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AUTOCORRELATIVE ANALYSIS OF LIGHT OF DQ Her, UX UMa AND RW Tri

Photoelectric observations of exnovae and similar stars were repeatedly analysed by means of statistical methods (1,2). These analyses were usually carried out for observations obtained during a few hours. The results of the autocorrelative analysis of the light variations of DQ Her (3,4), UX UMa (5,6) and RW Tri (7) are given in the present paper. They were obtained by the method described in (8), which can be applied to series with gaps. A unite correlative shift is equal to $0^d.0001$. The maximum shift equals $0^d.01$. For each of the three variables the analysis was performed twice: for all the observations and for observations that do not include eclipses. In the first case the autocorrelative function (r) essentially refers to the eclipse because of much larger dispersion of light variations owing to eclipse. The function obtained is close to a harmonic with a period near to the duration of the eclipse. The autocorrelative analysis of the observations outside eclipses gives the autocorrelative function of that component of the binary which has a larger light dispersion.

DQ Her: On Fig.1 (a,b) dots show r for two parts of the series of V observations. The dashed curves are cosinusoids with period of $P = 0^d.06$. Freed from the stochastic light variations the eclipse is the same for both parts of the series. On Fig.1 (c,d) the values if r were obtained after exclusion of the eclipses for V and U observations. The dashed curves are exponentials with relaxation times of $0^d.02$ and $0^d.0074$ for V and U bands, respectively. In addition to the known harmonic variation with the period $71^s.71 \pm 0^s.68$ (9) the autocorrelative analysis for DQ Her also reveals a pure stochastic light variation. The relaxation time of this stochastic process is larger for radiations of longer wave length.

UX UMa: On Fig.2 (a,b,c) dots show values of r for UBV series including eclipses. Dashed curves are cosinusoids with periods of $0^d.040$ and $0^d.037$. The eclipse in U is shorter. This is an argument in favour of the nonatmospheric nature of the eclipses. The difference between the eclipse durations may be caused by larger limb darkening on the brighter component in the U band. Curves d and e of Fig.2 represent values of r for UX UMa outside eclipses for V and B, respectively. The dashed curves are exponentials with

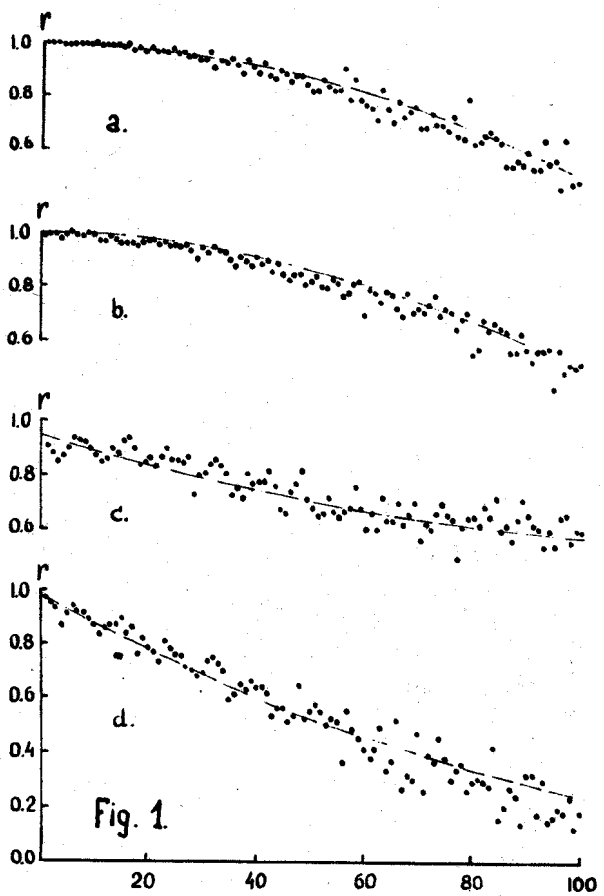

Fig. 1.

relaxation times of $0^d.025$ and $0^d.0056$. As well as for DQ Her the light variation outside the eclipses possesses a longer relaxation time for radiations of longer wave lenghts.

