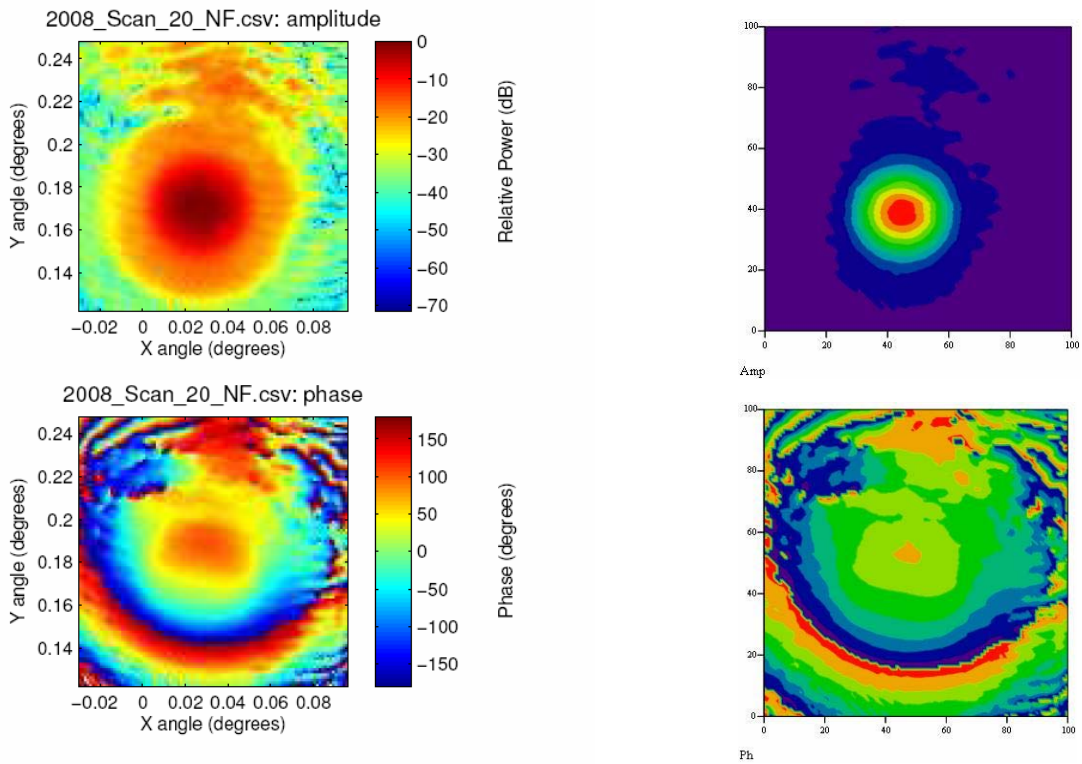


2008 Scan 20, 115 GHz.

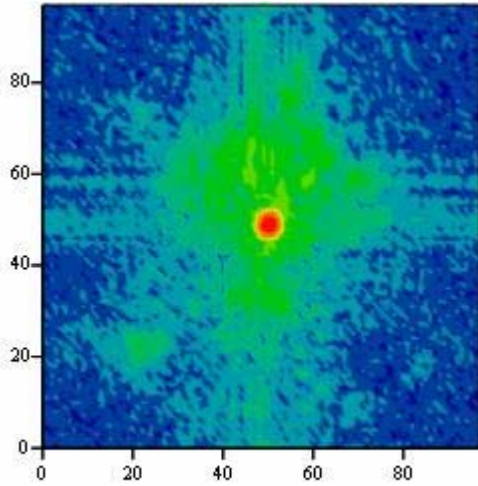
Some features of the near-field – far-field patterns

(Darrel Emerson, 2008-06-06,  
last revised 2008-06-25)



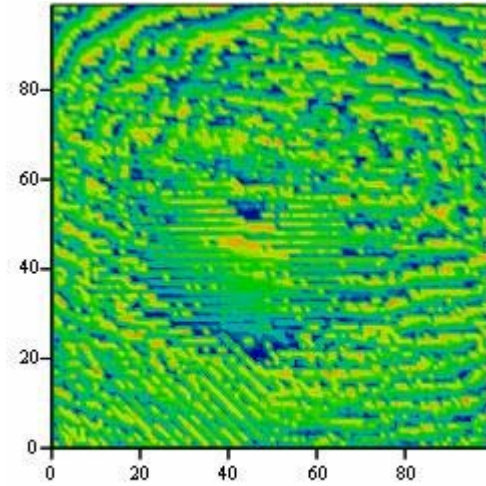
**Fig 1.**  
2008 Scan 20, amplitude and phase, plotted by Todd  
Amplitude plot at top is in dB  
Phase plot below

**Fig 2.**  
Scan 20, plotted in Mathcad by Darrel.  
Amplitude plot at top has a linear scale  
Phase plot below. Just confirms that  
the data have been read into Mathcad  
correctly.



