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Deciding Optimal Location for Steering Coil VH5A

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Report

Fig.1.: Wiggler parameters.

Fig.1.: Additional magnets (including steering magnet) parameters.

Fig.3.: Excitation current of the Steering magnet VH5A.

We locate Steering magnet VH5A at $z=457.6\text{mm}$ (nearly at the beginning of the bellow section).

We find out that the deflection of the aperture location ($z=689\text{mm}$) is small. On the other hand the angular deflection is quite large.

Fig.4.: For $I_{V5A}=3.3\text{A} \Rightarrow x(689)=0.73\text{mm}$, $x'=5.4\text{mrad}$.

Fig. 5.: For $I_{V5A}=-3.3\text{A} \Rightarrow x(689)=-0.30\text{mm}$, $x'=-6.3\text{mrad}$.

We also check the response to y deflection without x excitation: $I_{V5A}=0$:

Fig6.: $I_{H5A}=3.3\text{A} \Rightarrow x(689)=-4.5\text{mm}$.

Fig.7.: $I_{H5A}=-3.3\text{A} \Rightarrow x(z=689\text{mm})=-4.5\text{mm}$.

This is sufficient to scan the entire aperture ($\pm 5\text{mm}$).

We check the case of exaction of both x and y:

Fig.8.: $I_{H5A}=I_{V5A}=-3.3\text{A} \Rightarrow x(z=689\text{mm})=0.5\text{mm}$, $y(z=689\text{mm})=-4.2\text{mm}$.

Steering magnet VH5A is located on $z=500.5\text{mm}$.

Fig.9.: $I_{V5A}=3.3\text{A}$, $I_{H5A}=0 \Rightarrow x(z=689\text{mm})=0.4\text{mm}$,

Fig.10.: $I_{V5A}=-3.3\text{A}$, $I_{H5A}=0 \Rightarrow x(z=689\text{mm})=0$.

US: 9		File View Window Help	
system configuration ☐ single magnet ☐ magnet pair ☐ wiggler ☐ wiggler plus ☐ custom wiggler ☒ custom wiggler plus long		Electron Energy, keV 1408	
magnet dimensions, mm 50.8 a0 11.11 b0 11.11 c0		Long Magnets magnet dimensions, mm 11.11 a1 11.11 b1 1201.4 c1	
Saturating Field, Gs 8094 B0		Saturating Field, Gs 8490 B1	
wiggler properties 25 number of periods 6 periods account for 25 gap, mm		magnet positions, mm 0 z0 28.25 d1	

Fig. 1

Entrance magnet pairs To edit values double-click on the cell:

	a	b	c	d	e	alpha	Bz
1	50.8	11.11	5.55	19	19.94	180	9498
2	50.8	11.11	5.55	35.01	11.11	90	9498

Exit magnet pairs: To edit values double-click on the cell:

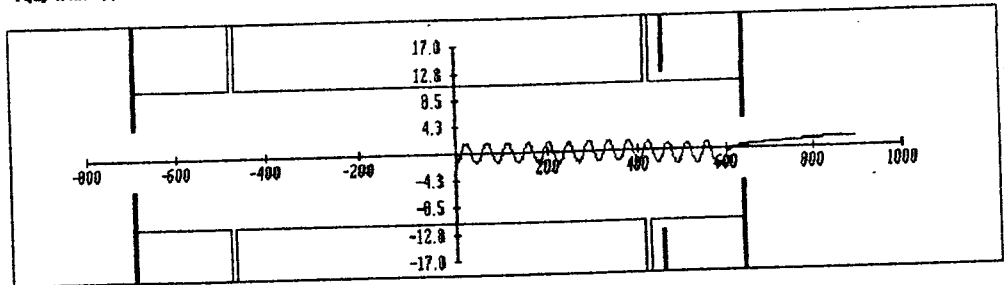
	a	b	c	d	e	alpha	Bz
1	50.8	11.11	11.11	18.05	11.11	0	7855
2	50.8	11.11	5.55	29	22.22	90	8983
3	50.8	11.11	5.55	19.5	31.08	180	8983

Single magnet: To edit values double-click on the cell:

