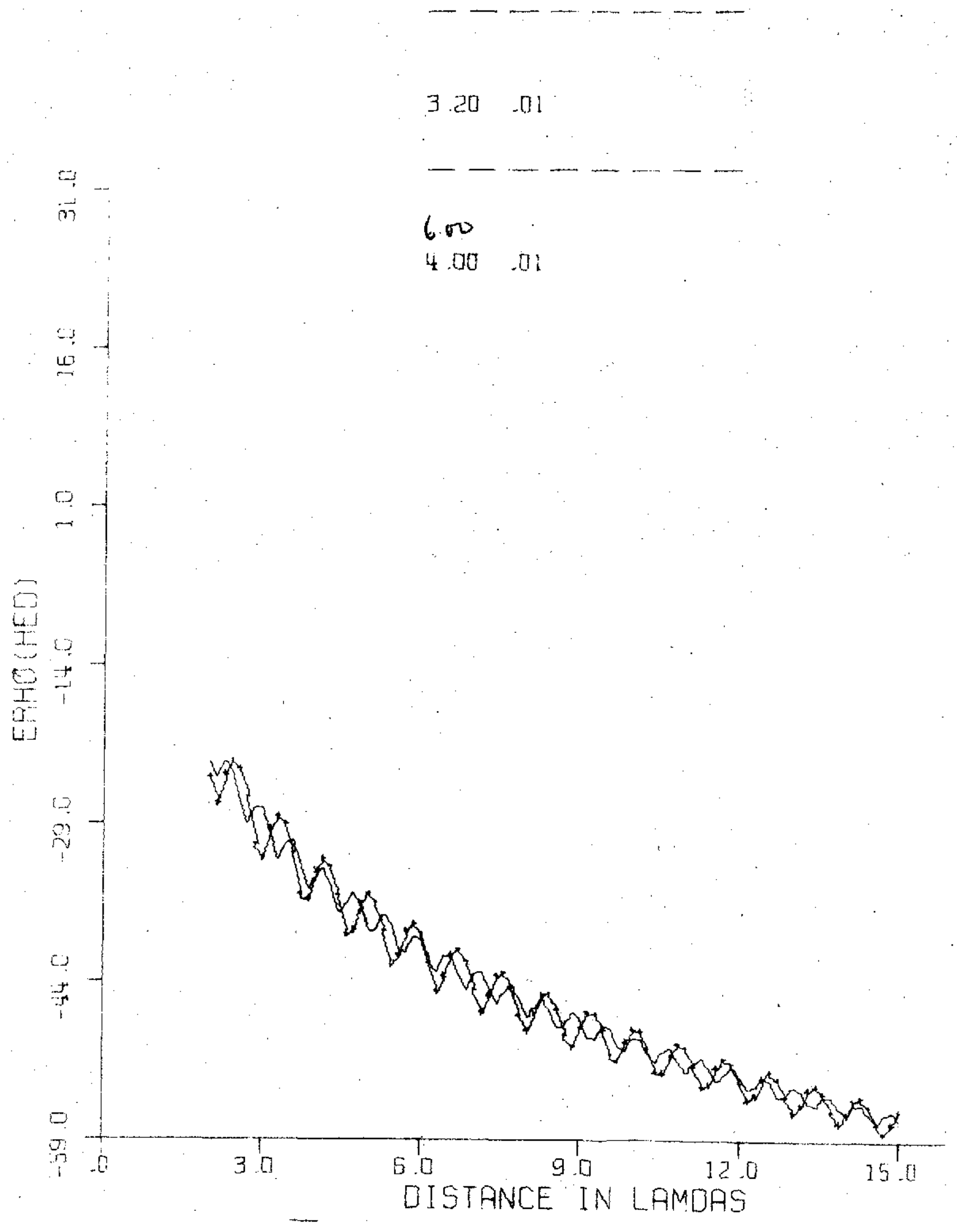

DEPTH= .05
MU= 1.2
A= 1.0
3.20 .01
6.00
4.00 .01
EPHI(HED)
20.0
5.0
-10.0
-25.0
-40.0
-55.0
-70.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

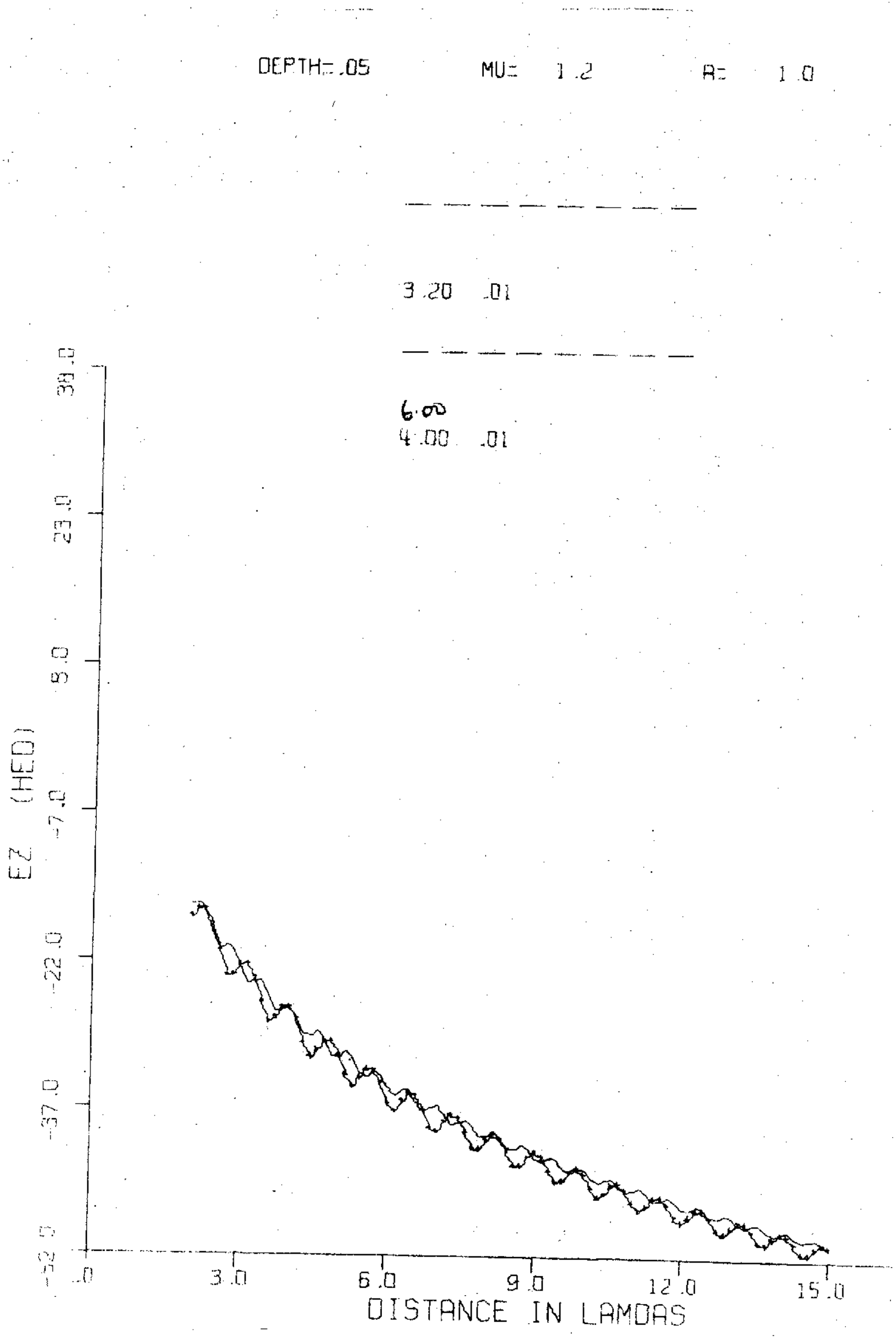
DEPTH=.05 MU= 1.2 R= 1.0

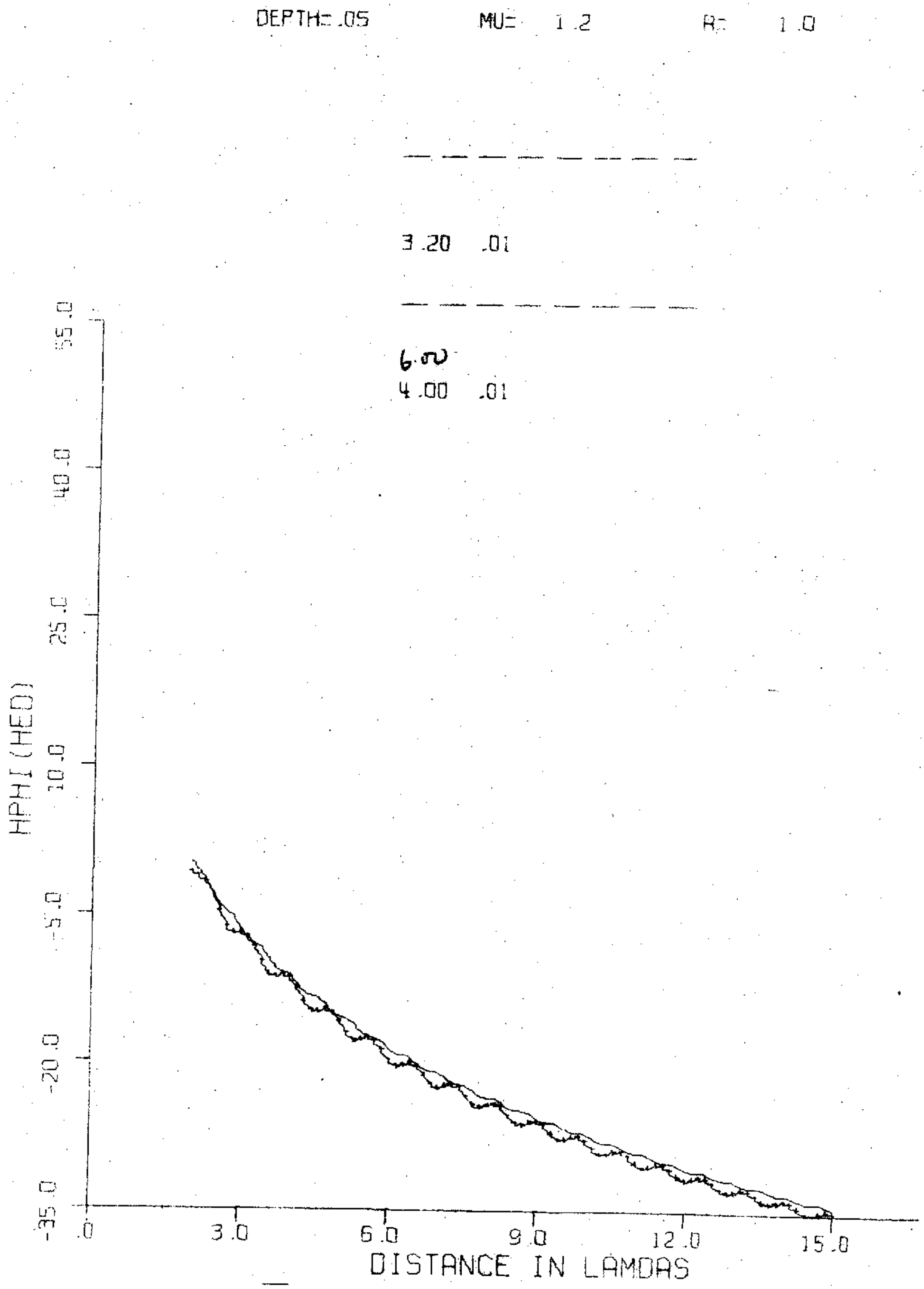



DEPTH= .05
MU= 1.2
R= 1.0
3.20 .01
6.00
4.00 .01
HZ (HED)
30.0
15.0
.0
-15.0
-30.0
-45.0
-60.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

DEPTH= .05 MU= 1.2 A= 1.0

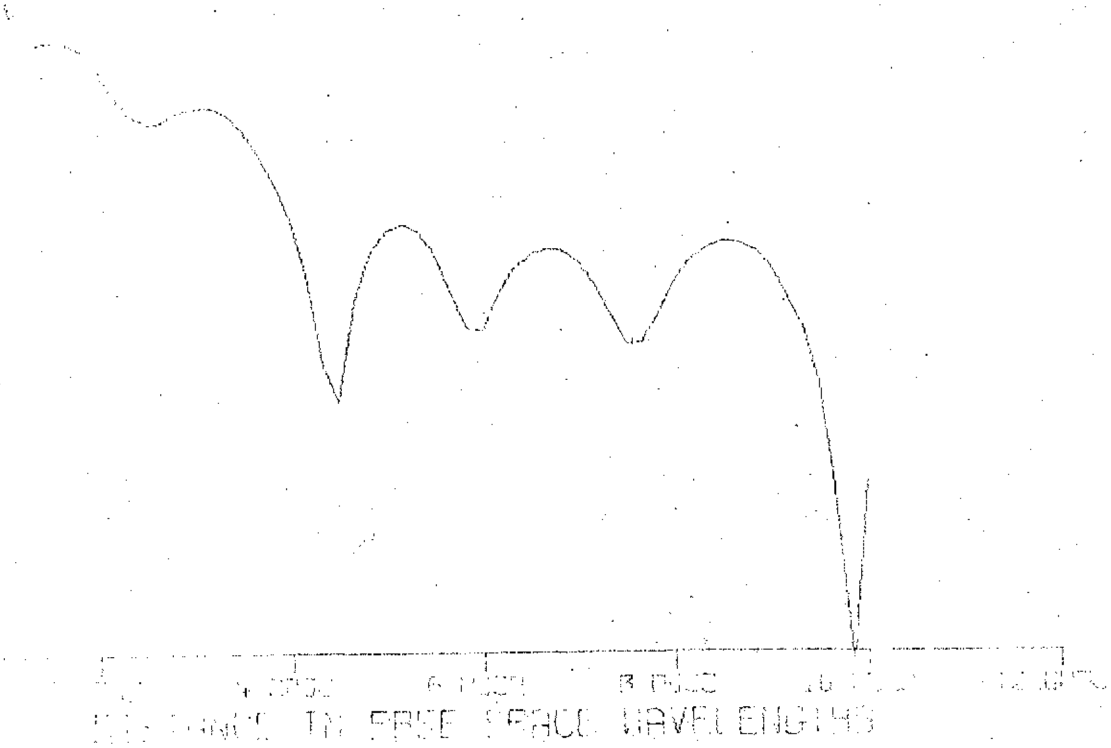



DEPTH= .05