RW Tri: On Fig.3 (a) dots show values of $\underline{r}$ for V observations including eclipses. The dashed curve is a cosinusoid with $P = 0^d.05$. On Fig. 3 (b) dots show the $\underline{r}$ values outside eclipses. The dashed curve is an exponential with a relaxation time of $0^d.055$. It refers to the light variations of that component or a gas nebula which are uneclipsed in the primary minimum. That follows from in-

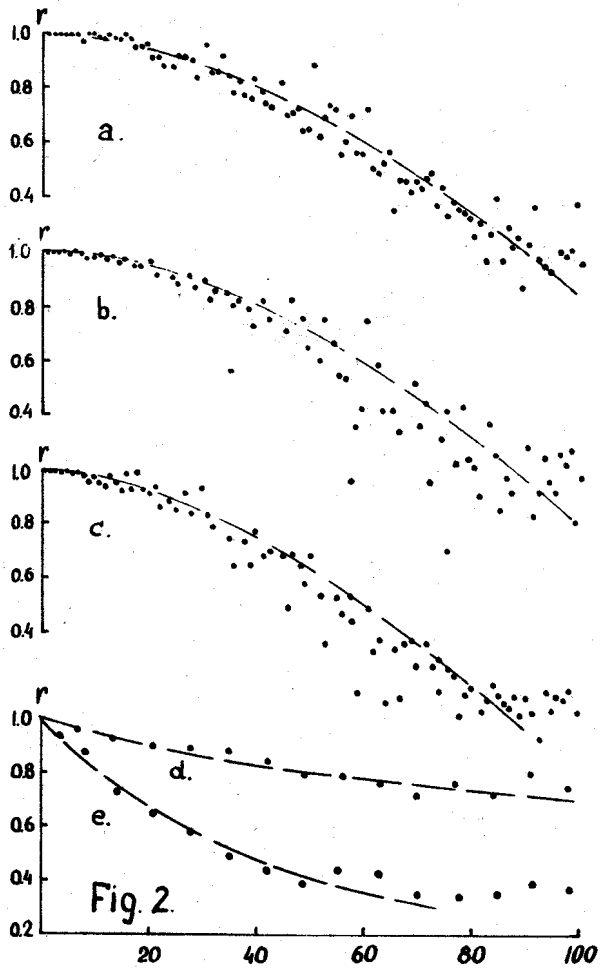

Fig. 2.

crease of the eclipse depth with decrease of brightness of RW Tri according to Walker (7). The 60^{s}-period of RW Tri that was pointed out previously (9), seems hardly real. Its appearance may be likely accounted for by the fact that observations (7) were carried out in intervals of the

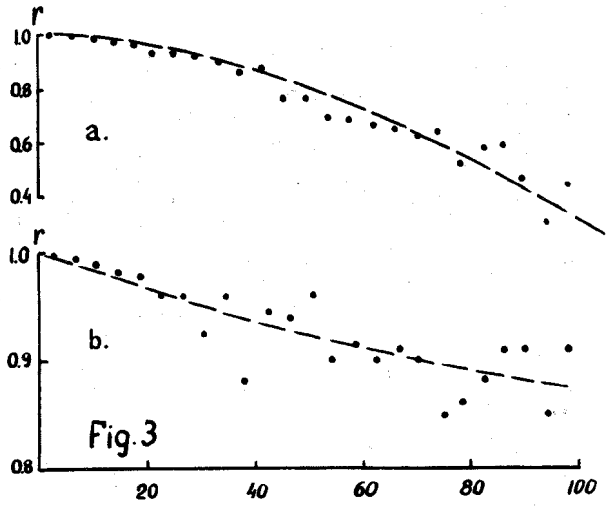

Fig.3

multiples of 1 minute. Pugach obtained during two hours about 600 observations of RW Tri using the counting technique. There was not any evidence of the 60s period.

Therefore, the three variables have stochastic components in their light variations. The autocorrelation functions of these stochastic processes are exponentials. Their relaxation times are equal to some thousandths of a day in B and decrease with wave length.

It is interesting that r for B observations of Sco X-1, which has the spectrum of an exnova, is also an exponential with relaxation time of $0^d.3$ (10).

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