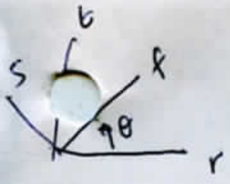


$r = f \cdot \cos\theta - s \sin\theta$
$t = f \sin\theta + s \cos\theta$

$f = r\cos\theta + t \sin\theta$
$s = -r\sin\theta + t\cos\theta$

Zpulse anisotropy

MRN100

split of radial pulse

$r = 1 \quad t = 0$
$f = \cos\theta \quad s = -\sin\theta$

$\Rightarrow$

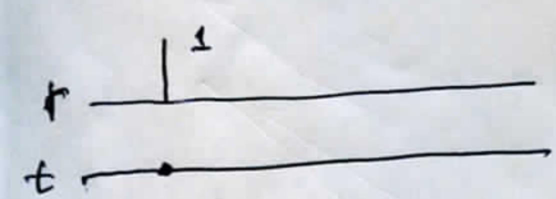
$r = \cos^2\theta\,\delta(t-t_f) + \sin^2\theta\,\delta(t-t_s)$
$t = \cos\theta\sin\theta\,\delta(t-t_f) - \cos\theta\sin\theta\,\delta(t-t_s)$

split of tangential pulse

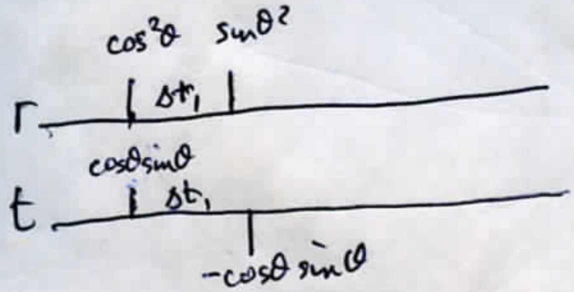
$r = 0 \quad t = 1$
$f = \sin\theta \quad s = \cos\theta$

$\Rightarrow$

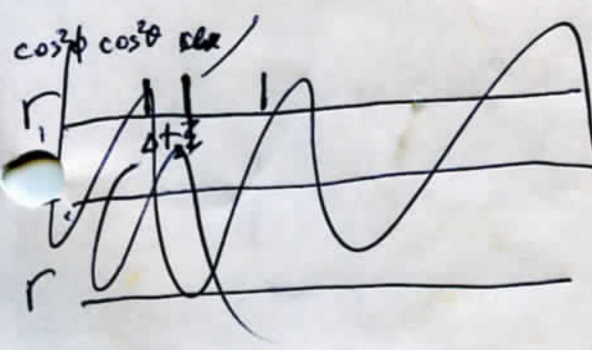
$r = +\cos\theta\sin\theta\,\delta(t-t_f) - \cos\theta\sin\theta\,\delta(t-t_s)$
$t = \sin^2\theta\,\delta(t-t_f) + \cos^2\theta\,\delta(t-t_s)$

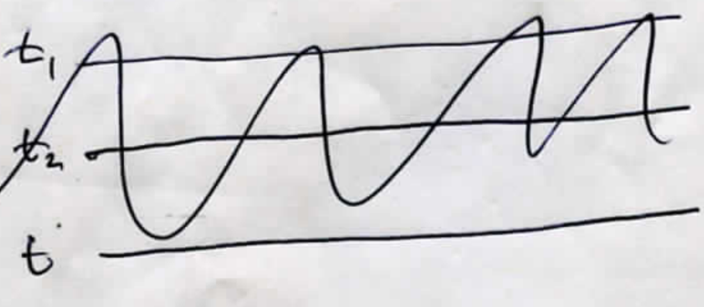



bottom of 1, angle $\theta$




$\longrightarrow$ angle $\phi$



$r \to$ $r: c^2\theta \quad s^2\theta$

$t: c\theta s\theta \quad -c\theta s\theta$

$t \to r: c\theta \sin\theta - c\theta s\theta$

$t: s^2\theta + c^2\theta$

$c^2\theta \quad s^2\theta$

$c\theta s\theta \quad -c\theta s\theta$

$c^2\theta c^2\phi \quad c^2\theta s^2\phi \quad s^2\theta c^2\phi \quad s^2\theta s^2\phi$

rr

$c\theta s\theta c\phi s\phi \quad -c\theta s\theta c\phi s\phi \quad -c\theta s\theta c\phi s\phi \quad c\theta s\theta c\phi s\phi$

tr

$T_{1F}+T_{2F} \quad T_{1F}+T_{2S} \quad T_{1S}+T_{2F} \quad T_{1S}+T_{2S}$

$c^2\theta c\phi s\phi \quad -c^2\theta c\phi s\phi \quad s^2\theta c\phi s\phi$

rt

$c\theta s\theta s^2\phi \quad c\theta s\theta c^2\phi \quad -s^2\theta c\phi s\phi$

tt

$-c\theta s\theta s^2\phi \quad -c\theta s\theta c^2\phi$

$\theta = \phi$

$c^2(c^2+s^2) \mid c^2s^2 - c^2s^2 \mid s^2c^2 - c^2s^2 \mid s^2(s^2+c^2) \quad cs(c^2+s^2) \mid -c^3s + c^3s \mid cs^3 - cs^3) - cs(s^2+c^2)$

$c^2 \quad 0 \quad 0 \quad s^2 \quad cs \quad 0 \quad 0 \quad -cs$

$\phi = \theta + 90$

$\sin\phi = \cos\theta = A$

$\cos\phi = -\sin\theta = B$

$\sin\phi = \sin(\theta+90) = \sin\theta \cancel{\cos 90^\circ} + \cos\theta \cancel{\sin 90} = \cos\theta$

$\cos\phi = \cos(\theta+90) = \cos\theta \cancel{\cos 90^\circ} - \sin\theta \cancel{\sin 90} = -\sin\theta$

$A^2B^2 \quad A^4 \quad B^4 \quad A^2B^2$

$-A^2B^2 \quad +A^2B^2 \quad +A^2B^2 \quad -A^2B^2$

$0 \quad A^2(A^2+B^2) \quad B^2(A^2+B^2) \quad 0$

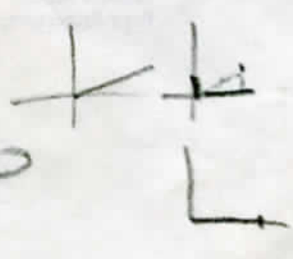
$0 \quad A^2 \quad B^2 \quad 0$

$A^3B \quad -A^3B \quad AB^3 \quad -AB^3$

$-A^3B \quad -AB^3 \quad A^3B \quad AB^3$

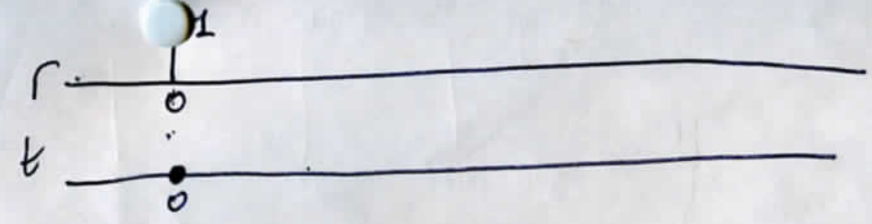
$0 \quad -AB(A^2+B^2) \quad AB(A^2+B^2) \quad 0$

