

THE PULSATIONS OF RADIAL VELOCITIES AMPLITUDE OF V 474 MON - THE DELTA SCT TYPE STAR

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The variations of radial velocities amplitude of V474 Mon - the Delta Sct type star have been determined from spectrograms obtained at the 6-m telescope. Lines of metals are measured. The curves of radial velocities show both primary and secondary period variations, and a pulsation amplitude varies with the secondary period. Using the observations published earlier, the relationship between the radial velocity amplitude and the phase of the secondary period was obtained. The constant gamma-velocity does not confirm a suggestion that the system is binary.

Key words: Stars: pulsating; radial velocities; V 474 Mon

V 474 Mon is a star which has clearly marked peculiarities among the δ Sct type stars - a great amplitude of light variations, multiperiodic, radial and nonradial mode pulsation, a small $v_{\text{sin}i}$. Since the star was discovered as variable one in 1963 (Cousins, 1963) the detailed photoelectric observations and frequency analysis of light curves were obtained (Mills, 1973, Shobrock and Stobie, 1974). These observations allowed the authors to abstract from light variations curves three nonsinusoidal waves with the periods 0.13612^d , 0.1337^d and 0.13856^d . When these three pulsations superimpose two periods of light variations display most strongly: the primary with period of 0.136126^d and secondary - 7.74639^d (Romanov and Fedotov, 1979). Because of this periods correlation the star looks like RR Lyr type stars (the main pulsation and Blazhko effect).

Even first observations of radial velocity of V 474 Mon by Jones (1966) show on varia-

tion of radial velocity amplitude from time. So far as there are few published observations of radial velocity, then correlation between radial velocity and secondary period is not investigated and the question about existence of tidal modulation (binarity of star) is not found out finally. Therefore the star have been observing to study in detail during some years by spectrograph of 6-m telescope of SAO RAS by group of observers: Yu.S.Romanov, S.N.Udovichenko, M.S.Frolov, B.N.Firmanjuk, L.P.Zaikova. This work is an extension of published earlier papers on investigation of radial velocities of V 474 Mon (Udovichenko, 1987, 1993).

For measuring of radial velocities spectrograms with dispersion 9 \AA/mm were taken. Measurements have been carried out by comparator with oscilloscopic pointing on line with direct putting into computer (Udovichenko and Romanov, 1991). Analyzing spectrograms the dispersion curve was approximated by polynomial, radial velocities were reduced to the center of Sun. Determinations of velocities were carried out under 20-30 metal lines from each plate on the average; then were calculated average values on each plate and probable errors. The measurements of radial velocities of V 474 Mon for heliocentric Julian date of observations and probably errors of average value are given in Table 1.

The curves of radial velocities are drawn for three periods of observations on Fig.1. Phases of secondary period for these curves are found from the ephemerides:

$$J.D.max(O - C) = 2441664.962^d + 7.74639^d N$$

Table 1: The radial velocities of 474 Mon

H.J.D.	V_r hel	mean sq.err.	H.J.D.	V_r hel	mean sq.err.
2446688.502	33.2	0.6	.561	15.2	0.4
.508	32.5	0.4	.569	15.2	0.4
.521	19.7	0.4	.579	15.2	0.5
.526	17.4	0.4	.586	13.2	0.5
.531	12.0	0.5	.593	17.8	0.4
.536	9.8	0.4	.598	14.8	0.6
.539	11.0	0.6	.602	18.9	0.5
.545	7.8	0.3	92.493	20.4	0.4
.549	9.6	0.4	.499	19.9	0.6
.557	9.7	0.4	.504	14.4	0.3
.562	9.4	0.3	.509	13.9	0.3
.566	11.8	0.4	.513	12.4	0.3
.570	10.8	0.4	.518	11.1	0.5
.576	11.1	0.4	.523	9.9	0.5
.582	15.8	0.4	.528	10.1	0.3
.587	14.7	0.3	.532	11.1	0.4
.592	20.7	0.4	.536	9.7	0.4
.598	21.4	0.3	.540	9.7	0.3
.602	22.4	0.3	.544	10.2	0.3
91.504	29.0	0.6	.549	11.8	0.4
.509	28.4	0.5	.554	11.6	0.3
.513	29.3	0.6	.559	14.6	0.4
.518	24.4	0.4	.564	16.0	0.4
.523	24.6	0.3	.570	18.7	0.3
.526	25.0	0.5	.576	19.7	0.3
.534	21.4	0.3	.588	22.1	0.3
.542	19.0	0.3	.594	26.5	0.4
.551	15.8	0.4	.602	27.1	0.4

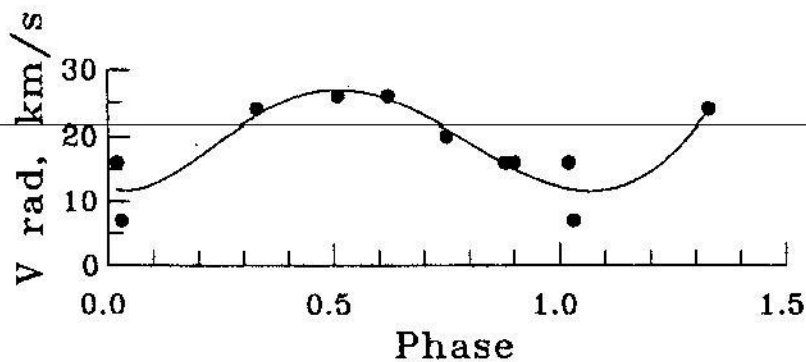


Figure 2: The variation of the radial velocity amplitude versus phase of the secondary period.

