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Subject: Re: Fourier back to real space

Posted by [Craig Markwardt](#) on Tue, 25 Oct 2011 03:16:19 GMT

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On Oct 24, 11:46 am, Anne <anne...@gmail.com> wrote:

> Hi,

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> I have an images with periodic stripes with various orientation which

> I would like to find the periodicity of. I've Fourier transformed the

> image and found the peak in the transform (via a radial average) so I

> have the q value (in I assume pixels<sup>-1</sup>) corresponding to my stripe

> periodicity. I now need to get a real space value out but I'm lost as

> to where the factors of 2pi etc go. Can anyone point me in the right

> direction? I've read the help files online but I'm still horribly

> confused.

Assume your original image has a linear size of L in whatever units you want. Let's say you have a satellite image that covers 7 km x 7 km. Then L = 7 km. Let's also say that your image has N pixels.

The FFT() produces Fourier coefficients which are a function of "frequency" which in this case is (1/length). (in physics we would call that a wavenumber)

The fundamental frequency is 1/L. Every fourier coefficient is an even multiple of that frequency. So if you have N real pixels, there are N/2 unique fourier coefficients, and they have a frequency assignment like this:

Coeff #:	0(DC)	1	2	3	4	...	N/2
Frequency:	0	(1/L)	(2/L)	(3/L)	(4/L)	...	(N/(2*L))

Once you determine the frequency of your stripes, the linear size corresponding to that frequency is just (1/frequency).

For example, if the stripes on our 1 km image have a fourier peak at sample 42, that is equal to frequency of 6.0 km<sup>-1</sup>, and a linear size of (1/6) km = 0.167 km.

Craig

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