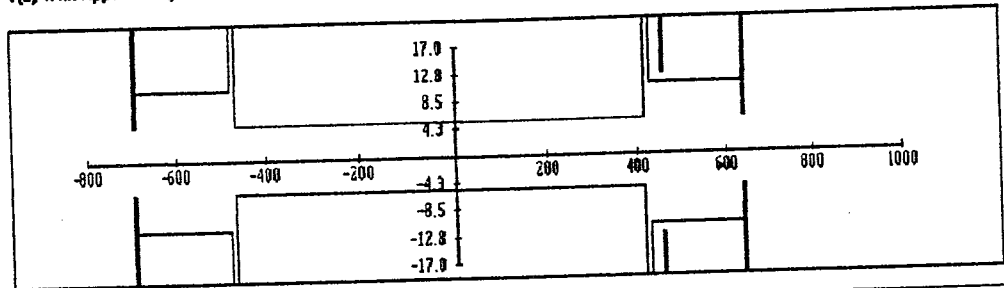
	a	b	c	Xm	Ym	Zm	alpha	beta	Bz	Type	Bz/TA
0	207	11	11	0	-98	-635.5	0	0	0	H5	1189.1
9	12	193	12	102.5	0	457.5	0	0	-5925	H5	1795.5
10	12	193	12	-102.5	0	457.5	0	0	-5925	H6	1795.5
11	217	12	12	0	102.5	457.5	180	0	-781.5	H6	236.83
12	217	12	12	0	-102.5	457.5	180	0	-781.5	H6	236.83

Fig. 2

X(z) With Apertures (In order to see the apertures, please click once on the graph)



Y(z) With Apertures (In order to see the apertures, please click once on the graph)



Enter The Z-value of the desired point

689

Calculate

Xmax

.730144259414712

View Stop Contours

Ymax

7.34583235659274E-07

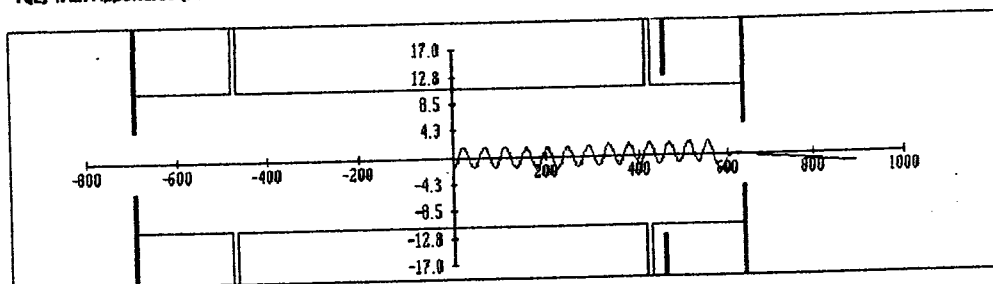
Print

Fig. 4

Fig. 4

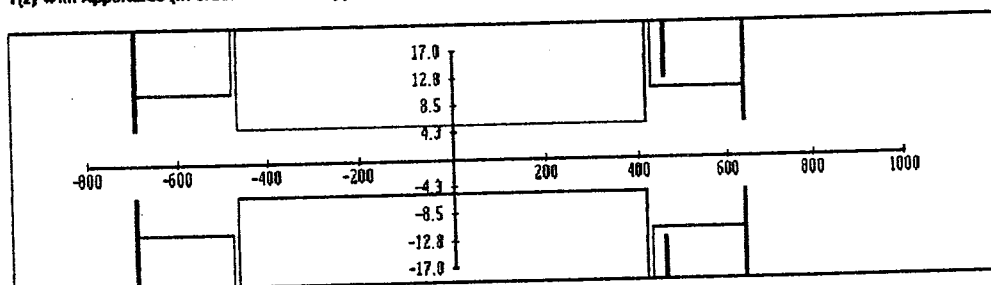
S

X(z) With Apertures (In order to see the apertures, please click once on the graph)



-2A

Y(z) With Apertures (In order to see the apertures, please click once on the graph)



Enter The Z-value of the desired point

689

Calculate X

X(max)

.302726787627678

View Step Coordinates

Y(max)

6.17047650924034E-08

print

Fig. 5

Fig.1. Deflection in the y-direction by VH 5a -steering current $I = 3.3A$. $y(z=900mm) = 11.6mm$.

