PHOTOELECTRIC PHOTOMETRY OF CLOSE BINARY SYSTEM MY Cygni

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Abstract. The light curves of MY Cyg have been constructed on the basis of numerous photoelectric observations made in the UBV system. Ten times of minimum light of the system and new light elements were derived. The orbital period was found to be 4.0051873 days, that means it is double in length with respect to the old one. The orbital solution of the light curve as well as the spectral observations of Popper lead to the conclusion that the system can be classified as a detached one with about the same components as for their masses, sizes and spectral types. The surface temperatures found correspond to the spectral types derived from the metallic lines in the spectrum. The components are moderately evolved main sequence stars of spectral type F2 IV—V.

1. Introduction

The old photographic light curves of MY Cyg published by Wachmann (1948) and Gaposhkin (1953) indicated that this eclipsing binary could be similar to Algol-type systems with the secondary giant component completely occupying the largest closed equipotential capable of containing its mass — the Roche lobe. As proved many times in recent years, those semi-detached systems can serve as very suitable examples for studying the models of mass exchange between their components; from this very point of view Algol-type systems became the centre of many interests during the past few years.

There were, however, also other reasons that supported our decision to include MY Cyg into our observing program; that main reason being that the star is known to be a metallic-line binary. Observational material on Am stars and its interpretation were reviewed in general by Conti in 1970. The close binaries with metallic-line spectrum can provide, however, more important information for a general study of metallicity than other single stars because of the possibility of direct determination of masses, radii, and surface gravities of the star bodies. Popper (1971) studied four eclipsing binaries with metallic-line spectra, XY Cet, RR Lyn, SZ Cen, and among them also MY Cyg from this very point of view. His conclusions concerning MY Cyg are based on rough photographic observations only, and new precise photometry is demanded in his paper. All these and also other circumstances stimulated our attempt at revising the orbital solution of the system and, for this purpose, at constructing new photoelectric multicolour light curves, as accurate possible.

MY Cyg is a very difficult object for photometry because of the fact that its period is nearly equal to an integral number of days. Though classed with eclipsing binaries as early as the end of the third decade of this century (Hoffmeister, 1930) for this very reason relatively little has been published about it. The star was systematically observed by Tsessevich in 1931. He composed its first fragmentary light curve including parts of the minima but did not publish his results until 1954 (Tsessevich, 1954). Meanwhile Rügemer (1932) observed eight times the minimum light and derived first light elements of the system.

Complete photographic light curves of MY Cyg were published by Wachmann (1948) and especially by Gaposhkin (1953). Both their sets of observations show a small decrease of the light in that very part of the light curve where the secondary minimum was to be presumed. However, it should be remarked here now that their "observed" secondary minima of the depth 0.10 (Wachmann) and 0.03 (Gaposhkin) magnitude are not verified in this paper and there are convincing arguments against them also in others authors (Popper, 1971).

Further observations of MY Cyg are only fragmentary and accidental. One minimum was published by Obůrka (1966), four by Bierögel and Busch (1967), others are referenced in Acta astronomica (Szczyrbak, 1939) and in the Bulletin of the American Astronomical Society (Vol. 5, 1973, 104).

The star was studied spectroscopically by Slettebak and Nassau (1959), by Conti (1970), and especially by Popper (1971). While Slettebak and Nassau derived only the spectral type — A7 from hydrogen lines and from the K line of calcium and F2 from metallic lines, Popper first published the spectroscopic orbit and the real orbital period double in length with respect to the old one.

Some supplementary data about MY Cyg can be excerpted from special papers. The narrow-band photometry at nearly zero phase of the system was performed by McNamara (1962), the proper motion of the star was published by Kopal (1942) and by Kopal and Treunfels (1951).

2. Observing Material

Numerous photoelectric observations were carried out in the time period including the years 1964 to 1974 and using two different equipments. One set of the observations numbering 4317 three colour measurements was obtained at Skalnaté Pleso mostly with an automatic photometer of the Astronomical Institute of the Slovak Academy of Sciences. The photometer was installed at the 9.990 m Cassegrain focus of the main 60 cm Zeiss reflector, and was equipped with an EMI 6256 B photomultiplier. Three standard combinations of filters, the same as at Brno Observatory, were installed in the optical part of the photometer suitable for the photometry in the UBV photometric system.

