linear interpolation of a log−time sequence

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The following is really a signal−processing question that appears here because it goes well beyond standard "math for engineers".

Suppose that I have a finite−length sequence of weighted time−domain impulses (Dirac functions) that occur on a log−time grid Tn = log(n), n an integer from 1 to K where K is the sequence length, and with a weighting factor w(n).

One can numerically compute the Fourier transform in any particular case by the simple summation of exponentials of the form w(n)*exp(−i*w*log(n)) from n=1 to K.

I need to interpolate this sequence to a LINEAR time grid Tn = n, in such a way as to preserve the magnitude of the Fourier Transform below the Nyquist rate (w < PI). Since the effective sampling rate of the log−time sequence is increasing over time, it is obvious that the FT of the linearly−interpolated sequence can only match below w = PI.

One approach would be to calculate the FT of the log−time sequence on a dense frequency grid, linearly sub−sample this dense frequency grid and then perform the inverse FT to get an approximation.

Are there any better approaches?

Bob Adams

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