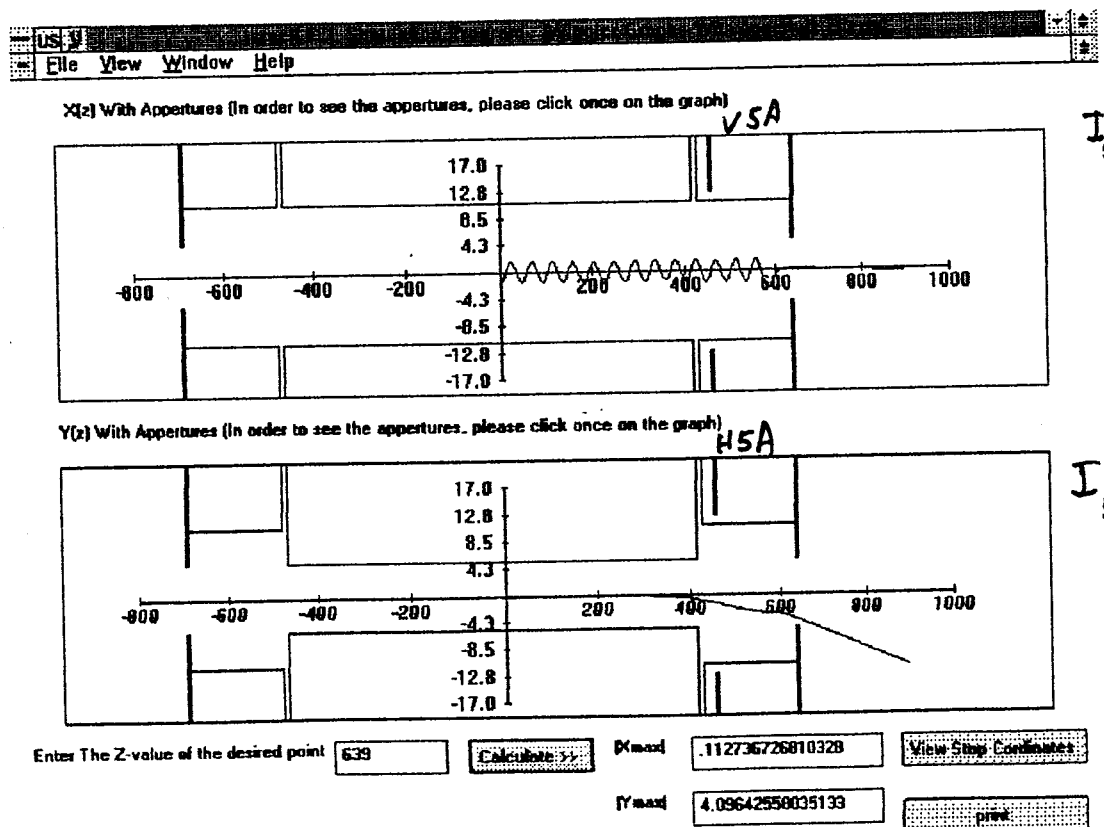
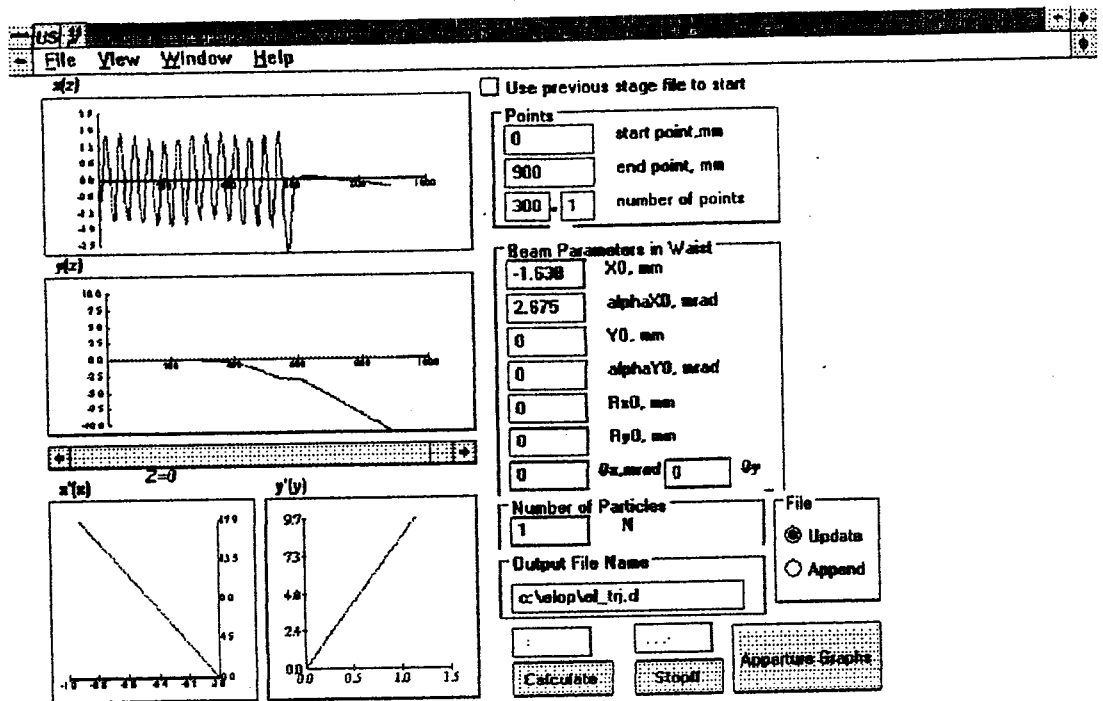