The photometer used works on the principle of coupling electric charges on the integrating capacitors. The observing process is partly automatized and the work of the electronic and output devices is controlled with a special programming unit. There are eight data typed with an electric output typewriter — the time of the observation, the number of the star, the duration of the intergration, the main photometric data, the indication of the colour and the diaphragm used, as well as the input and output self-adjusting sensitivity of the measuring electrometer. The full and detailed description of the photometer was published in a separate paper by Horák et al. (1976).

Some observations of MY Cyg were also obtained with the same reflector but using different observational technique (Tremko, 1975), the digital output device was replaced with a compensation recorder. In other cases the observations were carried out using another piece of the same type photomultiplier EMI 6256 B and, in addition to it, the mirror of the reflector was realuminized during the long observing time period. One could expect therefore that all these circumstances could give rise to some systematic changes in the instrumental colour system and, at the final stage, influence negatively our extensive observing material. Unfortunately we have no special measurements of that epoch for studying these effects in detail. Some relevant changes in the instrumental system cannot significantly influence the light curves of MY Cygni due to small efficiency of these effects as well as due to the small number of the representatives that could be affected by them.

The magnitude differences $m = m_{comp} - m_{var}$ were transformed into the standard photometric *UBV* system using the common procedure of processing. No corrections for the differential extinction were needed because of the small angular distance, a few minutes of arc only, between the variable and the comparison star BD + 33°3867.

The second set of observations numbering 2322 measurements in the *UBV* system were performed also with a 60 cm reflecting telescope but with that of the University Observatory in Brno. The Schott filter combinations used were UG1 1 mm thick for the ultraviolet colour, 1 mm thick BG12 plus 2 mm thick GG13 for the blue, and GG11 2 mm thick for the yellow colour. The effective wavelengths of the cell-filter combinations, 375, 442 and 551 nm correspond very closely to the standard *UBV* system.

The output of an EMI 6256 S multiplier was fed into a D. C. amplifier and registered on a compensation line recorder. Each observation consisted of one deflection of 20 seconds of the variable and of two deflections of the comparison star. The comparison BD +38°3864 was checked against BD +33°3867 sometimes during each observing night.

The observations confirmed the light constancy of both comparison stars during the whole observing time interval, allowed to register changes in the differential extinction during the observing nights, and finally, could be used for intergrating both series of the observing material obtained partly at Skalnaté Pleso and partly at Brno.

The correction for differential extinction were applied to all observations described in this section. As mentioned above the coefficients of the corrections were derived mostly from the running measurements of the comparison and the check stars. In some nights average values based on special observations were accepted for the computation of the differential extinction. The transformation of the magnitude differences $m = m_{comp} - m_{var}$ into standard photometric *UBV* system was easily carried out using transformation formulae derived earlier.

In the final stage the whole set of the observations carried out at both observatories were intergrated into one total and were further treated together. As the comparison star used at Skalnaté Pleso was identical with the check star taken at Brno Observatory it was easy to put both series of the observations together and process them in one universal manner; a rough analysis of the whole observing material showed that no systematic deviations exist between them.

The mean error of the observations strongly varies with the seeing during the individual observing nights in the range of ±0.003 to ±0.050 magnitude. Some series of the measurements presented, however, greater dispersions; they were excluded from further treatment and were not included in our collection of observations at the end of this paper.

The individual observations presented in the appendix (Tables 8—13) are given in the form of differences $m = m_{comp} - m_{var}$; as the comparison star BD +33°3864 was chosen because it is more suitable for this purpose than that one used at Skalnaté Pleso. The fundamental data for both comparison stars as well as for the binary MY Cyg are collected in Table 1.

