Subject: Re: Convolution, IDL & Numerical Recipes
Posted by James Kuyper on Fri, 01 Nov 2002 01:10:06 GMT

David Fanning wrote:

...
> Gonzales and Woods seem to suggest that "convolution" is a
> frequency domain concept, and can only be loosely applied in
> the linear spatial sense. Could this be part of the problem?

The convolution isn't specifically a frequency-domain concept. In fact,
as I'm usually seen it, the canonical definition is in the time domain.
$cgh(t)$ is the convolution of $g(t)$ and $h(t)$ if:

$$cgh(t) = integral(g(tau)h(t-tau) \, d \, tau)$$

The importance of the frequency domain for convolutions is that it can
be proven that if $G(f)$, $H(f)$, and $CGH(f)$ are the fourier transforms of
$g(t)$, $h(t)$, and $cfg(t)$ respectively, then:

$$CGH(f) = G(f)*H(f)$$

If they'd been thinking in the frequency domain, there's no way they'd
have named it using a word that is closely related to "convoluted".