Fig.2. Deflection in the y-direction if $I = 3.3A$.

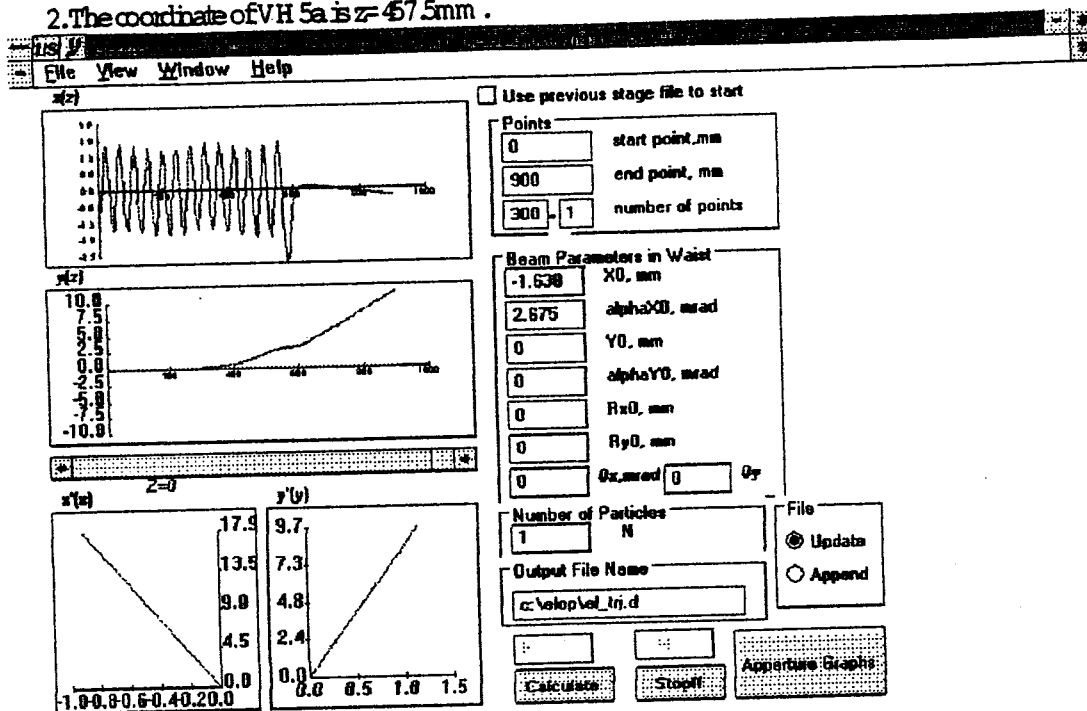
Fig. 6

7

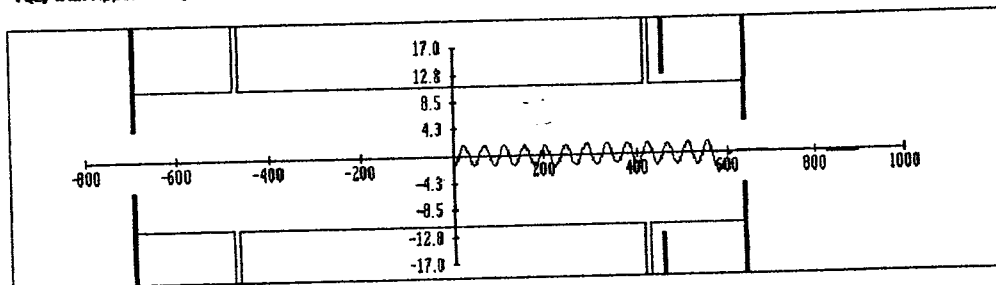
Sergey, 08.10.97

Deflection of central beam trajectory by steering magnet VH 5a.

1. The VH 6 data use for estimates.
2. The coordinate of VH 5a is $z = 457.5 \text{ mm}$.

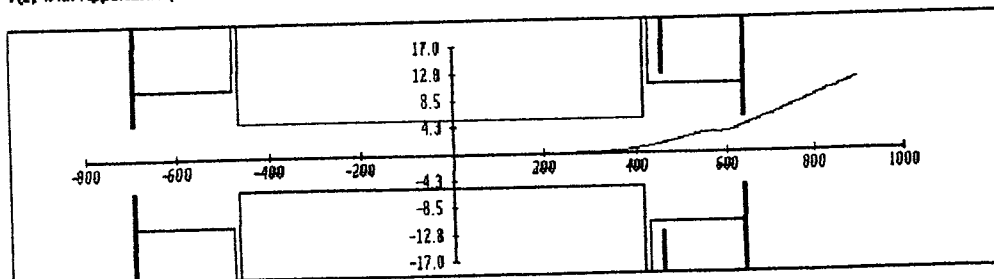


X(z) With Apertures (In order to see the apertures, please click once on the graph)



$I = 0$
VSA

Y(z) With Apertures (In order to see the apertures, please click once on the graph)



$I = 83$
HSA

Enter The Z-value of the desired point

639

Calculate >>>

Xmax

-112736665756632

View Step Coordinates

Ymax

4.09642558731146

print

Fig. 7

8

The correction both in x-and y-direction:

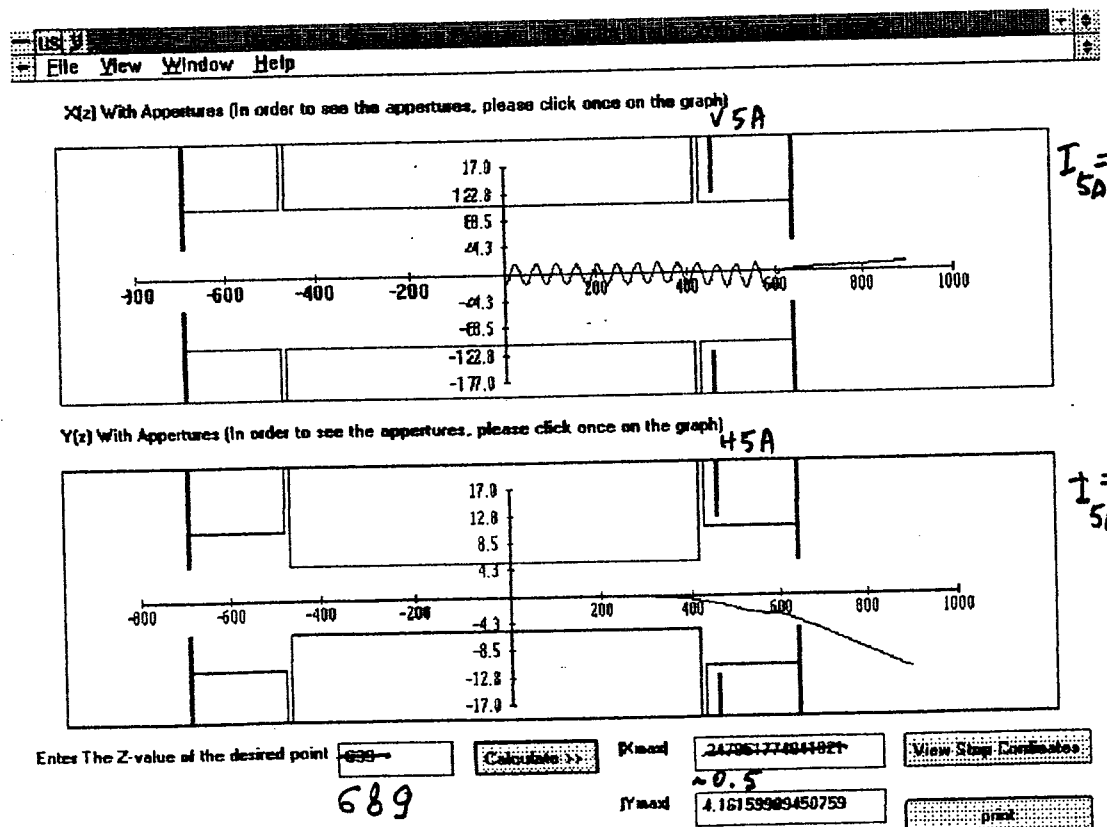
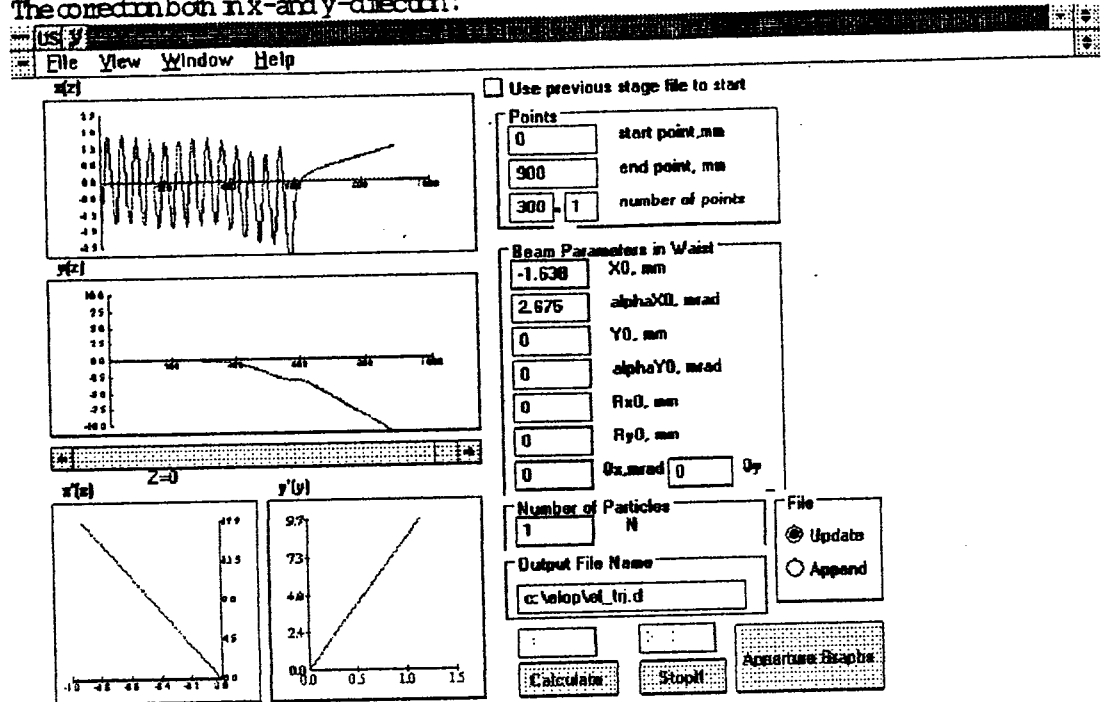
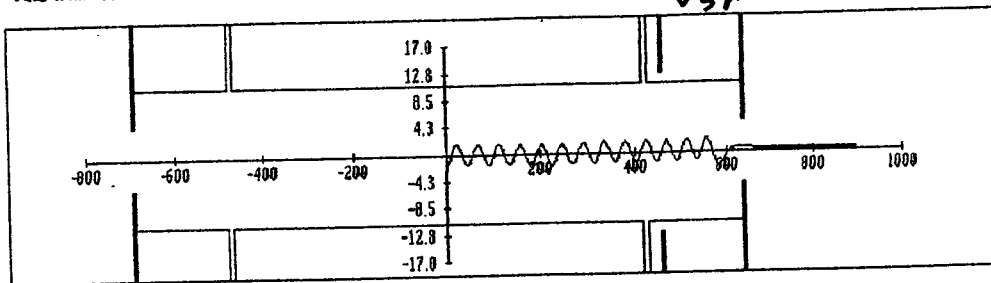