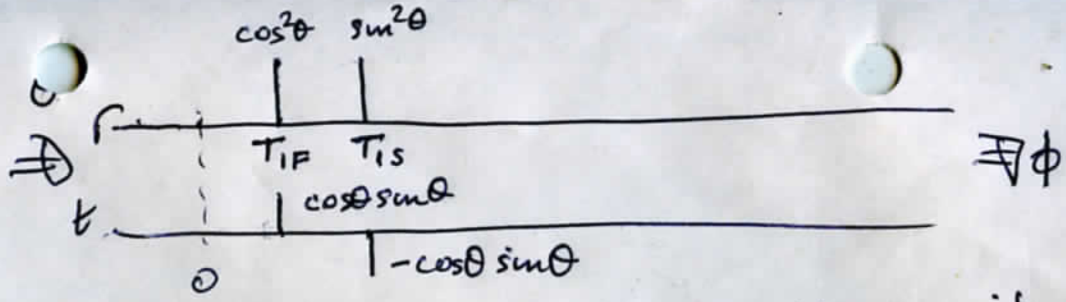
$0 \quad -AB \quad AB \quad 0$

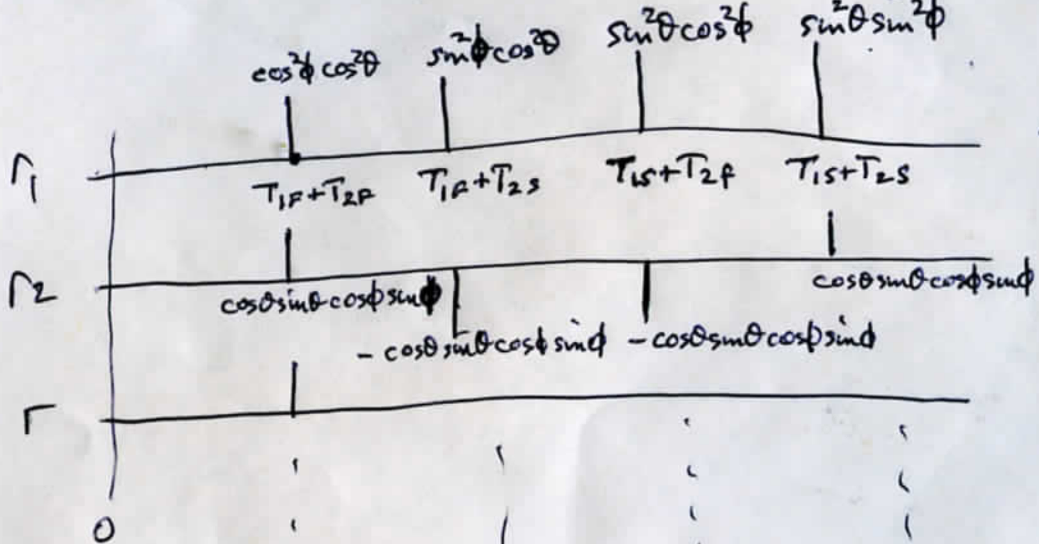


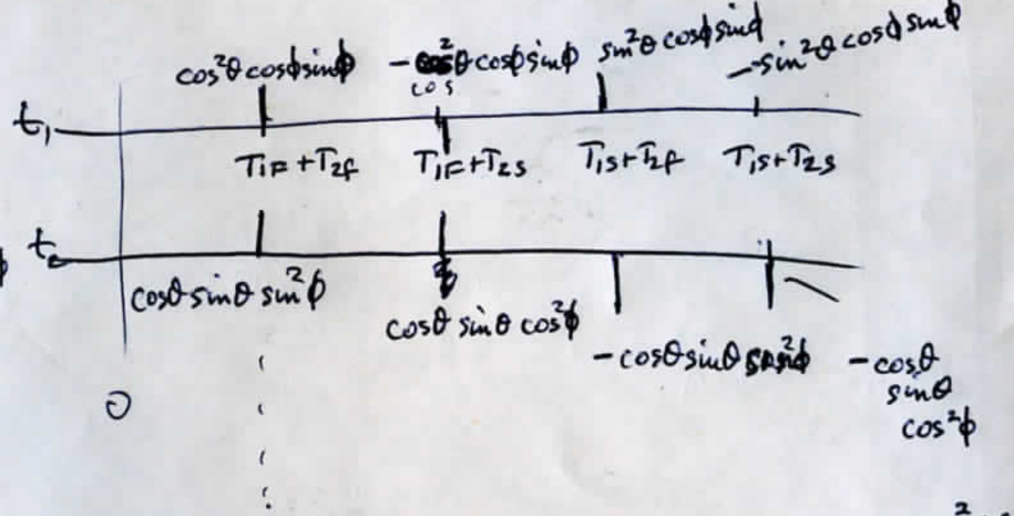
$\Delta T_1 = \Delta T_2$

$0 \quad 1 \quad 0 \mid 0 \quad 0 \quad 0$




Special case $\theta = \phi$

$$\begin{array}{l} \cos^2\phi\cos^2\theta \\ +\ \cos^2\phi\sin^2\theta \\ \hline = \cos^2\phi \end{array} \quad \checkmark$$

$$\begin{array}{l} \sin^2\theta\cos^2\theta \\ -\ \sin^2\phi\cos^2\theta \\ \hline 0 \end{array} \quad \checkmark$$

$$\begin{array}{l} \sin^2\theta\cos^2\phi \\ -\ \sin^2\theta\cos^2\phi \\ \hline 0 \end{array} \quad \checkmark$$

$$\begin{array}{l} \sin^2\theta\sin^2\phi \\ \cos^2\theta\sin^2\phi \\ \hline \sin^2\phi \end{array} \quad \checkmark$$

$$\begin{array}{l} \cos^2\theta\sin\phi\cos\phi \\ +\ \sin^2\theta\sin\phi\cos\theta \\ \hline \sin\theta\cos\theta \end{array} \quad \checkmark$$

$$\begin{array}{l} -\cos^2\phi\cos\theta\sin\theta \\ +\ \cos^2\phi\cos\theta\sin\theta \\ \hline 0 \end{array} \quad \checkmark$$

$$\begin{array}{l} \sin^2\theta\cos\theta\sin\theta \\ -\ \sin^2\theta\cos^2\sin\theta \\ \hline 0 \end{array} \quad \checkmark$$