MU= 1.2
R= 1.0
3.20 .01
6.00
4.00 .01
38.0
23.0
8.0
-7.0
-22.0
-37.0
-52.0
EZ (HED)
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

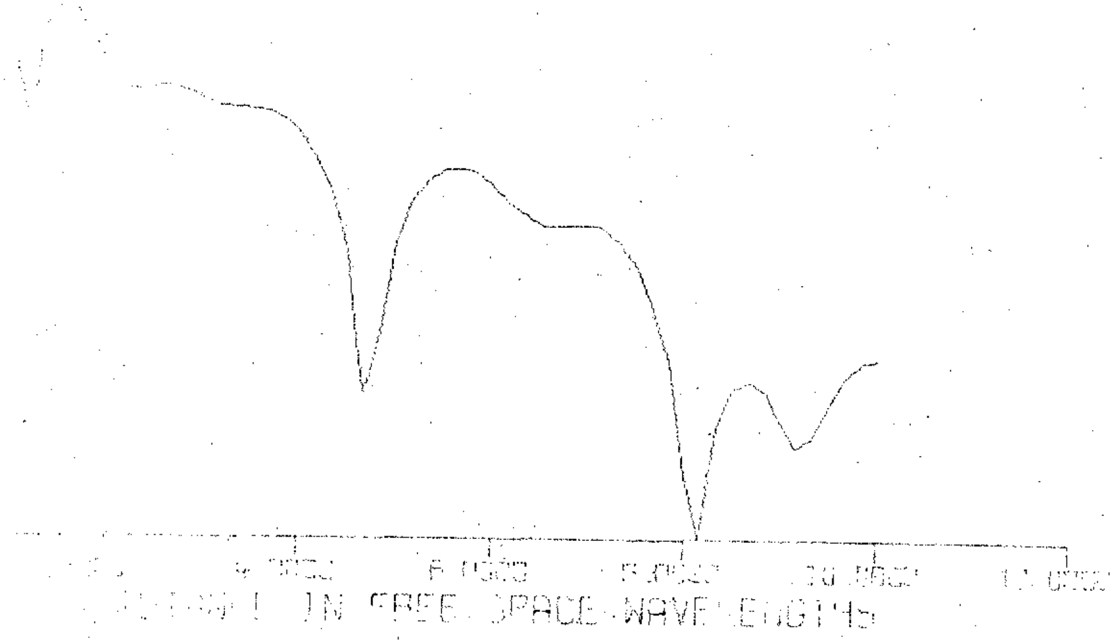

DEPTH=.05
MU= 1.2
R= 1.0
3.20 .01
6.00
4.00 .01
HPHI(HED)
55.0
40.0
25.0
10.0
-5.0
-20.0
-35.0
.0
3.0
6.0
9.0
12.0
15.0
DISTANCE IN LAMDAS

```
NLAYS=  4  FREQ=   32.000000
                                                   DEPTH in meters
DL,LT,PERM,ANIS
   1.000  0.0          1.000  1.000
------------------------------------------------   0.0