Fig.3. Correction in both direction. $I = -3.3A$

Fig. 8

X(z) With Apertures (In order to see the apertures, please click once on the graph)

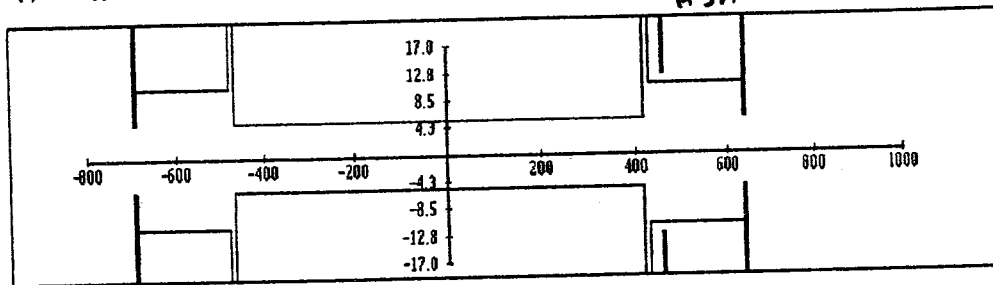
VSA



$$I_V = 3.31$$

Y(z) With Apertures (In order to see the apertures, please click once on the graph)

HSA



$$I_H = 0$$

Enter The Z-value of the desired point

689

Calculate

Xmax

.417499526044482

View Step Coordinates

Ymax

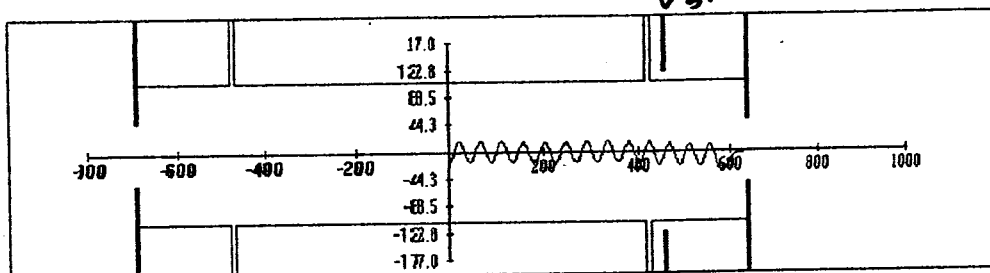
6.16726481058086E-08

print

$$z_{5A} = 500.5$$

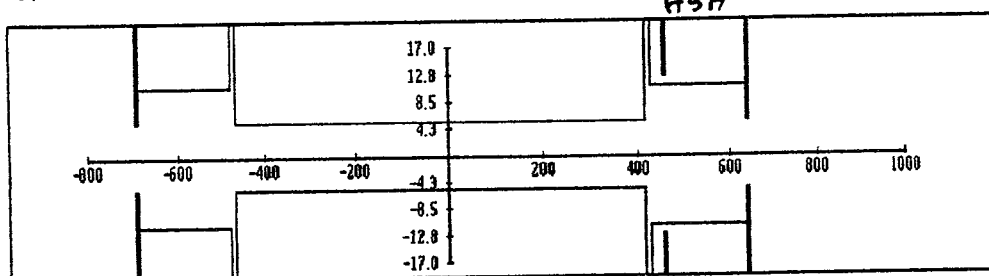
Fig. 9.

X(z) With Apertures (In order to see the apertures, please click once on the graph)



$$I_V = -3.3A$$

Y(z) With Apertures (In order to see the apertures, please click once on the graph)



$$I_H = 0$$

Enter The Z-value of the desired point

609

Calculate

X(max)

1.49984564532985E-02

View Stop Coordinates

Y(max)

6.82711795677641E-08

print

$$Z_{5A} = 500.5$$

Fig. 10.