Table 1. Data about the variable and comparison stars

Star	Catalogue number	R.A.$_{1950}$	DEC.$_{1950}$	*V*	*B—V*	*U—B*	Spectrum
Comparison star a	BD +33°3864 HD 193703	$20^h18^m.5$	+33°40′	8.45	0.28	−0.02	F2
check star b	BD +33°3867 —	20 .0	+33 36	9.24	0.46	0.02	—
MY Cyg	BD +33°3862 HD 193637	20 18.1	+33 47	8.34* 9.00** 8.98***	0.28 0.28 0.28	0.14 0.14 0.14	F2 IV—V + F2 IV—V

* outside eclipse,
** primary minimum,
*** secondary minimum.

3. Times of Minimum Light and the Period of MY Cyg

Only some years are favourable for observing the minima of MY Cyg because of the fact that the period of this star is almost commensurable with an integral number of days. During our observations lasting many years we had an opportunity of studying only two complete minima that allowed us, using the old light elements, to find a new and more precise orbital period of the system. Other parts of the light curve inside the minima were, however, sometimes observed; in these cases it was possible to use the mean light curve of the system for deriving supplementary times and to analyse the period of the star more in more detail.

The summary of the times of the minima observed within the framework of our observing campaign as well as minima excerpted from literature are given in Table 2. Those of ours obtained by means of the mean light curve are marked by asterisks. The data of the second and third columns of this table were calculated according to the new light elements for the primary minima of the star

$$JD_{Min\,I} = 243\,3847.607 + 4.0051873 \times E.$$

Table 2. Times of minimum light of MY Cyg

Primary minima

J.D.$_{hel}$	Epoch	O—C	Method, colour	Observer
242 8164.304	−1419	0ᵈ058	pg	Wachmann
8308.488	−1383	55	pg	Wachmann
8332.467	−1377	3	pg	Wachmann
8336.454	−1376	−15	pg	Wachmann
8865.230	−1244	76	pg	Wachmann
9041.463	−1200	81	pg	Wachmann
243 0073.467	−1192	43	pg	Wachmann
3126.680	− 180	7	—	Whitney
3218.791	− 157	−2	—	Whitney
3919.693	18	−7	—	Whitney
4135.974	72	−6	—	Whitney
5405.624	389	−1	—	Whitney
9054.360	1300	−10	—	Bierögel, Busch
9058.337	1301	−18	—	Bierögel, Busch
9763.2705	1477	0.0018	pe, V*	Tremko
.2685	1477	−2	pe, B*	Tremko
.2692	1477	5	pe, U*	Tremko
9783.2945	1482	−1	pe, V	Tremko*
.2945	1482	−1	pe,B	Tremko
.2940	1482	−6	pe, U	Tremko
244 1249.1920	1848	−11	pe, V*	Papoušek
.1920	1848	−11	pe, B*	Papoušek
1461.4688	1901	7	pe, V*	Papoušek

Secondary minima

J.D.$_{hel}$	Epoch	O—C	Method, colour	Observer
242 8122.242	−1429.5	0.051	pg	Wachmann
8306.503	−1383.5	73	pg	Wachmann
8338.452	−1375.5	−20	pg	Wachmann
8362.446	−1369.5	−57	pg	Wachmann
8366.470	−1368.5	−38	pg	Wachmann
8859.216	−1245.5	70	pg	Wachmann
9143.525	−1174.5	10	pg	Wachmann
243 2379.701	− 366.5	−5	—	Whitney
3849.611	0.5	1	—	Whitney
4622.620	193.5	9	—	Whitney
8295.378	1110.5	10	pg	Obůrka
9052.349	1299.5	−1	—	Bierögel, Busch
9056.370	1300.5	0.017	—	Bierögel, Busch
9048.3516	1298.5	0.0089	pe, V	Tremko
9056.3624	1300.5	93	pe, V	Tremko
244 0494.2230	1659.5	77	pe,V*	Tremko
.2230	1659.5	77	pe, B*	Tremko
.2236	1659.5	83	pe, U*	Tremko
2308.5739	2112.5	87	pe,V*	Tremko
.5747	2112.5	95	pe, B*	Tremko
.5732	2112.5	80	pe, U*	Tremko

* The minimum was derived using the mean light curve of the system.

