On Sat, 6 Apr 2002, Robert Stockwell wrote:

> complex-valued interferrogram?

Indeed you are correct. The interferogram is a mathematically real
quantity-- it is the observable in any interferometer I've ever worked on
which makes it real by definition (I think...).

> to shed a little light on it [1], in interferometry, the
> interferrogram is the autocorrelation function of the electric field
> vector. The power spectrum is the fft of the autocorrelation function.
> (this is a well known theorem, and if I only had a brain, I'd remember
> the name of it) Note the real value-ed-ness of "autocorrelation" and
> "power". The interferrogram is an even function, the power spectrum is
> real-valued.

Do you mean the Wiener-Khinchine-Einstein theorems? These basically state
that the autocorrelation function of the source (aka interferogram) must
be Fourier-transformed to retrieve the desired spectrum.

In most cases, interferometers do not truly measure an even (symmetric)
interferogram. At the level I am trying to deal with, experimental,
instrumental and computational limitations all introduce asymmetries.
Thus, complete reconstruction of the spectrum requires a complex FFT.
So, the spectrum is mathematically complex while the interferogram is
mathematically real.

Thanks to both Paul and you for your replies to my original post... To
put it mildly, last week wasn't one of my better weeks and, as it turns
out, I was doing something completely illogical. For perspective, I am
constructing an instrument model for an optical interferometer that
accounts for the known instrumental effects. I am therefore generally
already working in the Fourier (interferogram) domain. For one reason or
another, when it came to Fourier transforming my modulation function into
a spectral instrument lineshape function, I proceeded to use Paul's
"fft_to_interferogram" routine instead of "fft_to_spectrum." From that
point onwards, everything went down hill and I started thinking about
'interferograms' when I should have been thinking 'spectra.' In a
monumental moment of horror (Friday evening at 6:30 PM) I realized my
rather silly error... sigh. I then proceeded to take the entire weekend
off and enjoy the unseasonably nice British weather with my wife ;)

With luck, this will be a better week.

Thanks again for your comments!

Cheers,
Randall