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DETECTION OF NEW SHORT PERIOD OSCILLATIONS IN PG 1711+336 (V795 HER)

Long period light variations of the cataclysmic variable PG 1711+336 (V795 Her) were first noticed by Mironov et al.(1983a,b) who reported a photometric period of 0.115883 day for the system. Baidak et al., (1985) improved the ephemeris and refined the period to 0.114488 day (2.75 hour). If this period is interpreted as the orbital period, then the system is unique in that its orbital period falls within the period gap in the distribution of cataclysmic variables versus their orbital periods. The detection by Thorstensen (1986) of a spectroscopic period of 14.8 hours in the radial velocity data using H_α emission line of the system coupled with the lack of any evidence of the 2.75 hour period in the power spectrum of the radial velocity data has further deepened the mystery surrounding this object. In an attempt to study the time variabilities in the system, we carried out high speed photometric observations of the object.

The observations were carried out with the 1 meter telescope of the UP State Observatory at Nainital, and our two star photometer (Venkata Rao et al., 1989) on April 7 and April 10, 1989. PG 1711+336 was observed in white light in the main channel using an uncooled RCA 8850 PMT.

On April 7, we could collect only about 3600s of data. The fast variability of the star was evident during this run. On April 10, we collected about 9000s of data with an integration time of 5s.

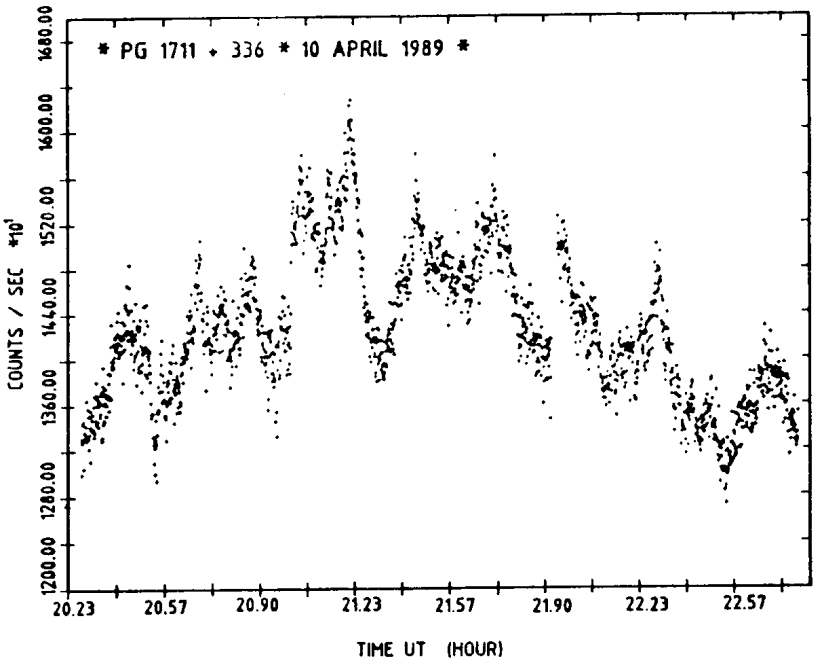

Figure 1

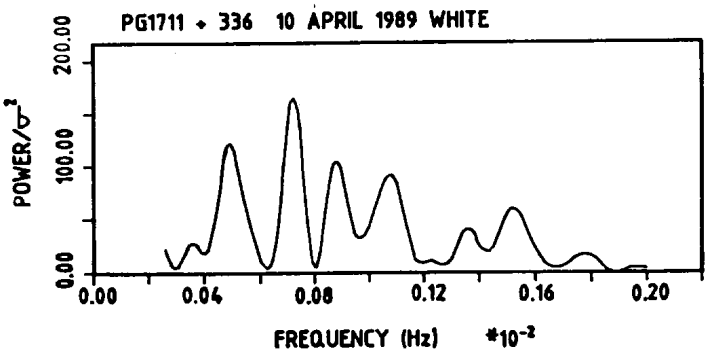

Figure 2

Fig.1 shows the sky subtracted light curve of the star on April 10. The 2.75 hour photometric variation is evident in the data. The maximum of the light curve occurs at about 21.23 hour UT. The phase of this maximum is 0.3 when calculated using the ephemeris of Baidak et al. This agrees well with the phase of the maximum of their folded light curve.

The short period, structured oscillations of the star within the primary 2.75 hour period are unmistakably evident in our data shown in fig 1 as well as in our April 7, 1989 data (not shown here). Also we were surprised to see similar short period variations of the star in one of our earlier runs on May 12, 1986 taken with a single star photometer under poor sky conditions.

Visual inspection of the raw light curve in fig. 1 while indicating the presence of more than one period, seems to reveal a period around 1400s. We have subjected the April 10, 1989 data to a DFT analysis after removing the clear 2.75 hour variation in it. The resulting normalised power spectrum is shown in fig.2. It shows a maximum around a period of 1389s and also a next significant power around 2040s. The width of the peak can be attributed to the limited resolution due to the finite data length. The power spectrum also reveals other peaks around 1136s, 935s, 735s, 658s and 562s. Eventhough the power around 562s is rather low,the power spectrum of our April 7, 1989 data had the maximum peak centred around this value. At present with the existing stretch of data we are not in a position to confidently pinpoint which of these peaks represent genuine periods.

As a check on the consistency of the 1389s period, we decided to split the data into two sets. A demarkation that divides the total data into two sets is provided by the relatively large dip in the data lasting about 10 minutes from 21.23 UT to 21.48 UT. This remarkable dip does not show the flickers present in the rest of the data. The dip also demarkates the data into an ascending and descending portion of the 2.75 hour

variation. We therefore subjected the portion of the data upto 21.33 UT and the rest of the data separately to a DFT analysis. The excess power around 1389s was seen only in the first portion of the data. Also our data of 7 April did not show any excess power at this period on subjecting it to a DFT analysis thereby indicating that the 1389s period may be quasi-periodic in nature.

In conclusion, apart from confirming the 2.75 hour photometric variability (most probably due to orbital variations) our detection of very large amplitude (~0.2 magnitude), short period (tens of minutes) oscillations of the system makes PG 1711+336 an extremely interesting object for further detailed investigations.

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