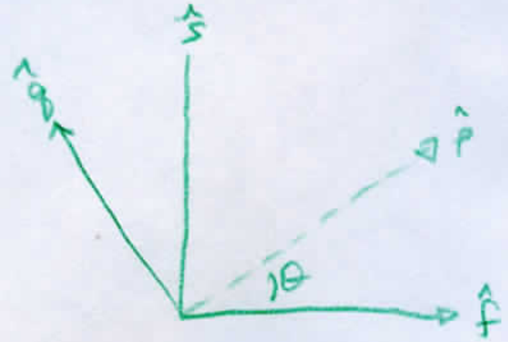
Relationship Between Cross-Conv. and Min Tans.

MRN115

$\hat{f}, \hat{s}$ = fast, slow directions

$\hat{p}, \hat{q}$ = polarization, $\perp$ polarization directions



$f = \cos(\theta) p - \sin\theta\, q$

$s = \sin(\theta) p + \cos\theta\, q$

$p = \cos\theta \hat{f} + \sin\theta \hat{s}$

$q = -\sin\theta \hat{f} + \cos\theta \hat{s}$

for signal polarized in $\hat{p}$ direction

$f = \cos(\theta) p$

$s = \sin(\theta) p$

impulse resp. operators $f(t) = \cos(\theta)\,\delta(t)$

$s(t) = \sin(\theta)\,\delta(t-\tau)$ τ = delay

$F(t), S'(t)$ = observed fast, slow seismograms

$e(t) = F(t) * s(t) - S'(t) * f(t) = \sin(\theta) F(t-\tau) - \cos\theta\, S'(t) = -Q(t)$ (delayed F)

= component $\perp$ to polarization before splitting occurs.

But since $e(t)$ invariant under rotations:

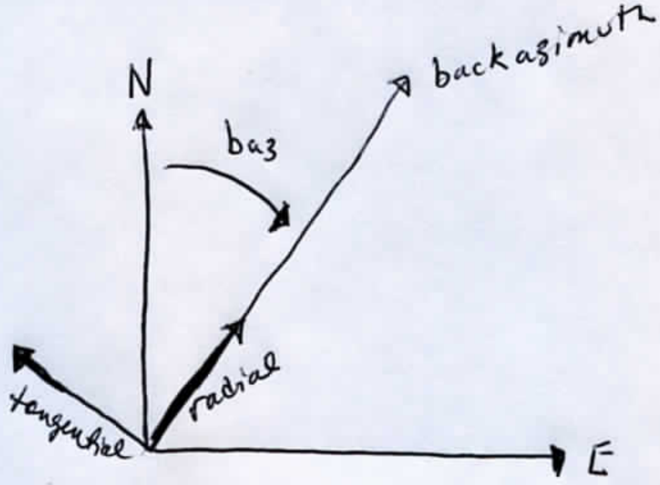
$e(t) = -Q(t) = F*s - S'*f = N*e - E*n = V*h - h*V$

(up to a sign at least)

so min $\|e\|_2$ same as min $\|Q\|$

11-22-02

Marke



radial = $\cos(baz)\, N + \sin(baz)\, E$ $\qquad \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

tangential = $\sin(baz)\, N - \cos(baz)\, E$

$N = \cos(baz)\, R + \sin(baz)\, T$ $\qquad \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

$E = \sin(baz)\, R - \cos(baz)\, T$

$$\begin{pmatrix} c & s \\ s & -c \end{pmatrix} \begin{pmatrix} c & s \\ s & -c \end{pmatrix} = \begin{pmatrix} c^2+s^2 & cs-cs \\ cs-cs & s^2+c^2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \checkmark$$