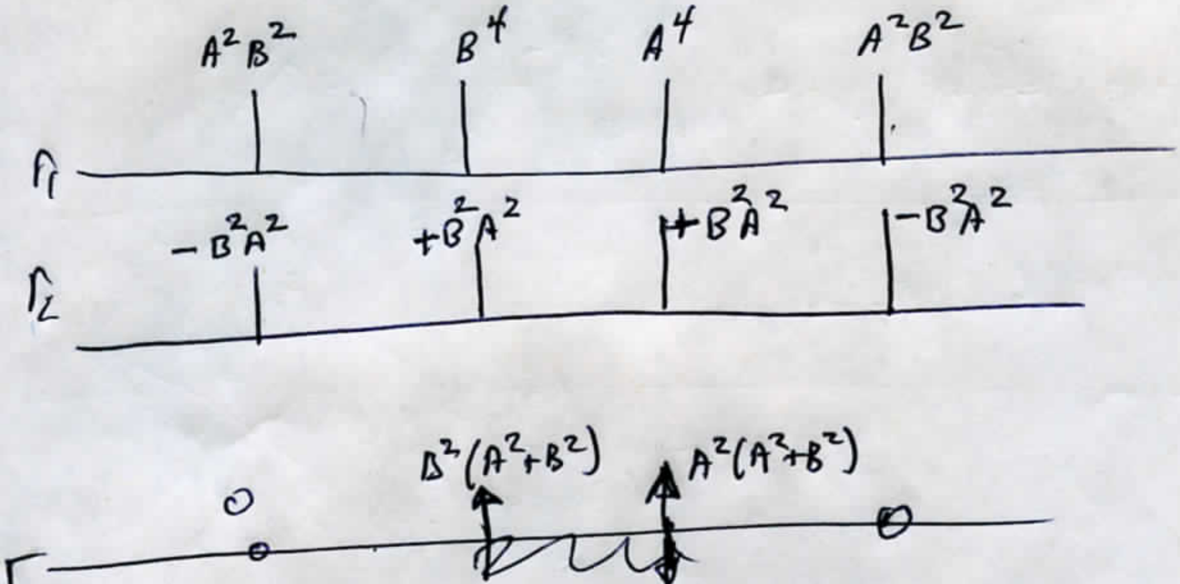
$$\begin{array}{l} -s^2cs \\ -c^2cs \\ \hline -\sin\theta\cos\theta \end{array} \quad \checkmark$$

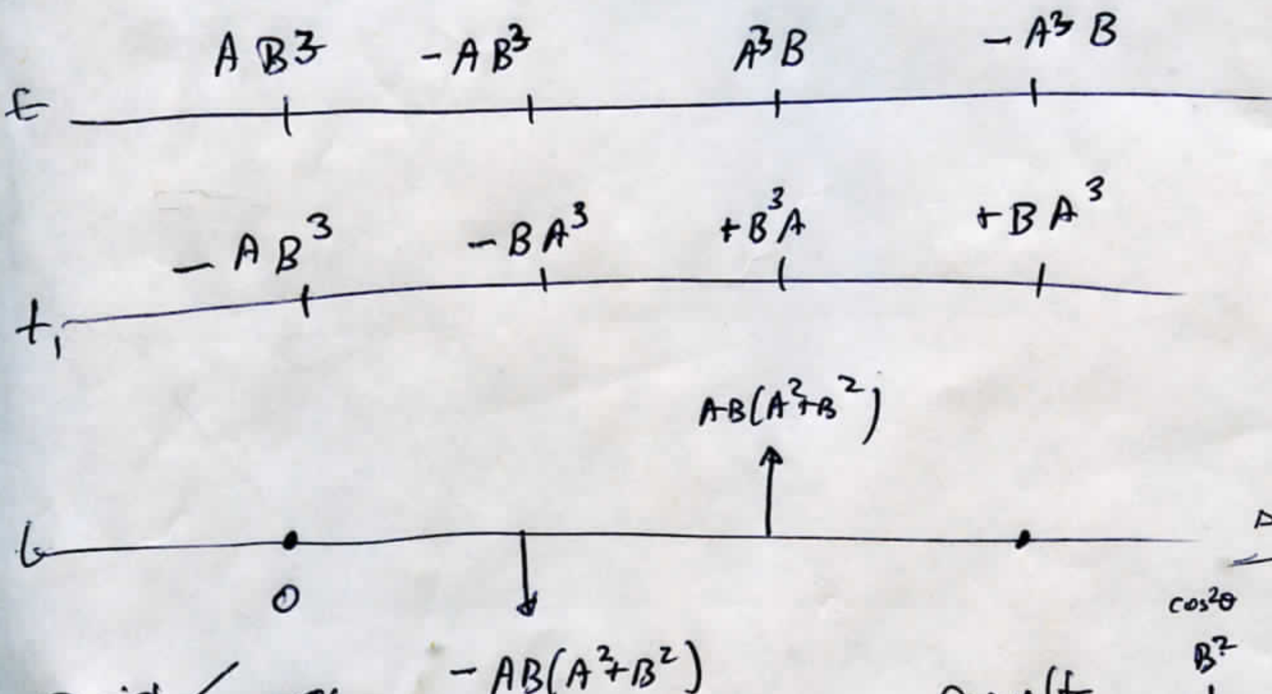
$\cos\phi = \sin\theta = A$

$\sin\phi = -\cos\theta = B$

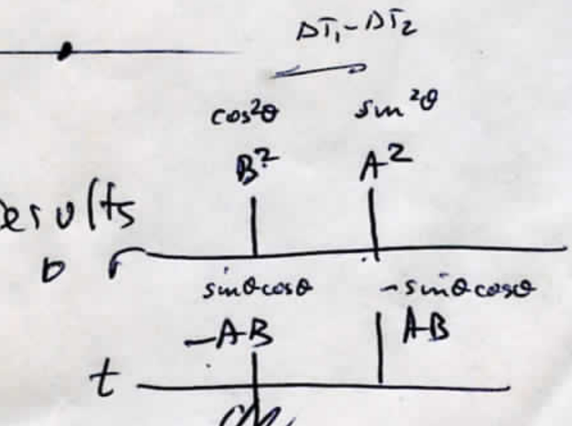
case $\phi = \theta - 90$

2 orthogonal fast axes.




results



almost $\perp$ arcs

$\theta' = \theta + \delta$

$\sin\theta' \simeq \sin\theta + \delta\cos\theta$

$\cos\theta' \simeq \cos\theta - \delta\sin\theta$

$\cos\theta = A \qquad \cos\phi = B \qquad \cos\theta' = A + \delta B$

$\sin\theta = -B \qquad \sin\phi = A \qquad \sin\theta' = -B + \delta A$

$\cos^2\theta' = A^2 + 2AB\delta$

$\sin^2\theta' = B^2 - 2AB\delta$

$\sin\theta'\cos\theta' = -AB + (A^2 - B^2)\delta$.

