
Subject: The spectra of fluctuations in variable

Posted by duxiyu@gmail.com on Wed, 14 Mar 2007 11:51:37 GMT

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I have a time series B(T).

The time resolution dt of the data is 4s and the amount N is 1000.

The unit of B and T is 'nT' and 's'.

I want to study its fluctuations in frequency space using the power spectral density (PSD).

BB=FFT(B)

freq=FINDGEN(N)/(N*dt)

Then I am not clear how to calculate the PSD.

Maybe, $PSD=(ABS(BB))^2$, but there is a problem in the unit.

The unit of BB is 'nT' that is the same as B, so the unit of PSD which is obtained by the above method is 'nT²'.

But in physical view the unit of PSD should be 'nT²/Hz'.

The other question is how to calculate the phase difference between two B1 and B2.

I calculate it by the following method, but I am not sure whether it is right.

BB1=FFT(B1)

BB2=FFT(B2)

phase1=ATAN(BB1,/phase)

phase2=ATAN(BB2,/phase)

difference=phase1-phase2

Moreover, the angles seem not smoothed by regular method because of their periodicity.

Is there other method to smooth the angle data?

Best wishes,

Du Jian
