Subject: Re: red noise ?
Posted by Craig Markwardt on Sat, 11 Mar 2006 21:41:26 GMT
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"R.G. Stockwell" <no@email.please> writes:

> Does anyone have a routine that calculates a red noise random time series?
> (where red noise indicates a slope of 1/f^2 in the power spectrum)
>
> I whipped up an autoregressive routine to do this, but the slope flattens
> out
> at the higher frequencies.
>
> Pink noise would be nice as well. In fact, if someone had code to create
> a time series of random variables with any arbitrary spectral slope, that
> would
> be great!

Sure, here is a function that does that, modulo a normalization, which you will have to diddle yourself. You enter the frequency and desired PDS, and the output is one realization of such a power spectrum, assuming random phases. [ Of course there are an infinite number of realizations with the same PDS. The PDS discards 50% all phase information so you can't go backward to a unique time series from it alone. ]

Craig

```
; PDS2LC
;  FF - input frequency
;  PDS - input PDS
;  TOTRATE - input scale factor for output time series
;  SEED - (optional) random number seed
;  TIME - output time samples
; RETURNS: time series sampled at TIME bins
;
function pds2lc, ff, pds, totrate, seed=seed, time=tt

  df = ff(1) - ff(0)
  texp = 1/df
  dt   = 0.5/max(ff)
  npts = n_elements(ff)

  cpds = sqrt(pds) * exp(2d*!dpi*dcomplex(0,randomu(seed,npts)))
  cpds = [cpds, 0, reverse(conj(cpds(1:*)))]
  cpds = cpds * sqrt(texp*totrate/2)
```

```
  cpds(0) = 0

  clc = fft(cpds,-1)
  lc = (double(clc) + totrate*dt)>0
  tt = n_elements(lc)*dt

  return, lc
end
```

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Craig B. Markwardt, Ph.D.  EMAIL: craigmnet@REMOVEcow.physics.wisc.edu
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