   3.200  0.003125   1.000  1.000
------------------------------------------------  15.0
   4.200  0.003125   1.000  1.000
------------------------------------------------  45.0
   5.400  0.003125   1.000  1.000
------------------------------------------------******
```

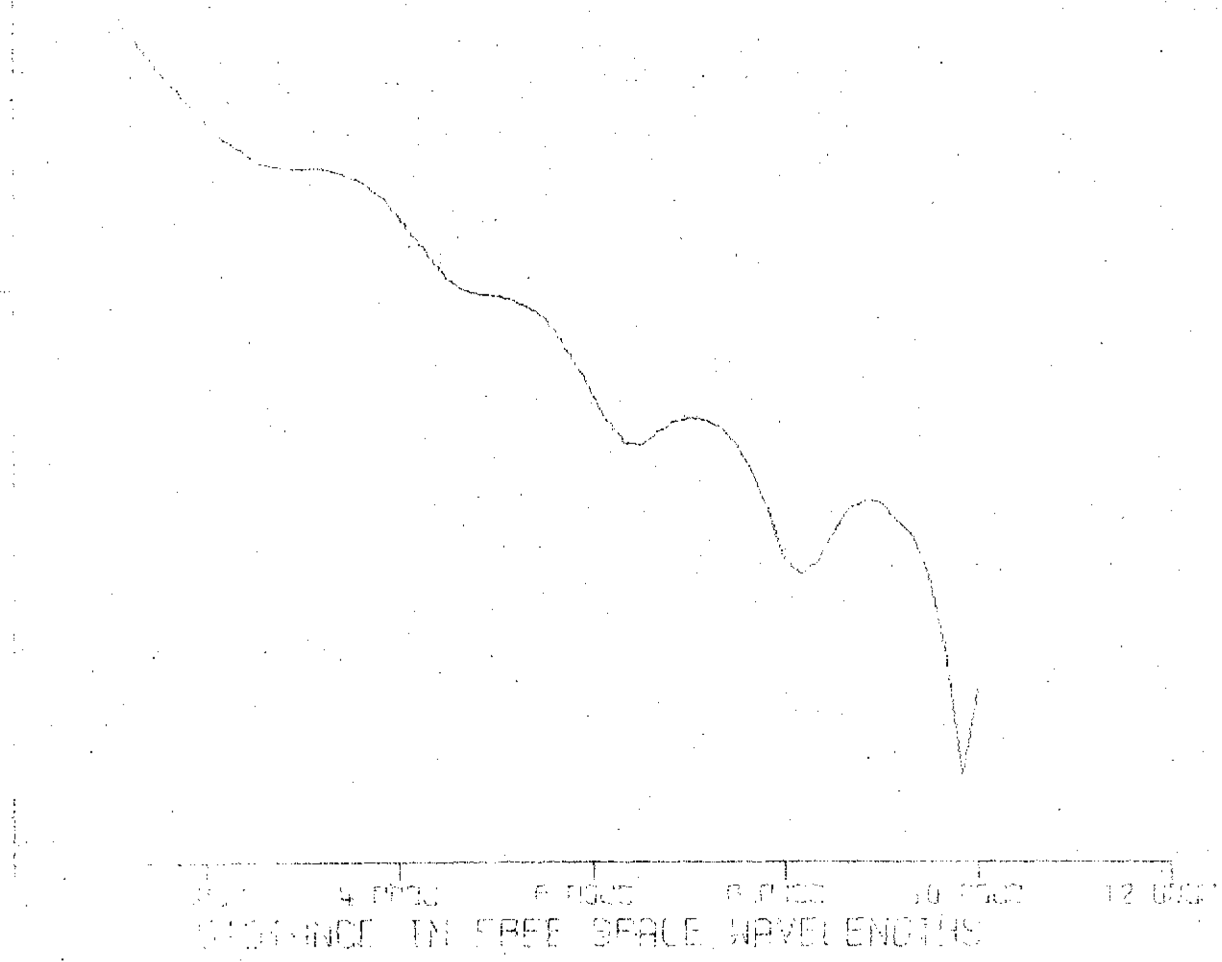
```
Z=      0.213333 λ0
```



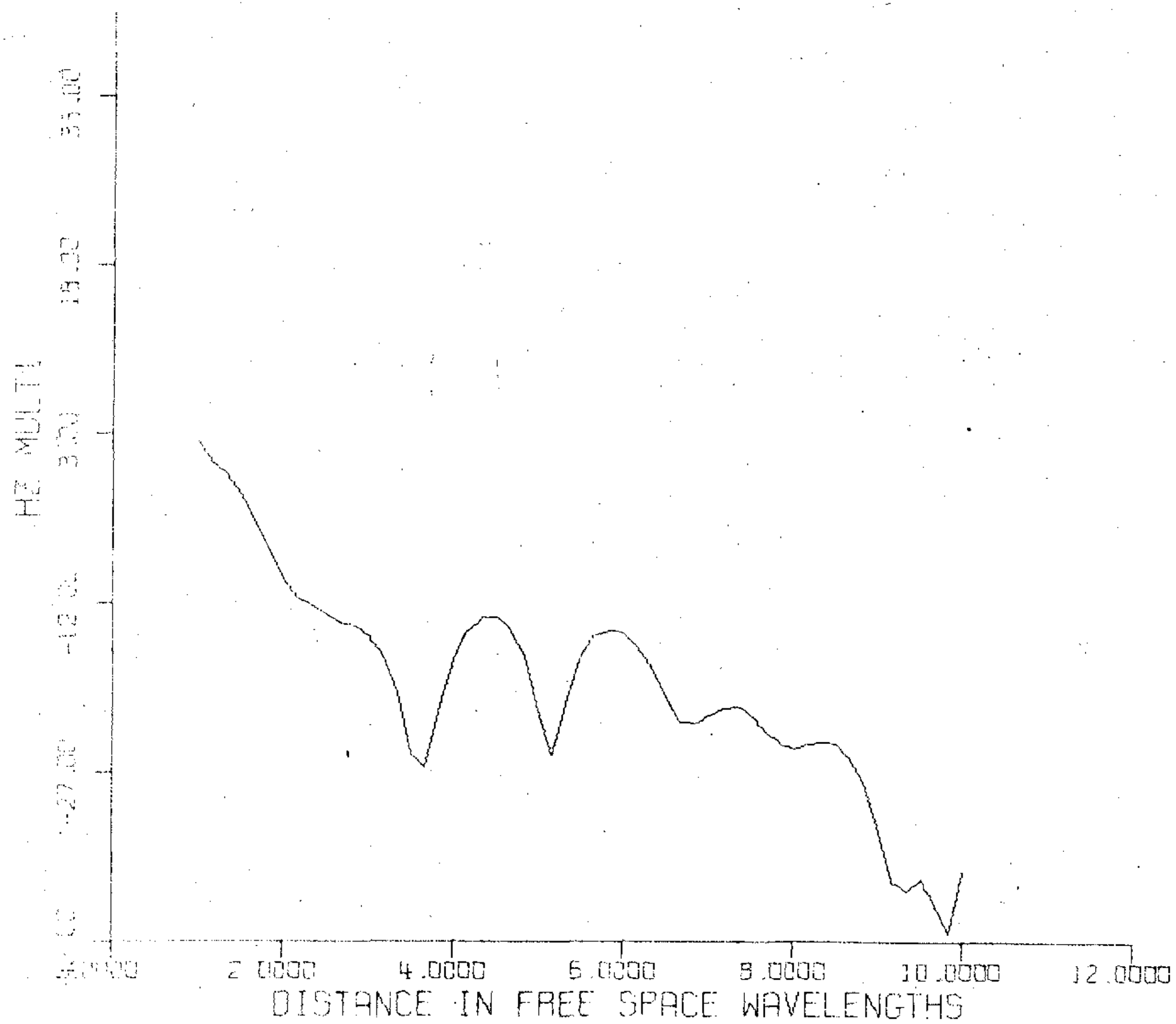
```
NLAYS=   4   FREQ=    16.000000

DL,FT,PERM,ANIS                                         DEPTH in
   1.000   0.0            1.000   1.000                       meters
