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PERIODICAL COMPONENT IN THE LIGHT CURVE OF R CORONAE AUSTRINAE

R CrA undoubtedly belongs to the class of Ins variable stars. This is confirmed by its connection with a cometary nebula, rapid irregular variations of its brightness and its spectral peculiarities. But by the method of sliding differences (1,2) a periodical component in the light variations of the star was discovered. Fig.1 shows the mean difference as a function of time interval. The long sequence of Jones' observations (3) was used. The brightness is expressed in intensity scale.

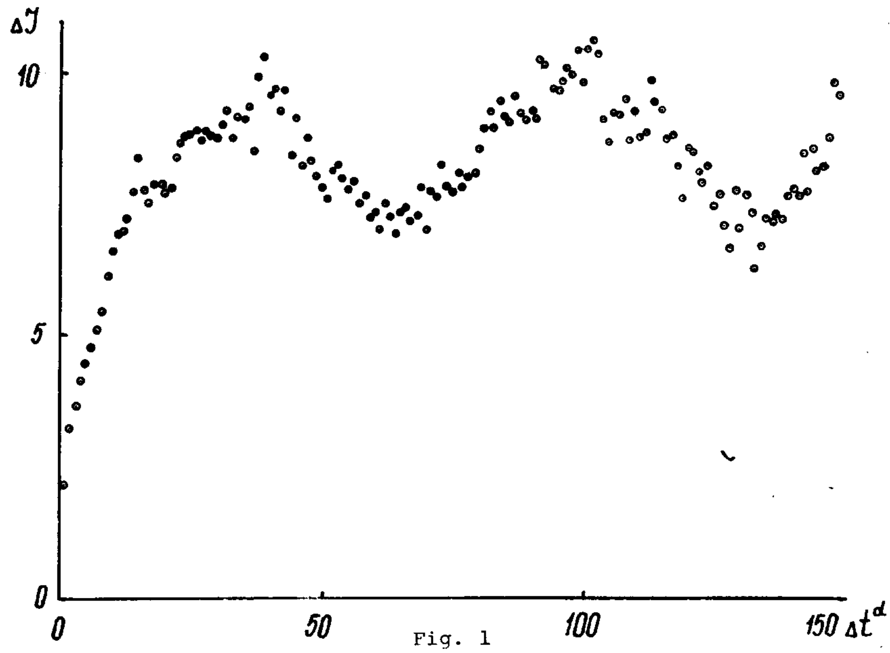


Fig. 1

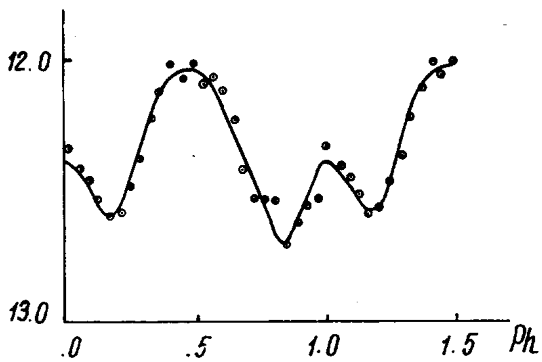


Fig. 2

Each point is obtained from 310 differences in average.

The regularity cannot be explained by axial rotation of the star by analogy with RW Aur (2). The curve considerably differs from analogous curves for the solar activity and RW Aur. Instead of fading of the amplitude with increasing time interval one can see its rise. A drift of the second minimum in the direction of the longer time intervals is also absent. Absence of the fading of the mean difference curve and an accurate multiplicity of the time intervals between the first and the second minima can be explained by some periodical light variations with a constant initial phase. We have found

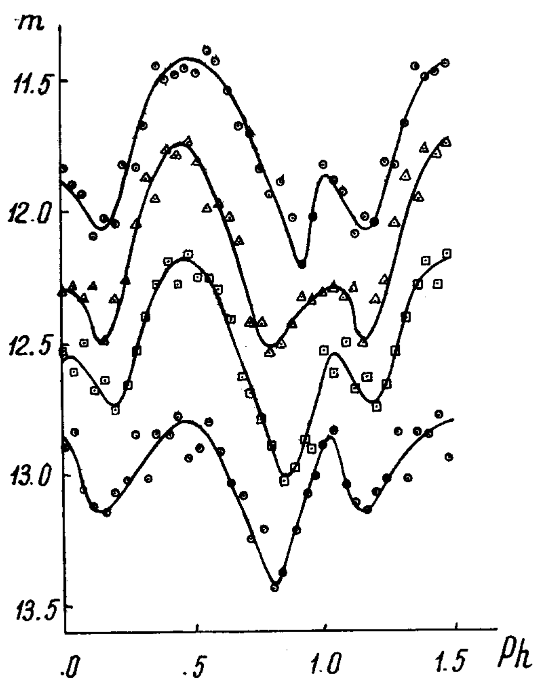
$$Max_2 = 2426497 + 65^{d}.67\ E$$

and obtained the mean curve (Fig.2).
The curve is obtained from all the published observations (n=3407, JD 2426537 - 2440861). The very large dispersion of the mean curve ($\Delta m = \pm 0^{m}.6$) considerably exceeds the probable accidental error of the observations.

Fig.2 shows a peculiarity of the light curve. It consists of two light waves with maxima a half of the period away. The waves differ from each other in amplitude. The first is larger than the second. The main maximum has a symmetrical shape.

A relation between the light curve shape and the mean brightness is detected. The curves for four intervals of mean brightness are shown in Fig.3. As the brightness weakens the difference between the two maximum heights decreases.

The brightness of the star has two fluctuations. Regular fluctuations interfere with rapid and irregular ones. The amplitude of the periodical fluctuations is some three times smaller



than the amplitude of the irregular fluctuations. Herein is the reason why the periodicity in the britghtness variations was unknown though there are long sequences of observations.

It is not probable that a star has both periodical pulsations and irregular light variations with larger amplitude simultaneously. Duplicity of the star is more obvious.

It is impossible to work out a model of a system only on the base of visual estimates of a star brightness without accurate colorimetric and spectral data. The light variations of the system are evidently under the influence of a gas nebula into which it is immersed.

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References

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