FdB

**Figure 3: The FFT of Fig 2, giving the far field pattern of the entire field. Axis is marked in pixels, where one pixel is about 1.2 degrees. Note the spurious sidelobe lower left, about 22 pixels up and 22 pixels to the right of the origin lower left, and about 40 degrees from the main beam.**



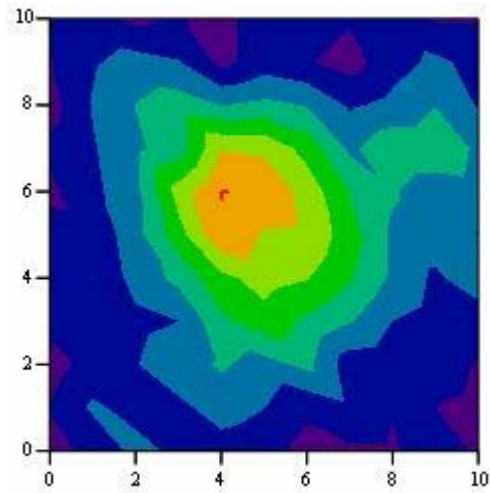
Pcs2

**Figure 4: The near-field data shown in Fig 2 above was put through a high-pass Filter. Above is the resultant phase distribution, equivalent to the lower plot of Figure 2 above.**

**Note in particular:**

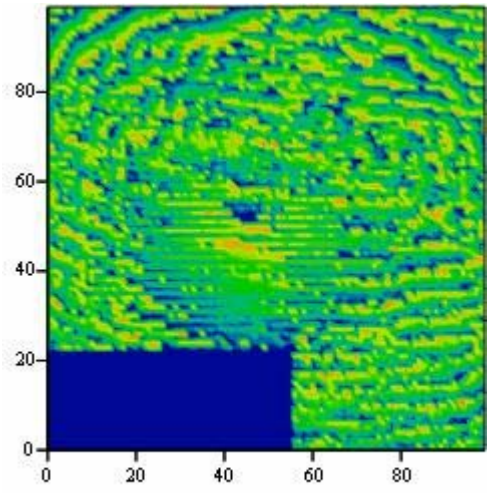
**(i) The parallel fringes slanted at ~ 45 degrees, lower left, extending from 0-50 on the horizontal axis, and 0-25 vertically. These fringes are responsible for the spurious sidelobe seen lower left in Figure 3. If masked, this spurious feature in Fig 3 disappears.**

**(ii) The horizontal straight fringes near the center of the map. These may be a feature of the scanning – hysteresis?**



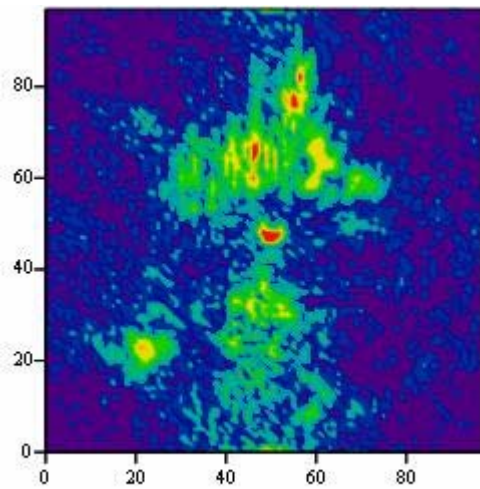
FAsmall

**Figure 5: A blow-up (dB) of the spurious sidelobe seen lower left in the far field pattern of Figure 3. Axis is marked in pixel units of roughly 1.2 degrees. The intensity is just under 1% of the main peak.**



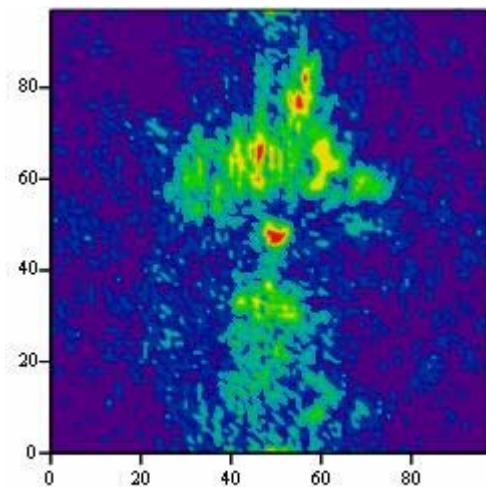
Pcs2

**Figure 6: As Figure 4 above, but with the area causing the unwanted spurious feature in the far-field data masked out.**



