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RED VARIABLE STAR L973 IN M13

Recently it was shown by Fuenmayer and Osborn (IBVS 952 , 1974) that one of the brightest and reddest stars in M13 = NGC 6205, no. 973 in Ludendorff's catalogue (Publ. Potsdam Obs., 15, no. 50. 1905), which as it was suggested by Russev (Astr. Zr., 51, 122, 1974) to vary in brightness, is indeed a variable star. It is a member of M13 according to radial velocity measurements (Noris and Zinn, 1977, ApJ, 215, 74).

We have investigated the variability of the star L 973 on 43 blue plates of M13 taken with the 60-cm reflector of the Belogradchik Astronomical Station (Bulgaria) during four years, from 1974 to 1978 (JD 24 42 294 - 43 724). The plates were ORWO - ZU2 emulsion in combination with ultraviolet filter (Panchromar UVII) which give a system close to the B one. Using the photometry of Cathey (AJ, 79, 1370, 1974) we have measured the magnitudes of the star with a MF - 2 photometer. The average error of the measures was  $\pm 0^m.07$ . In addition to the present observational material we have utilized 19 blue plates from the collection of the State Astr. Inst. Sternberg in Moscow obtained with the 70-cm reflector AZT-2, during 1961 - 1972 (JD 24 37 790-41 092). The accuracy of the Moscow magnitudes, which have been measured with an automatic iris-photometer, is close to our measurements. Moreover we have used the observations of Fuenmayer and Osborn (IBVS 952, 1974).

The available observational data covering about sixteen years have permitted us to obtain confidently seven season maxima of the brightness, which indicated that the period of variability was approximately 43.3 days and that this one itself is probably not constant. Applying the usual method we

have derived the following elements of the light curve:

$$\text{Max} = \text{JD } 24 \ 38 \ 246.4 + 43^{\text{d}}.49.E \text{ (to JD } 24 \ 40 \ 716.6)$$

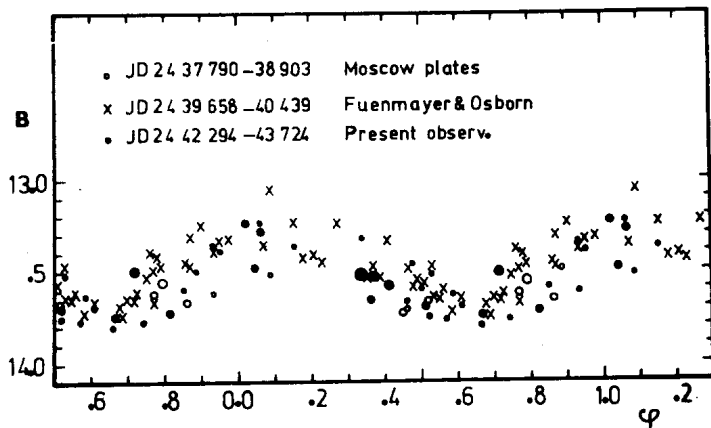
$$\text{Max} = \text{JD } 24 \ 41 \ 069.6 + 43^{\text{d}}.04.E \text{ (after JD } 24 \ 40 \ 716.6)$$

The light curve of L 973 in M13 constructed by the upper elements is shown in the Figure. The symbols are indicated in the Figure. Their size depends on the number of observations per night.

Besides we have attempted to explain the season maxima with a continuously changeable period and the result is:

$$\text{Max} = \text{JD } 24 \ 38 \ 248.53 + 43^{\text{d}}.515.E - 0.00225.E^2$$

The light curve constructed with this ephemeris is quite similar to the one presented in the Figure, but the residuals  $O - C$ , in general, are larger compared to those obtained with the first elements.



In general it follows from both interpretations that the period of the star during the last sixteen years has probably decreased with 0.45 days.

From the average light curve we have obtained for L 973  $\bar{B} = 13^{\text{m}}.53$  and the average amplitude of the variation  $A_B = 0^{\text{m}}.45$ . Since  $\bar{V} = 12^{\text{m}}.04$  (from 5 Moscow plates, this magnitude has been

also given by Osborn 1971, Ph.D. Thesis, Yale Univ.) the colour index of the star is  $\overline{B - V} = +1^m.49$ .

Finally, it is important to point out that red variables with periods about 43.3 days are met very rarely in the globular clusters. Our attempt to compare L 973 with similar objects in other globular clusters shows that the number of this kind of variables discovered up to now is not more than four - five. These are first of all V53 ( $P = 32^d.7$ ) and V164 ( $P = 37^d.2$ ) in  $\omega$  Cen, V13 ( $P \sim 40^d$ ) in NGC 6121 and V6 ( $P = 47^d$ ) and V18 ( $P \sim 49^d$ ) in 47 Tuc.

The details of our studies of L 973 together with other red variables in M13 will be published elsewhere.

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