R1

$$(A^2 + 2AB\delta)B^2 = A^2B^2 + 2AB^3\delta$$

$$(-AB + (A^2-B^2)\delta)AB = -A^2B^2 + (A^2-B^2)AB\delta$$

$$0 + AB(2B^2 + A^2 - B^2)\delta$$

$$AB(A^2+B^2)\delta$$

$$AB\delta$$

---

R2

$$(A^2+2AB\delta)A^2 = A^4 + 2A^3B\delta$$

$$(B^2 - 2AB\delta)B^2 = B^4 - 2AB^3\delta$$

$$(AB - (A^2-B^2)\delta)AB = 2A^2B^2 - 2(A^2-B^2)AB\delta$$

$$(A^4+A^2B^2) + (B^4+A^2B^2) + 2AB(A^2-B^2)\delta - 2AB(A^2-B^2)\delta$$

$$A^2(A^2+B^2) + B^2(A^2+B^2)$$

$$1$$

---

R3

$$(B^2 - 2AB\delta)A^2 = A^2B^2 - 2A^3B\delta$$

$$(-AB + (A^2-B^2)\delta)AB = -A^2B^2 + (A^2-B^2)AB\delta$$

$$0 + AB(-2A^2 + A^2 - B^2)\delta$$

$$AB(-A^2-B^2)\delta$$

$$-AB\delta$$

$t_1$ $(A^2 + 2AB\delta)AB = A^3B + 2A^2B^2\delta$

$(-AB + (A^2 - B^2)\delta)A^2 = -A^3B + A^2(A^2 - B^2)\delta$

$A^2(2B^2 + A^2 - B^2)\delta$

$A^2(A^2 + B^2)\delta$

$A^2\delta$

---

$t_2$

$-(A^2 + 2AB\delta)AB = -A^3B - 2A^2B^2\delta$

$(-AB + (A^2 - B^2)\delta)B^2 = -AB^3 + B^2(A^2 - B^2)\delta$

$-AB(A^2 + B^2) + B^2(\cancel{2}A^2 + \cancel{A^2} - B^2)\delta$

$-AB + B^2(-\cancel{2}A^2 - \cancel{1}B^2)\delta$

$\cancel{-AB - 2B^2\delta}$ $-AB + B^2(-A^2 - B^2)\delta$

$-AB - B^2\delta$

$(B^2 - 2AB\delta)AB = AB^3 - 2A^2B^2\delta$

$-(-AB + (A^2 - B^2)\delta)A^2 = A^3B - A^2(A^2 - B^2)\delta$

$AB(A^2 + B^2) - A^2(A^2 - B^2 + 2B^2)\delta$

$(A^2 + B^2)$

$AB - A^2\delta$

$-AB - B^2\delta$

$AB - A^2\delta$

$0 - \delta$

$\cancel{-(A^2 + B^2 + B^2)\delta}$

$\cancel{-(1 + B^2)\delta}$

$-\delta$

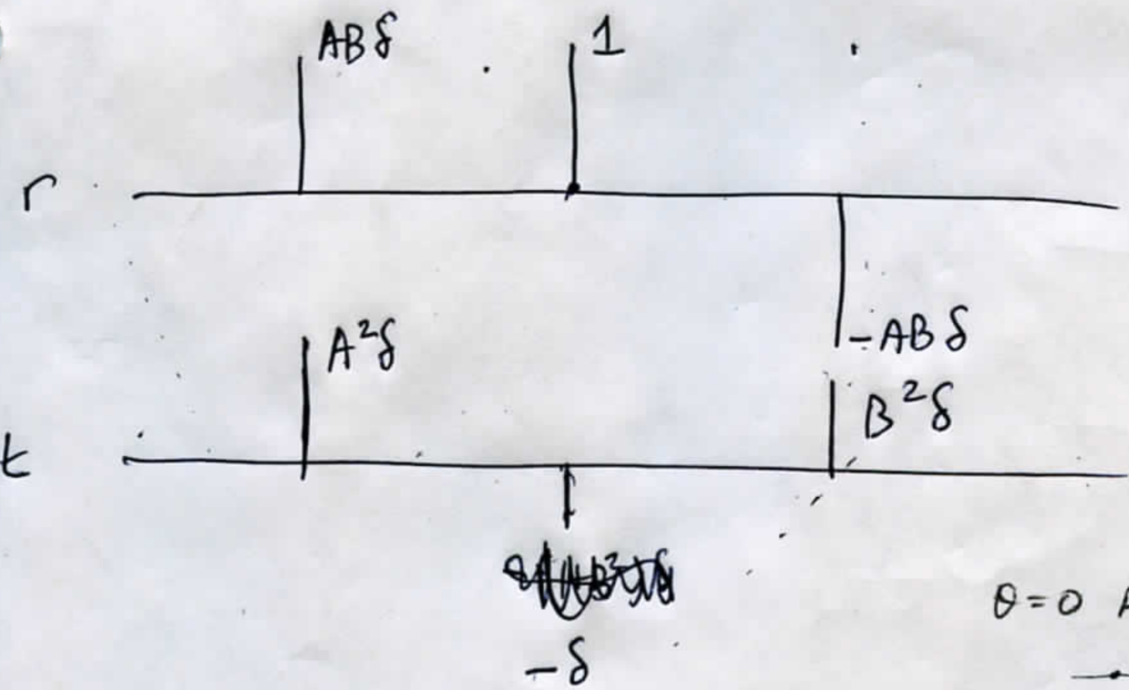
t4

$$-(B^2-2AB\delta)AB = -AB^3 + 2A^2B^2\delta$$

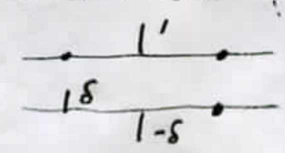
$$-(-AB+(A^2-B^2)\delta)B^2 = +AB^3 - (A^2-B^2)B^2\delta$$

