Spectral Smoothing vs Windowing

Apr 29, 2011
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A. FT of gaussian with variance σ_t^2
is gaussian with variance $1/\sigma_t^2 = \sigma_\omega^2$

B. convolution of two gaussians with σ_1^2, σ_2^2
is gaussian with variance $\sigma^2 = \sigma_1^2 + \sigma_2^2$

C. product of two gaussians with σ_1^2, σ_2^2
is gaussian with variance $\sigma^{-2} = \sigma_1^{-2} + \sigma_2^{-2}$

$=$
time domain: taper σ_A, FT, Freq Domain: smooth σ_S

$$s(t)\, g(\sigma_A) \xrightarrow{FT} s(\omega) * g(\sigma_A^{-1})$$

$$\rightarrow s(\omega) * g(\sigma_A^{-1}) * g(\sigma_B)$$

$$= s(\omega) * g\left(\left[\sigma_A^{-2} + \sigma_S^2\right]^{1/2}\right)$$

time domain: taper σ_B, FT: no smoothing

$$s(t)\, g(\sigma_B) \rightarrow s(\omega)\, g(\sigma_B^{-1})$$

Equal when $\left[\sigma_A^{-2} + \sigma_S^2\right]^{1/2} = \sigma_B^{-1}$

or $\sigma_S^2 = \sigma_B^{-2} - \sigma_A^2$

But note result is for FT not spectrum