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AUTOCORRELATION ANALYSIS OF DQ Her AND RW Tri

The photoelectric observations of DQ Her and RW Tri made by M.Walker [1,2,3] were subjected to autocorrelation analysis. Observations with yellow filter were used. To investigate only intrinsic variations all observations at eclipse (phases from 0.90 up to 1.10) were excluded.

The standardized coefficient of correlation $r(\tau)$ was calculated by using the formula:

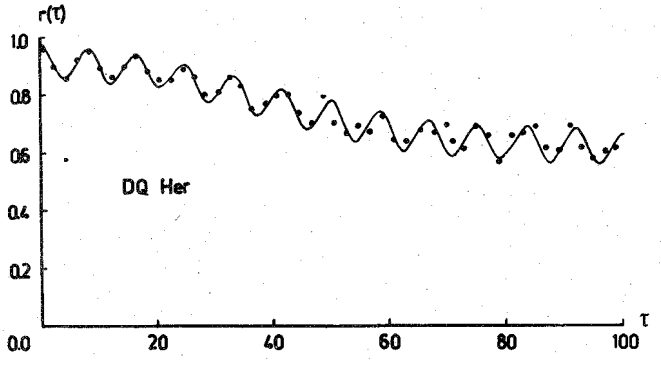
$$r(\tau) = \frac{\sum U_j \cdot U_{j+\tau}}{\sqrt{\sum U_j^2 \cdot \sum U_{j+\tau}^2}} ; \quad \tau = n \cdot \Delta t ; \quad u_i = m_i - \bar{m} ;$$

where: $n = 1,2,3,\ldots\ldots 100.$
$\Delta t = 0^d.0001 = 8^s.64$
m_i = observed brightness at a moment i
$\bar{m}$ = mean quantity of brightness.

The method of correlation analysis for the series with gaps was described in [4] . Being applied to the observations concerned such treatment gives a possibility to reveal periods from 0.5 up to 30 minutes. All calculations were performed on the M - 220 computer.

DQ Her

Correlation function for DQ Her is shown on Figure 1. Dots represent the calculated value of $r(\tau)$ while



the solid line is the function

$$r_0(\tau)=0.86\cdot\exp\left[-\left(\frac{\tau}{153}\right)^2\right]+0.07\cos\left(\frac{2\pi\tau}{116}\right)+0.06\cos\left(\frac{2\pi\tau}{8.5}\right)$$

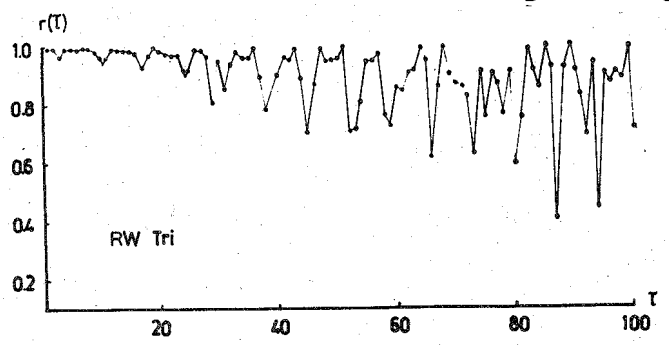
Thus, on the time scale from 0.5 up to 30 minutes the process of light variation of DQ Her may be mathematically represented as a sum of three independent processes:

a) accidental fluctuations. The term $\left\{e^{-\left(\frac{\tau}{153}\right)^2}\right\}$ in the expression of $r_0(\tau)$ corresponds to this process.
b) harmonic variations $\left\{\cos\left(\frac{2\pi\tau}{116}\right)\right\}$ with the period about 17 minutes, but perhaps with random phase.
c) short-period sinusoidal oscillations $\left\{\cos\left(\frac{2\pi\tau}{8.5}\right)\right\}$ with the period $71^s.71 \mp 0^s.68$.

Relative energy contribution of each process is accordingly 1.0 : 0.3 : 0.2.

RW Tri

Correlation function for RW Tri is given on Figure 2.



It seems hardly possible to select any analytical expression for this curve. From the examination of the fig.2 one may conclude that there are two processes:

a) accidental fluctuations,
b) short-period variations with the period $60^s.48 \mp 0^s.35$.

As stated above 1.2 - minute variations of DQ Her have harmonic shape (see also [5] while 60^s variations of RW Tri reveal pulse features. Neither amplitude nor polarity of these shortest variations were possible to determine.

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REFERENCES

1. M.F.Walker, 1956, ApJ 125, N1.
2. M.F.Walker, 1958, ApJ 127, N2.
3. M.F.Walker, 1963, Contr.Lick Obs., N 145.
4. F.I.Lukatskaya, 1967, Perem. Zv., (SU), 16, N 2.
5. R.E.Nather, B.Warner, 1969, MN, 143, 145.