---------------------------------------------------      0.0
   3.200   0.006250       1.000   1.000
---------------------------------------------------     15.0
   4.200   0.006250       1.000   1.000
---------------------------------------------------     45.0
   5.400   0.006250       1.000   1.000
---------------------------------------------------******

Z=       0.106667 λo
```



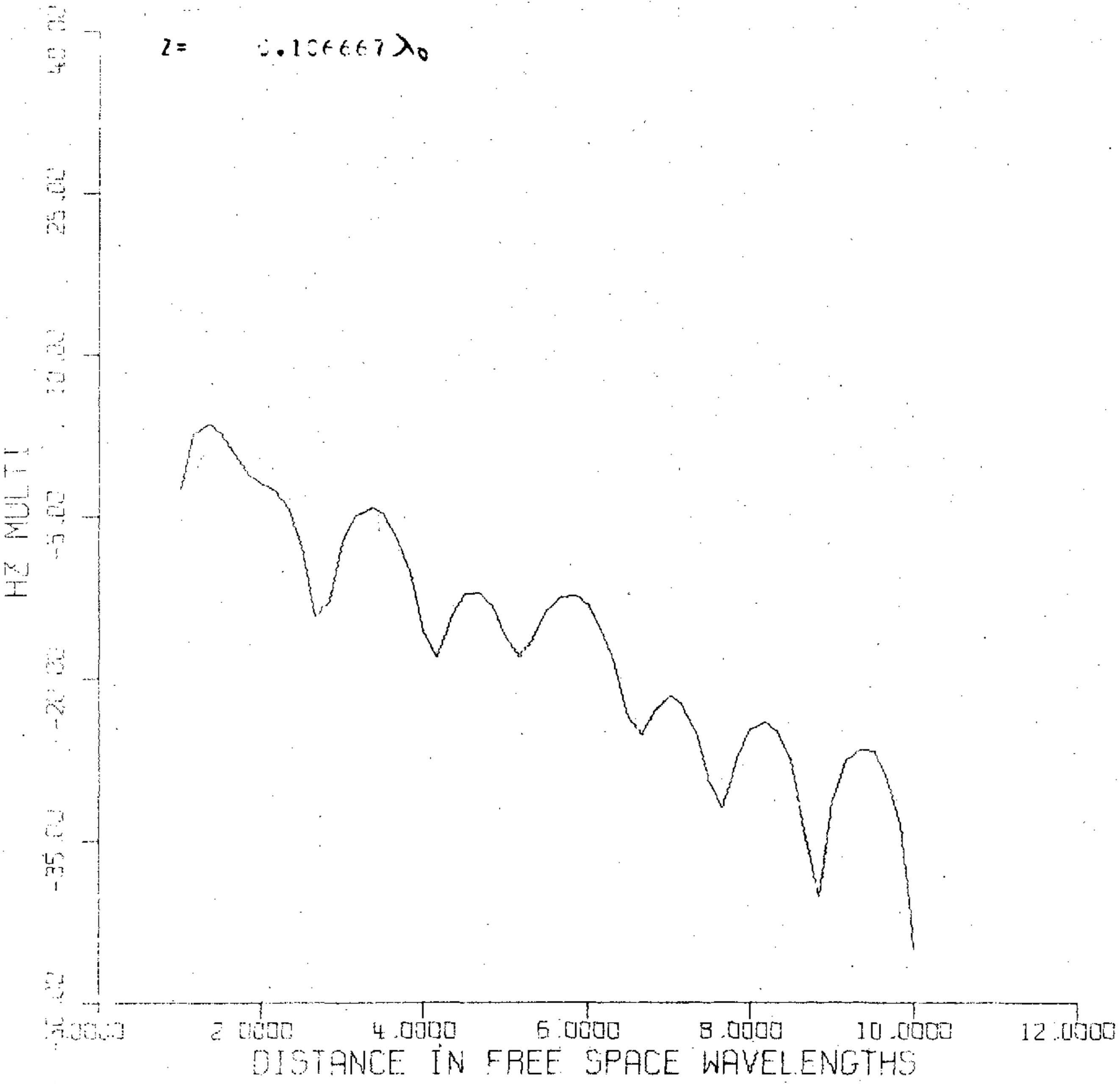
```
NLAYERS= 4   FREQ=   8.[illegible]