$$0 + B^2(2A^2-A^2+B^2)\delta$$

$$B^2\delta$$

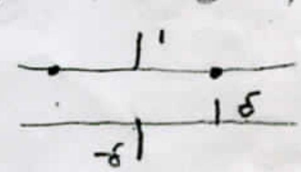



$\theta=0$ $A=1$ $B=0$




$\theta=45$ $A=\frac{1}{2}$ $B=-\frac{1}{2}$

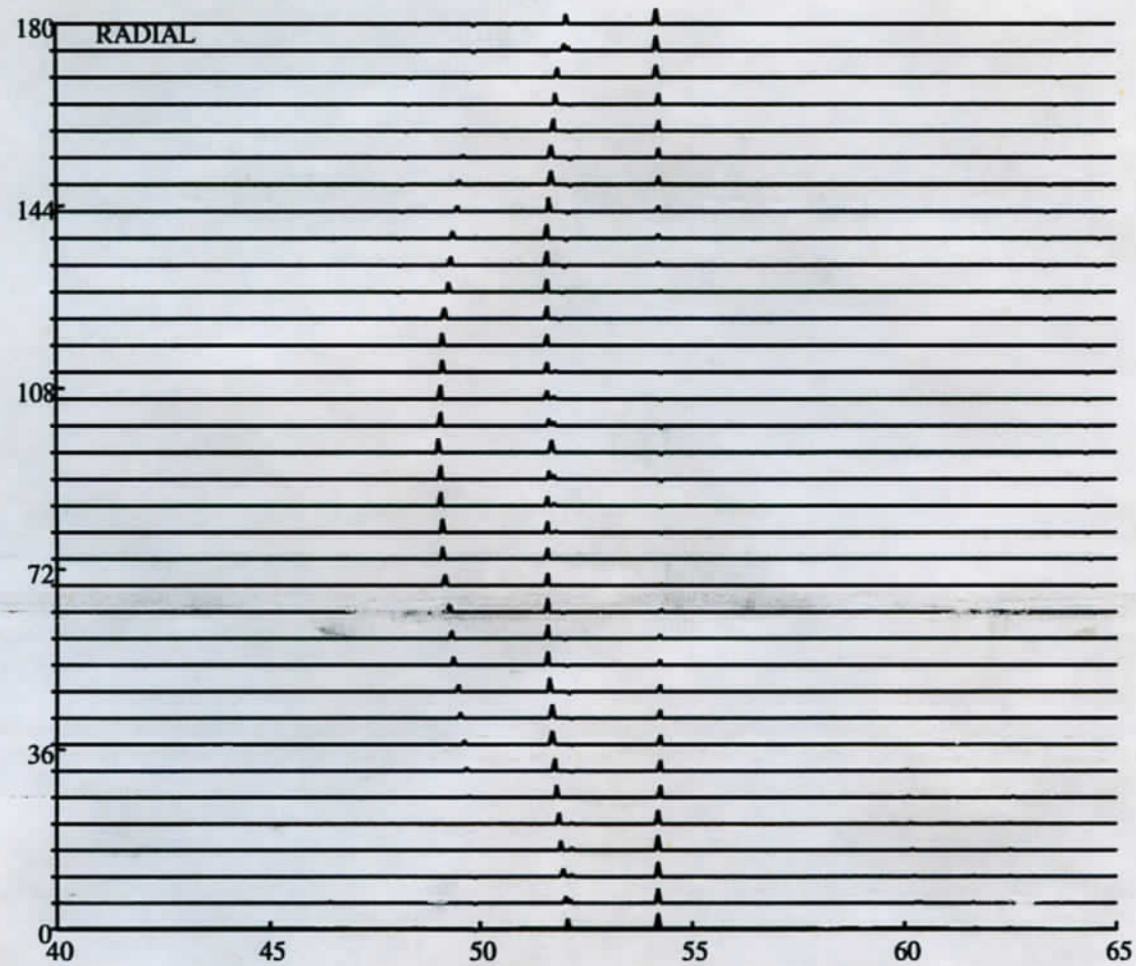

$\theta=90$ $A=0$ $B=-1$

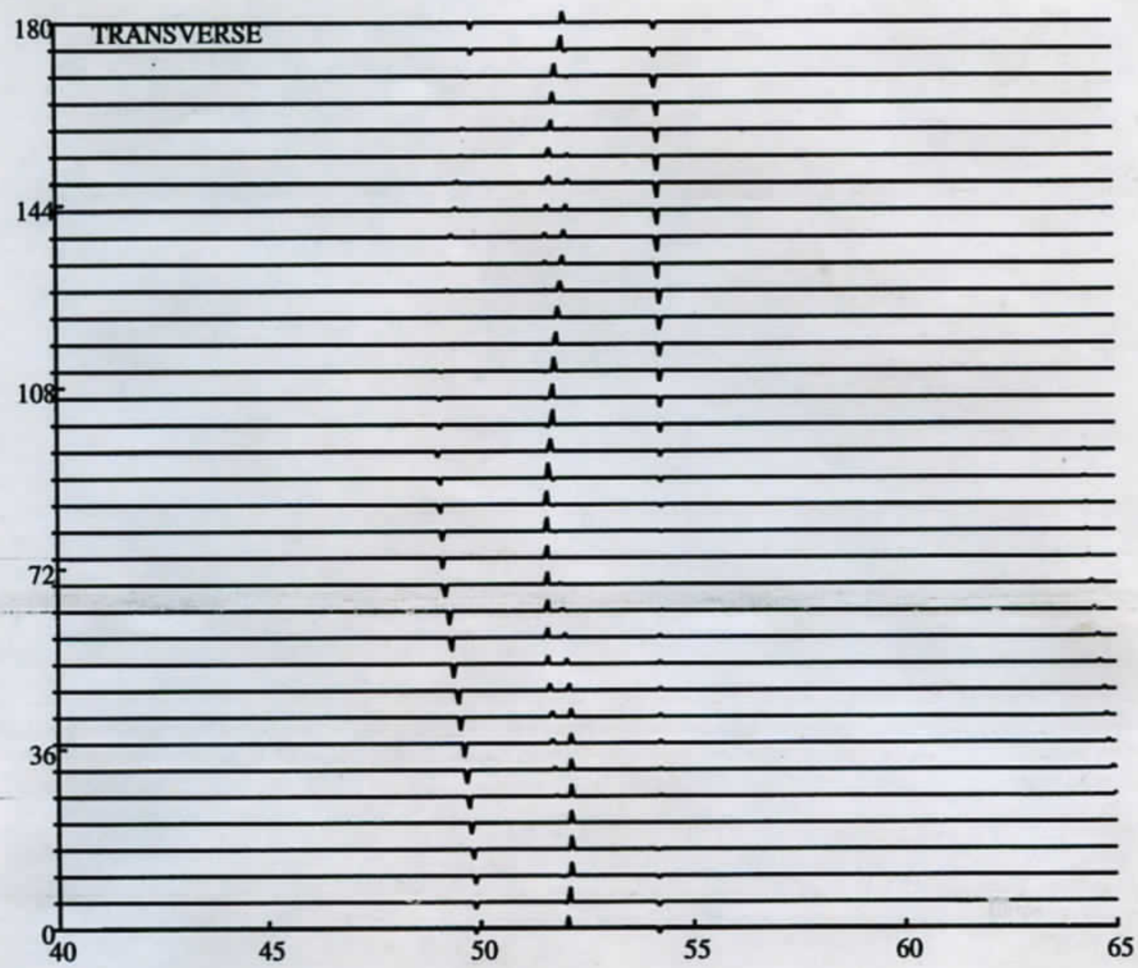