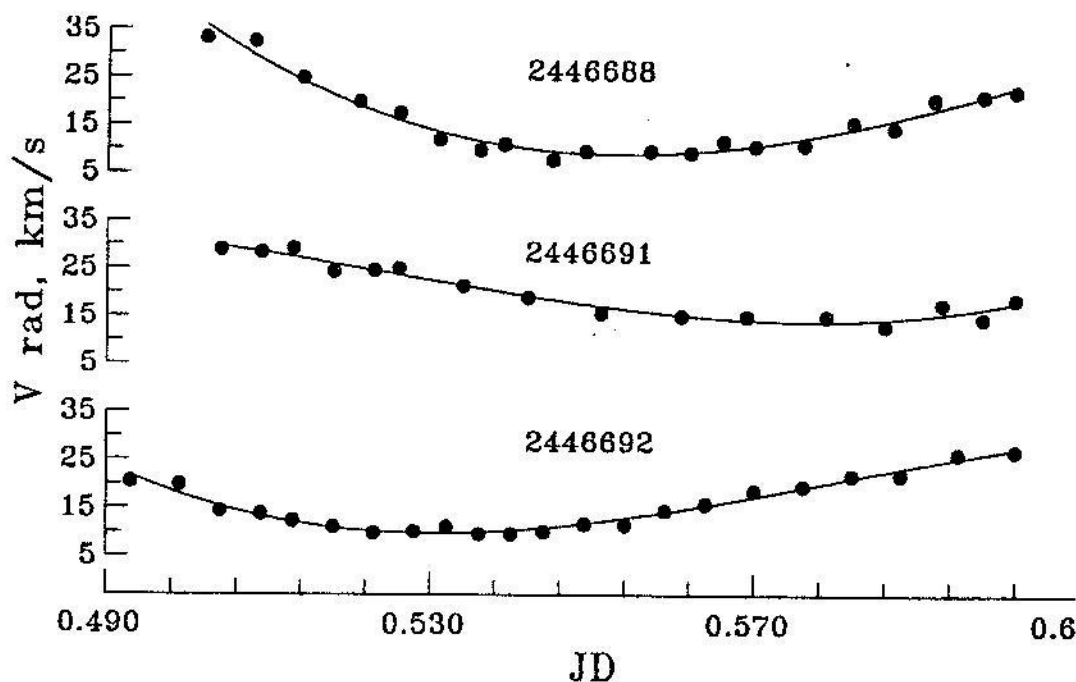


Figure 1: The radial velocity curves for three sets of observations. Numbers correspond to H.J.D.

(Romanov and Fedotov, 1979)

The curves of radial velocities' variations show a pulsation with the basic period of light star variation, and a pulsation amplitude varies with the secondary period. Using earlier published observations (Udovichenko, 1993), we received the variation of radial velocity amplitude (Table 2, Fig.2). For all curves gamma-velocity is 20 ± 1.5 km/sec and do not vary, what does not confirm a lot of periods because of tidal modulation. The most probable cause of multiperiodic in star V 474 Mon is simultaneous excitation and interaction of some pulsations with similar frequencies.

Table 2: The variation of radial velocities amplitude

H.J.D.(mean)	Phase	Ampl.,km/s
2439103.49	0.33	24
2439139.44	0.03	7
2445984.52	0.62	26
2445985.55	0.75	20
2445986.54	0.88	16
2446688.55	0.51	29
2446691.57	0.90	19
2446692.57	0.02	15

References

Cousins A.W.J.: 1963, *Mon. Not. Astr. Soc. South. Africa*, **22**, 12.
 Jones D.H.P., Lagerweij H.C.: 1966, *Mon. Not. Astr. Soc. South. Africa*, **25**, 169.
 Jones D.H.P.: 1971, *Royal Observ. Bull.*, **163**, 241.
 Millis R.L.: 1973, *P. A. S. P.*, **85**, 410.
 Romanov Yu.S., Fedotov Yu.T.: 1979, *Astron. Tsirk.*, **1071**, 6.
 Shobrock R.R., Stobie R.S.: 1974, *M.N.R.A.S.*, **169**, 643.
 Udovichenko S.N.: 1987, in: "Problemy Astronomii", **2**, preprint UkrNIINTI, 430 Uk-87Dep., 1.
 Udovichenko S.N.: 1994, *Kinematika i fizika nebesnyh tel*, **4**, N 1, 43.
 Udovichenko S.N., Romanov Yu.S.: 1990, *Pri-bory i tehnika experimenta*, **3**, 239.