This gives two terms

$$\int W(y)\,(-2\pi i y)\,A^{*} e^{-2\pi i z y}\left(R(y) - A e^{+i 2\pi z y}\right)$$

$$+\int W(y)\,(+2\pi i y)\,A e^{+2\pi i z y}\left(R^{*}(y) - A^{*} e^{-2\pi i z y}\right)$$

$$= 0$$

The term proportional to AA^{*} cancels, leaving

$$A^{*}\int (-2\pi i y)\,R(y)\,e^{-2\pi i z y}$$

$$+ A\int (2\pi i y)\,R^{*}(y)\,e^{+2\pi i z y} = 0$$

The integral is clearly the derivative of the dirty map at z w.r.t. z

Overall, we can combine the two terms because A is the dirty map itself

as $\dfrac{d}{dz}\,D(z)\,D^{*}(z) = 0$ where

$$D(z) = \text{dirty map} = \int R(y)\,e^{-2\pi i z y}\,dy$$

Hence the claim that one picks sources at the maxima of the (absolute) square of the (complex) dirty map.

The calculation for minimizing $\sum_{uv} |(I(u,v) - I_0 e^{-2\pi i(lu+mv)})|^2$ + similar terms for Q U V is very similar!

Least squares for polarised CLEAN a-la Schwarz (1)

$x = RM$, $y = 2\lambda^2$, then if we define

$P(x)\,dx = [Q(x) + i\,U(x)]\,dx$ = polarised emission per unit RM, (per unity) then we have $R(y)$ = polarised emission per unit y encoded as $Q + iU$,

$$R(y) = \int dx\; P(x)\, e^{-i \cdot 2\pi x y}$$

This is measured, we want to restore $P(x)$.

A CLEAN like approach is to minimise

$$\int \left(R(y) - A e^{i\,2\pi z y}\right) \times \left(\underset{\text{for complex conjugate}}{\text{c.c}}\right) W(y)\, dy$$

[W=0 for no data at y]

where we are fitting the data $R(y)$ with a polarised point source of strength A at depth z. For given z, minimising w.r.t. A^* gives

$$\int W(y)\, e^{-2\pi i z y} R(y) - \int A\, W(y)\, dy = 0$$

[This is equivalent to the more transparent but tedious differentiation w.r.t. real & imaginary parts of A).

So we get $A = \int W(y)\, R(y)\, e^{-2\pi i z y} \Big/ \int W dy$

= dirty map at z / peak of dirty beam

The second parameter to be fixed is the location z, so differentiating wrt z,