Re: randomized white noise = white noise?

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I'll try to answer two posts at once here...

Note that when a rolloff slope changes from 3dB/octave to 6dB/octave, it's a gradual thing. You can draw lines on a Bode plot that are straight and intersect at a sharp corner, but in practice, the transition is gradual. So the difference in response between just the 3dB/octave and the added 6dB/octave in the top octave will be relatively small. In fact, if you get Scilab and run the simple code I suggested, you can see a plot of the response−−easy to plot the response of your filter, or the difference between it and "true pink." And what you will see with your original coefficients is that they cause the high end to drop off faster than "pink" anyway, by just about what you are suggesting with that "6dB slope in the top octave". So you may have that already. In fact, in Scilab (or Matlab) it's easy to make most of what I posted be a routine that will plot the response or whatever, and you just change the coefficients and run the routine to see the effect. Even with a slow processor, it should do the calcs in a second or less, especially if you used fewer points logarithmically spaced, but even if you do that one point per Hz hack I posted, it's still fast.

OK, have a look at the relationships in your filter to see why you get large values pretty often. Notice that b2, for example, remembers over half its previous value, and adds MORE than one times the input to itself. So let's say you have three white samples in a row that are in the range 0.5 to 1.0 (assuming that white runs from −1 to +1). Note that:

b2(k+1) = 0.57*b2(k) + 1.05*white(k)
= 0.57* (0.57*b2(k−1) + 1.05*white(k−1)) + 1.05*white(k)
=
0.57*(0.57*(0.57*b2(k−2)+1.05*white(k−2))+1.05*white(k−1))+1.05*white(k)
= 0.185*b(