Week 5 Exercise, due Wed wk 6

- Load into Matlab the same data file as used for the week 4 exercise: filter_ex.mat (described as Week 4 Exercise data file on Vital).
- Plot the time series (1000 points) from the first of the 100 grid points. Comment briefly on its appearance as compared to the various power law noise plots in the lecture notes.
- Using a window width of 200 points and overlap of half the window width, calculate and store in an array the power spectra of all 100 time series, returning 10 points per independent frequency. Repeat with 1 point per frequency (and remember the two different frequency lists).
- Make 2 log-log plots, the first of the spectrum of the first time series, the second of the average of all 100 spectra. In each case plot the oversampled (10 points per independent frequency) data as a line, and the 1 point per frequency data on top with symbols.
- Repeat these two plots, but in variance preserving form.
- Comment on the visibility of the 20 day period signal in the different cases, and on why averaging the 100 spectra helps to make it clear.
- The data actually consists of a combination of red noise, white noise, and a periodic signal. Very roughly, describe the relative amounts of energy accounted for by each of these.
- Explain the reason for the different amplitude of the final (highest frequency) point