looks like $\theta=0,90$ cases are most 1-Layer like

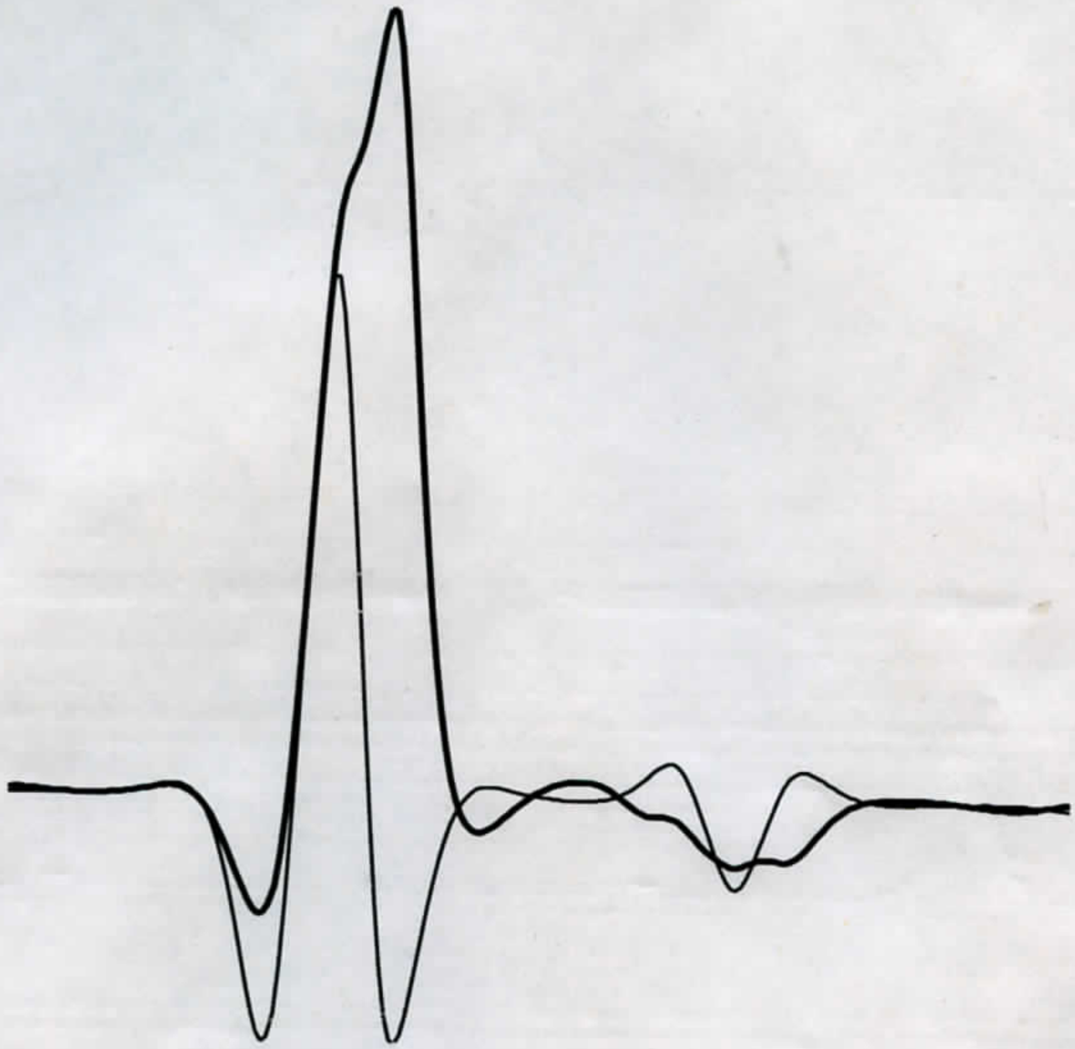
$$\cos^2\theta\cos^2\phi + \cos\theta\sin\theta\cos\phi\sin\phi$$

$$\frac{1}{4}(\cos 2\theta + 1)(\cos 2\phi + 1) + \frac{1}{4}\sin 2\theta \sin 2\phi$$