FdB2

**Figure 7: The far-field power pattern, dB, from the high-pass filtered data whose phase is shown in Figure 4.**



FdB2

**Figure 8: The same far-field pattern as Fig 7, but where the NF area with sloping lines lower left in Fig 4, from (0,0) to (55,22), has been masked out, as indicated in Fig 6.**

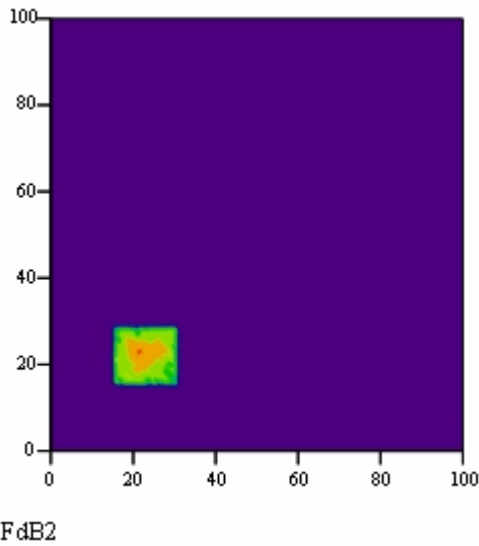


Figure 9(a), Far Field

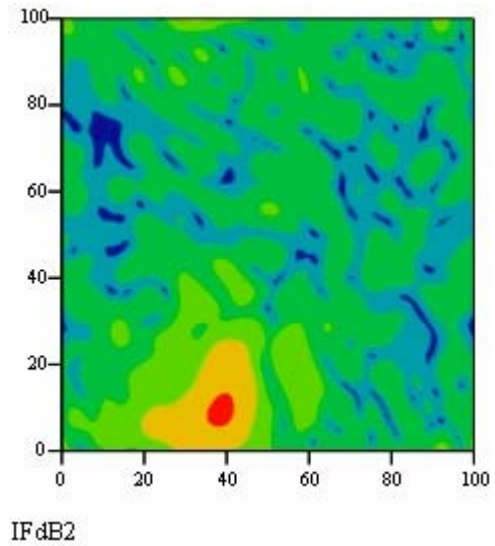


Figure 9(b), Near Field, inverse FFT of 9(a)

In Fig 9(a), the Far-Field distribution shown in Figure 3 has been masked, to select the spurious feature seen most clearly in Figure 7. Fig 9(b) is an inverse FFT of 9(a), showing (bright red spot) the near-field origin of the spurious FF feature.

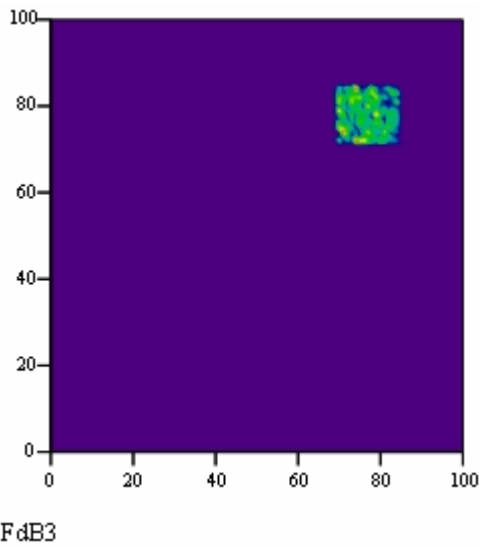


Figure 10(a), Far Field

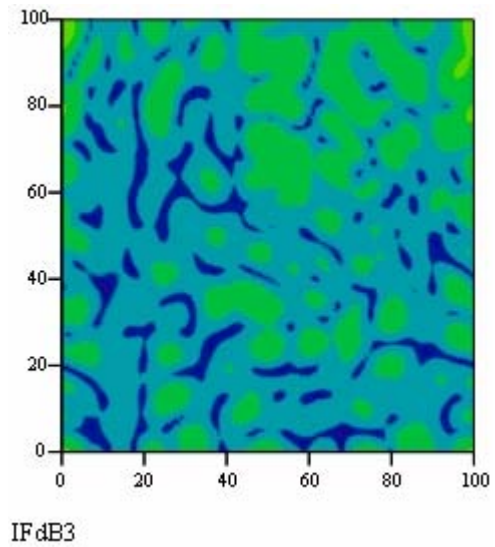


Figure 10(b), Near Field from 10(a)

In Fig 10(a), the FF distribution of Fig 3 has been masked in an equivalent area, but which contains no spurious feature. In Fig 10(b) is the inverse FFT of 10(a). The bright spurious NF feature shown in Fig 9(b) has now disappeared. Fig 10(b) has the same color scale as Fig 9(b). It shows just random noise.