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# A SPECTRAL ANALYSIS OF THE LIGHT CURVE OF THE RV Tau STAR EP Lyr

As it is well known, the maximum entropy method is so far the powerful one to estimate the power spectra of time series with equally spaced data (Percy, 1977 and references therein).

This method has been applied to analyse the light curve of the RV Tau star EP Lyr, since of this star there is a long run of photoelectric observations, which has sufficient continuity to be uniformly sampled (Wachmann, 1968).

The power spectrum has been computed using the Burg recursive procedure and adopting the Akaike criterion to choose the length of the error prediction filter ( Richer and Ulrych, 1974).

In Fig. 1 we have the spectrum, which has in abscissae the frequencies (cycles to day), and in ordinates the logarithm of the power. This spectrum has been computed from the V observations made between J.D. 2439614 and J.D. 2439814. The data have been connected with a free hand curve and then this has been sampled with a step of 5 days.

It can be seen that the formal period of the star yields a series of peaks, which are due to its harmonics (the order of each one is written above the downward arrows). The period, which has been determined fitting these harmonics with the least squares, is of 84.2 ± 2.5 days, which is in good agreement with the one of 83.315 given by Wachmann, who determined it using a very long series of minimum epochs. Moreover there are two other peaks (upward arrows) at the frequencies of about 0.023 and 0.067 c/d.These peaks are the responsible of the not perfect regularity of the light curve. The higher of these two peaks is very close to the one due to the $2^{o}$ harmonic of the formal period; so it is bad resolved. Its position can be estimated only with approximation, since in such cases the peaks tend to depart one from the other.

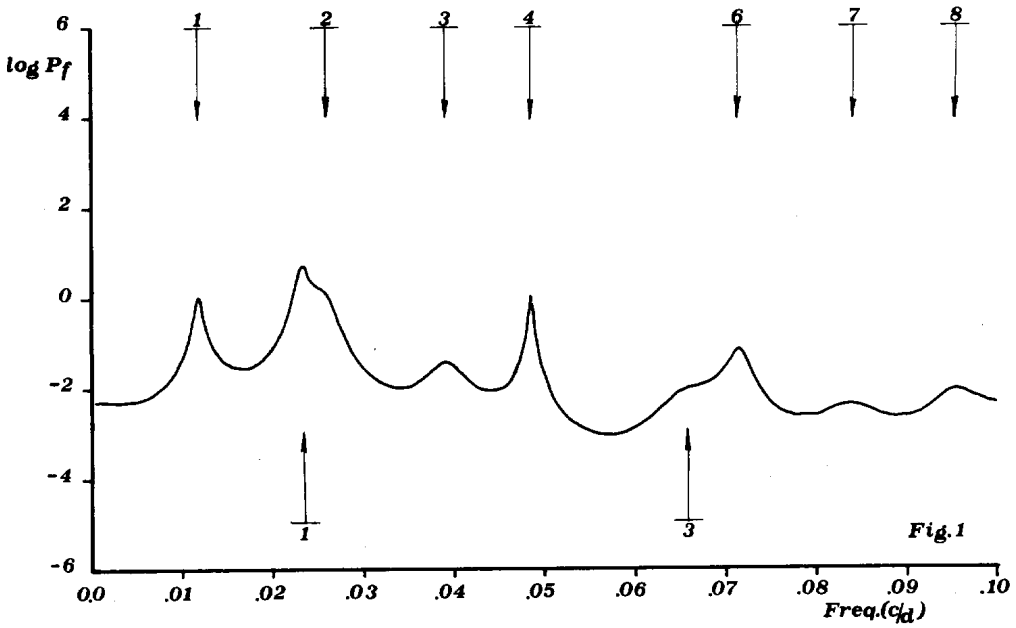


Fig.1

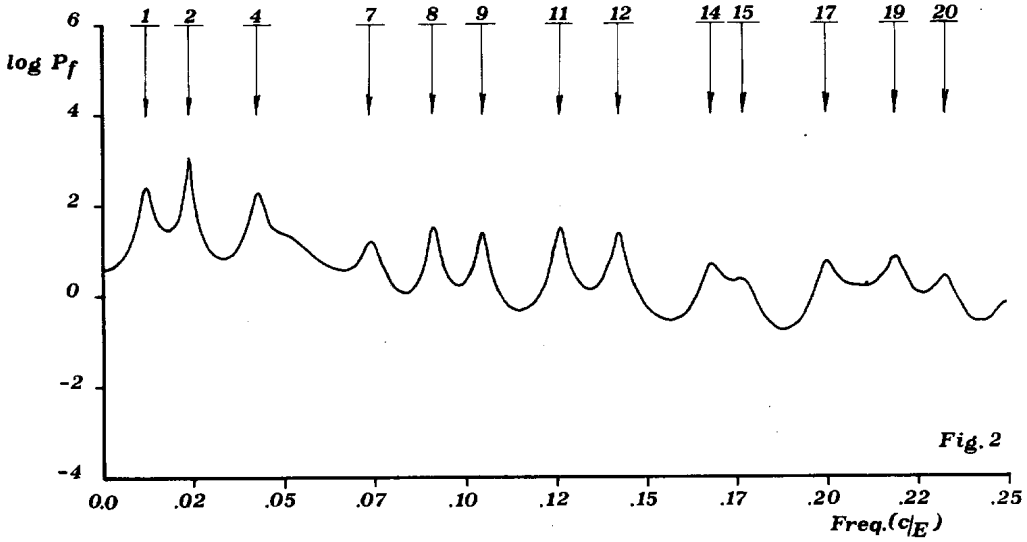
1
2
4
7
8
9
11
12
14
15
17
19
20
6
log $P_f$
4
2
0
-2
-4
0.0
.02
.05
.07
.10
.12
.15
.17
.20
.22
.25
Freq.($c/_E$)

Fig. 2

A similar consideration can be made for the second peak. So probably this one is third harmonic of peak at 0.023 c/d. In such hypothesis it results a second periodicity of 45.1 ± 1.7 days. Unfortunately there are not in the literature other sufficiently long runs of observations to confirm this second periodicity, which till now passed unnoticed owing to its proximity to the $2^{o}$ harmonic of the formal period.

Wachmann gives also a series of epochs of principal minima (which cover 160 formal periods) and the concerning (O-C), which have been computed with the period $P=83^{d}.315$. The spectrum of this curve, which has been obtained with the same procedure used for the V light curve, has been also computed (Fig.2, in abscissae the frequencies are in cycles to period).

All the peaks in the spectrum are harmonics of a very slow oscillation of 7067 ± 88 days. For this oscillation Wachmann gives a period of 3500 days, which as it can be clearly seen from the spectrum, is only the $2^{o}$ harmonic of the true period.

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