RADIAL
180
144
108
72
36
0
40
45
50
55
60
65

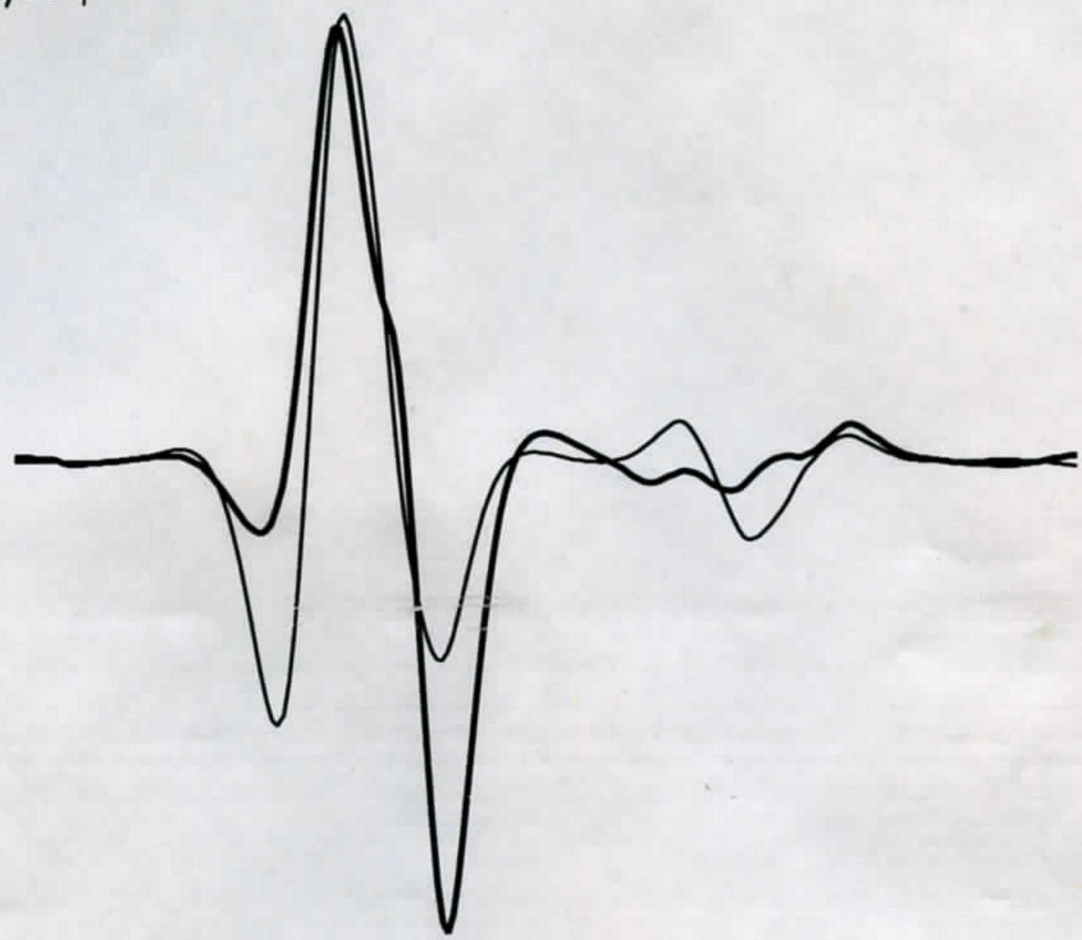

TRANSVERSE
180
144
108
72
36
0
40
45
50
55
60
65

bay = 0
R, T

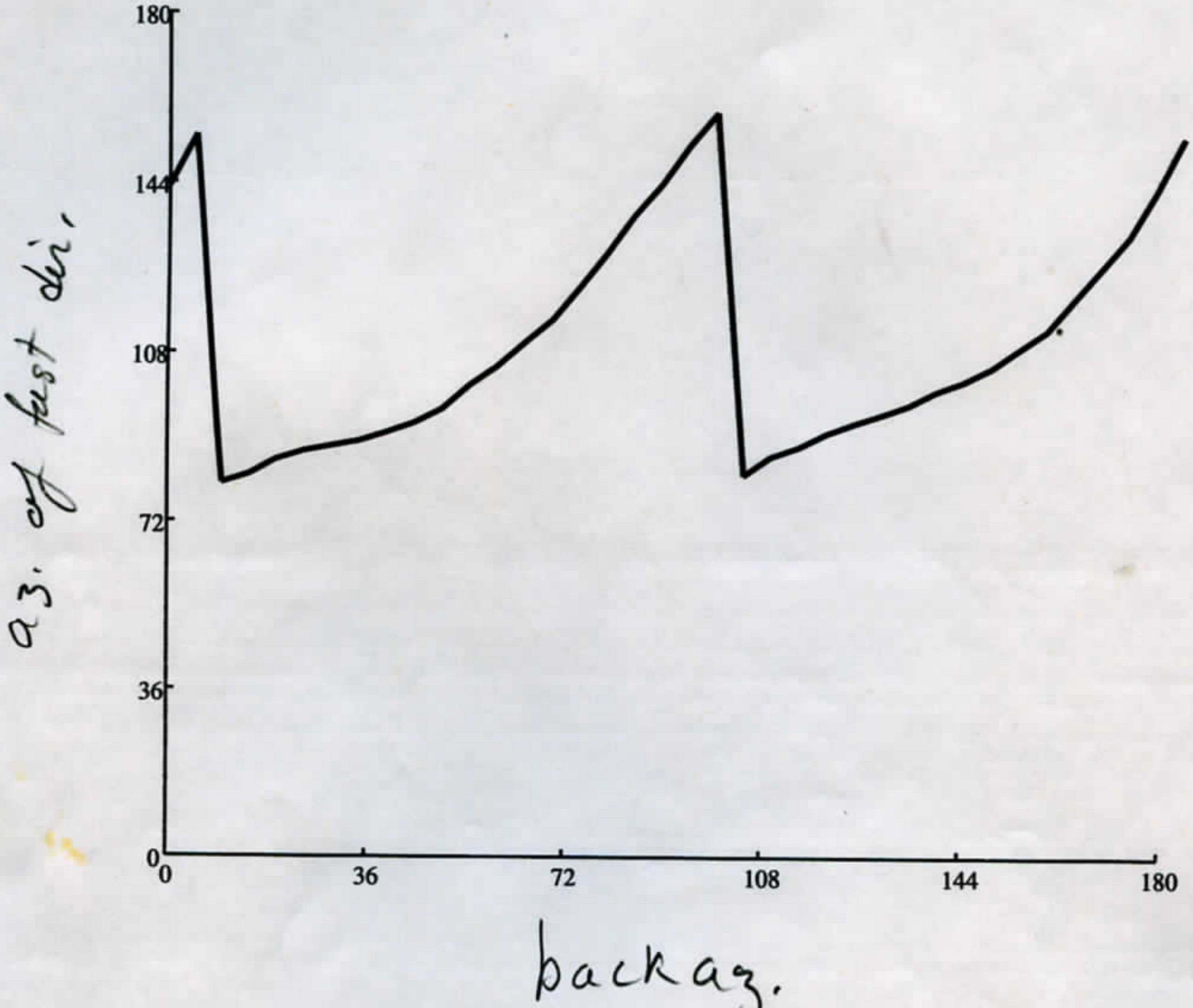


baz = 0

1 layer fit