                                                     DEPTH in meters
[illegible]
  1.       0.0          1.[illegible]  1.[illegible]
----------------------------------------------------  [illegible].0
  [illegible]   0.012500  1.000   1.000
----------------------------------------------------  15.[illegible]
  [illegible]   0.0125[illegible]   1.[illegible]   1.[illegible]
----------------------------------------------------  45.0
  [illegible]   0.0125[illegible]   1.[illegible]   1.[illegible]
------------------------------------------------------******
------------------------------------------------------

Z=      0.[illegible]3333 λ0
```

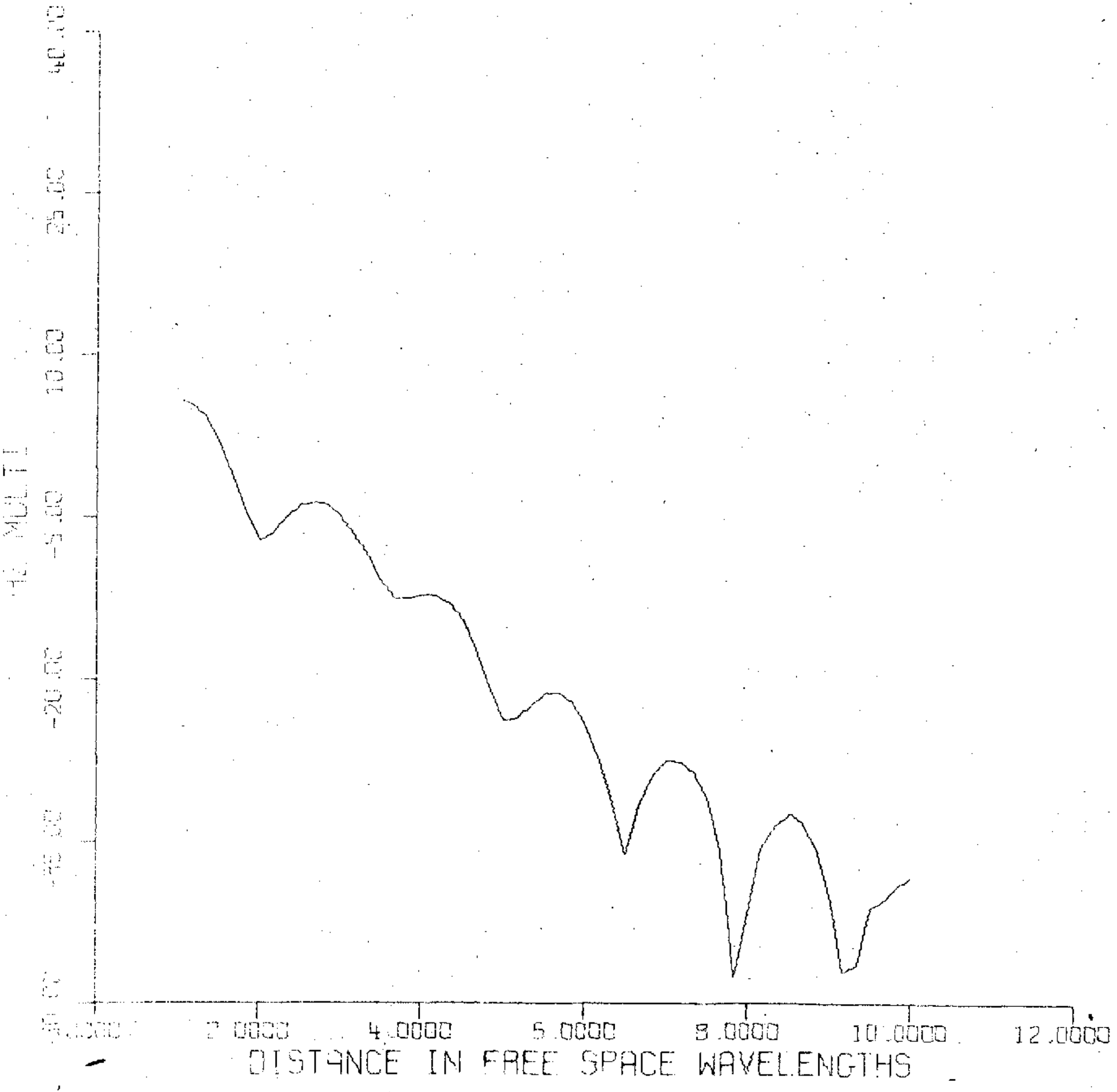


```
NLAYS=  4  FREQ=   32.000000

CI,LT,PERM,ANIS                               DEPTH in meters
   1.000  0.0            1.000  1.000
-------------------------------------------   0.0
   3.200  0.003125  1.000  1.200
-------------------------------------------  15.0
   4.200  0.003125  1.000  1.200
-------------------------------------------  45.0
   5.400  0.003125  1.000  1.200
-------------------------------------------******

Z=     0.213333 λ0
```



```
NLAYS=  4   FREQ=    16.000000

DL,LT,PERM,ANIS                                DEPTH
   1.000  0.0        1.000  1.000           in metres
----------------------------------------------  0.0
   3.200  0.006250  1.000  1.200
----------------------------------------------  15.0
   4.200  0.006250  1.000  1.200
----------------------------------------------  45.0
   5.400  0.006250  1.000  1.200
----------------------------------------------******

Z=      0.106667λ0
```



```
NLAYS=   4   FREQ=      3.000000

DI,LT,PERM,ANIS                                   DEPTH
   1.000   0.0          1.000  1.000              in meters
---------------------------------------------------   0.0
   3.200  0.012500     1.000  1.200
---------------------------------------------------  15.0
   4.200  0.012500     1.000  1.200
---------------------------------------------------  45.0
   5.400  0.012500     1.000  1.200
---------------------------------------------------******

Z=      0.053333 λ0
```