Re: randomized white noise = white noise?

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2006−05/msg04186.html

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- *Date*: 23 May 2006 15:35:35 −0700

Well, I suppose you could do it with an FFT. But why bother? If you want some spectral shape of noise, just generate spectrally "flat" noise and run it through an appropriate filter. I can do that in a rather modest DSP for pretty much any sort of reasonable spectral shape, down to 1/12 octave bands or even 1/24th octave bands. Generating spectrally flat noise is quite easy, even with a fixed−point processor. All you need to make it efficient is a parallel XOR instruction. But filtering generally requires multiplications, and unless you can cleverly arrange to use multiplications only by integer powers of 2, things are going to be tough in a processor with no multiplication operation.

Sounds like you have a really inefficient algorithm to generate your sines, or whatever. I just did basically what you describe in one line of Scilab, and it took 35 seconds to generate 1/10 of the whole thing (20−2kHz instead of 20−20kHz). That's on a slightly slower machine than you have. But again, that's a poor way to generate a spectrum that doesn't have to have hyper−abrupt band edges. Even an FFT filter (get a spectrum as an FFT of, say, a white noise time signal, multiply it by a "mask" to shape the spectrum, and inverse−FFT it back to the time domain) can be very fast for only a second's worth of data. Again, I just let Scilab do that: generate the white noise, fft it, shape the spectrum, and inverse−fft it. With 65536 samples, it took well under a second. At 131072 samples, it took about a second. I'd get really impatient with an algorithm that took an hour to generate a second's worth of data. REALLY impatient.

Also, beware that phase is important. If you add a whole bunch of sinewaves as you described that are in−phase all at the same point in time, you'll have something approximating an impulse in the time domain. (Actually something close to zero till you get close to the time where they are all in phase, then building rapidly to a negative peak, slewing very rapidly to a positive peak, and then tapering rapidly back down toward zero, if they line up at zero phase of a sine. Cosines all at zero phase yield a single positive peak, with a bit of "ringing" off to the sides.) An impulse is spectrally "white" noise, but probably not quite what you wanted.

Cheers,

Tom

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