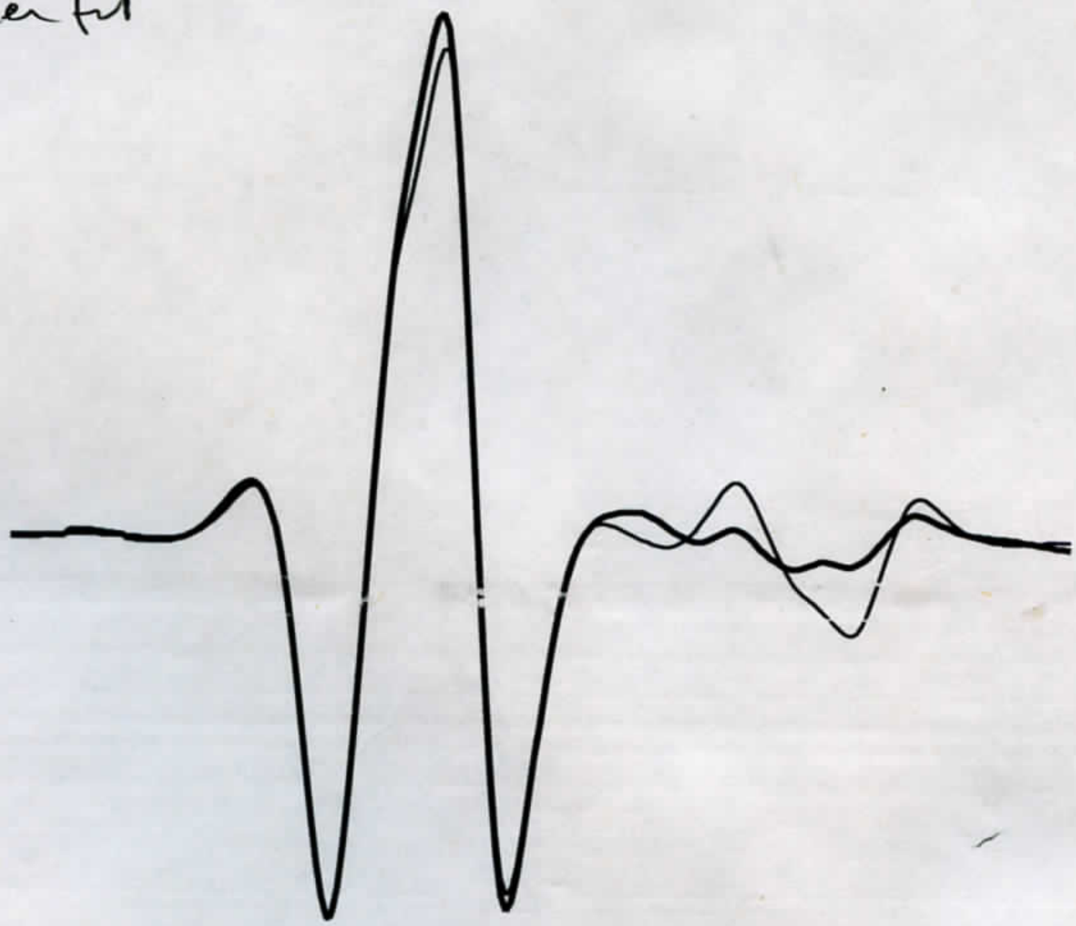


1-layer fit

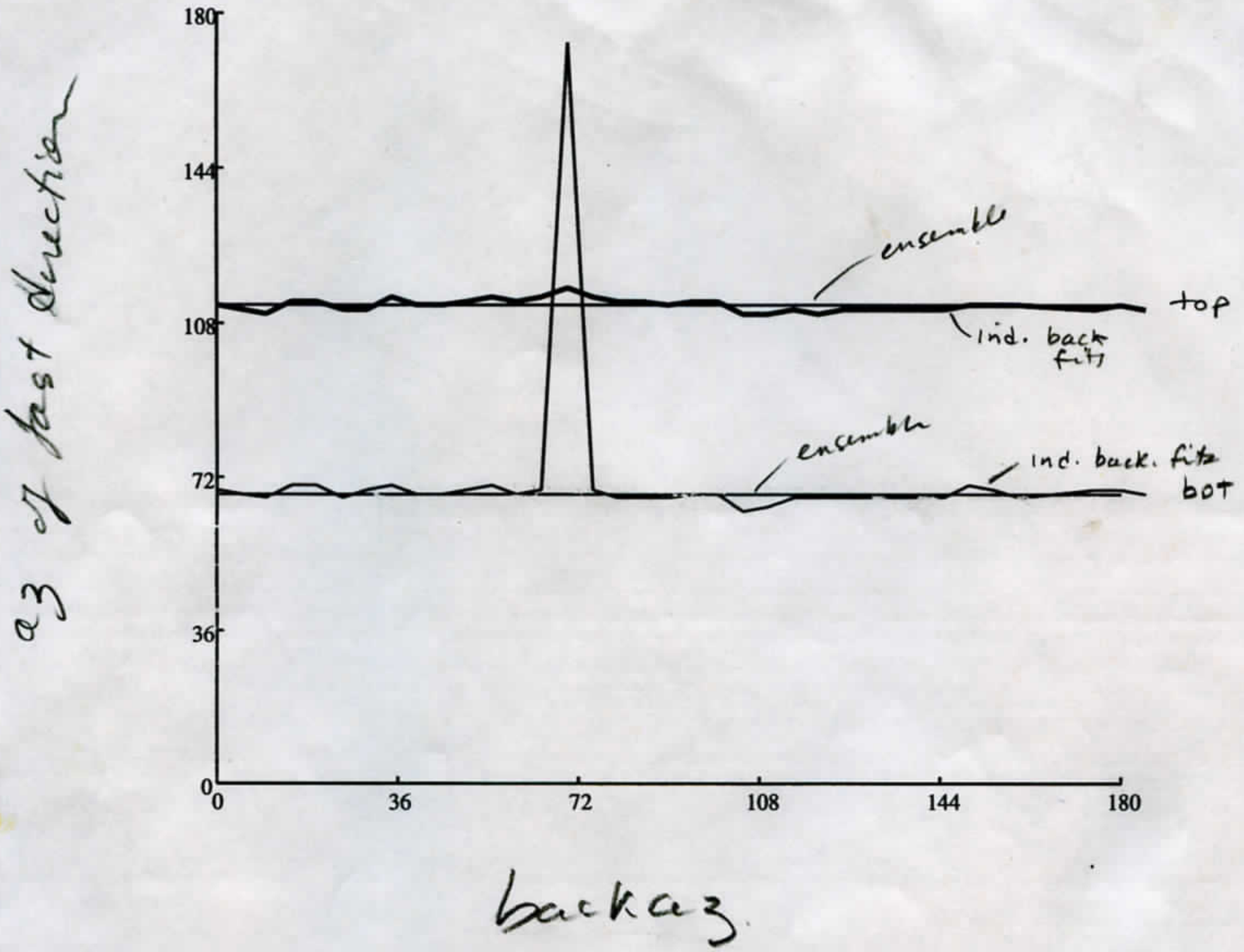


ba3=0

2 laser fit



2-layer fit.


180
144
108
72
36
0
0
36
72
108
144
180
ensemble
top
ind. back fits
ensemble
ind. back. fits
bot
az of fast direction
backaz