The new period, double in length with respect to the data given in the last supplement to the General Catalogue of Variable Stars (Kukarkin et al., 1974), follows from the orbital solution of the light curve presented latter, of the spectroscopic solution given by Popper (1971), and is also reflected in systematic deviations of the times for secondary minima. The latest effect is quite convincingly expressed in our observing material but with a certain degree of imagination can also be noticed at less accurate photographic observations of former observers. The shift of secondary minima by about 0.0021 of the period relative to the phase 0.5 gives evidence of elliptical orbital motion of the components that could be directly reflected in the apsidal motion of the orbit and indirectly observed in periodic changes of the orbital period.

As follows from Figure 1 the course of O-C's does not allow to make any conclusions about relevant changes of the orbital period of MY Cyg. The spread of the points in that figure seems to be accidental except the observations by Wachmann $E = -1429.5$ to -1174.5; but these particular observations do not produce respectable effect because of the enormous amplitude and the rate of the change of the period corresponding to the deviations in Figure 1. This is why we prefer the course of the O-C's in later epochs concluding that the period of the system does not vary in the range more than can be verified by hitherto observations.

In connection with the new light elements for MY Cyg some comments should be said about the designation of the primary and the secondary minima of this star. As both minima differ in depth by about 0.01 magnitude only and as the components are almost the same stars they are very difficult to distinguish on the basis of photometry or spectroscopy. This is why the designations "primary" and "secondary" due to the formal identity of both minima are not founded on facts and have to be fixed conventionally. Using precise photoelectric measurements we have taken the slightly deeper minimum for fixing the "primary" component of the system. This decision of ours caused that the new initial epoch differ from the old one given in the General Catalogue (Kukarkin et al., 1974) and also from that in the paper by Popper (1971) by one half of the new period; that means the primary and secondary components should be interchanged in the solution presented by Popper (1971) when comparing it with our results.

4. Light Curve and Its Treatment

The individual observations grouped according to their phases in 200 equidistant phase intervals served as the starting data when calculating the normal points of the light curves. As shown in Table 3 each normal point roughly consists of 10—50 observations; that means the light curve is satisfactorily representative for deriving accurate orbital elements though composed of points of different weights; otherwise precision of it can be also appreciated according to the mean errors of the normal point lying in the interval of 0.001 to 0.010 magnitude.

There are some gaps on the light curve especially on the descending branch of the primary minimum where no observations were at our disposal. This effect could influence our calculations when deriving the orbital solution especially as to its accuracy to a certain extent but could not affect at all further conclusions about the course of the light curve. The light curve in V colour is graphically plotted in Fig. 2, the ones in B and U colours can be easily realized taking into account the course of the added colour indices B-V and U-B; There is no doubt about the fact that the light curves of MY Cyg are as closely similar as possible in all spectral regions.

The course of the light curve outside the minima excludes the existence of any decrease of light that could be suggested as the "secondary" minimum mentioned by the previous observers (Wachmann, 1948; Gaposhkin, 1953; the Supplement to the General Catalogue of Variable Stars 1974). The light outside the minima seems to be constant and signalizes that the effect of ellipticity of the components as well as the reflection effect are absent in MY Cyg. The Fourier analysis of the parts of the light curves outside the minima verified such a conclusion, the coefficients of the light were found to be zero within the observing errors (Tab. 4).

A small shift of the secondary minimum relative to the phase 0.5 by 0.0021 periods indicates that the orbit of the system is a little eccentric; it is, however, impossible to derive the exact value of the orbital eccentricity from our observing material.

5. Orbital Solution

As the light curve of MY Cyg show neither the effect of reflection nor that of oblateness of the components, classical rectification could be omitted when processing them. There were, however, other complications connected with the eccentricity of the orbit; as the theory of photometrical eclipses has not yet been satisfactorily worked out for the elliptical orbits such possibility could not be included in our standard processing programme used for solving the light curves. On the other hand, the orbital eccentricity is only slightly expressed in our case; that means the real orbit does not differ

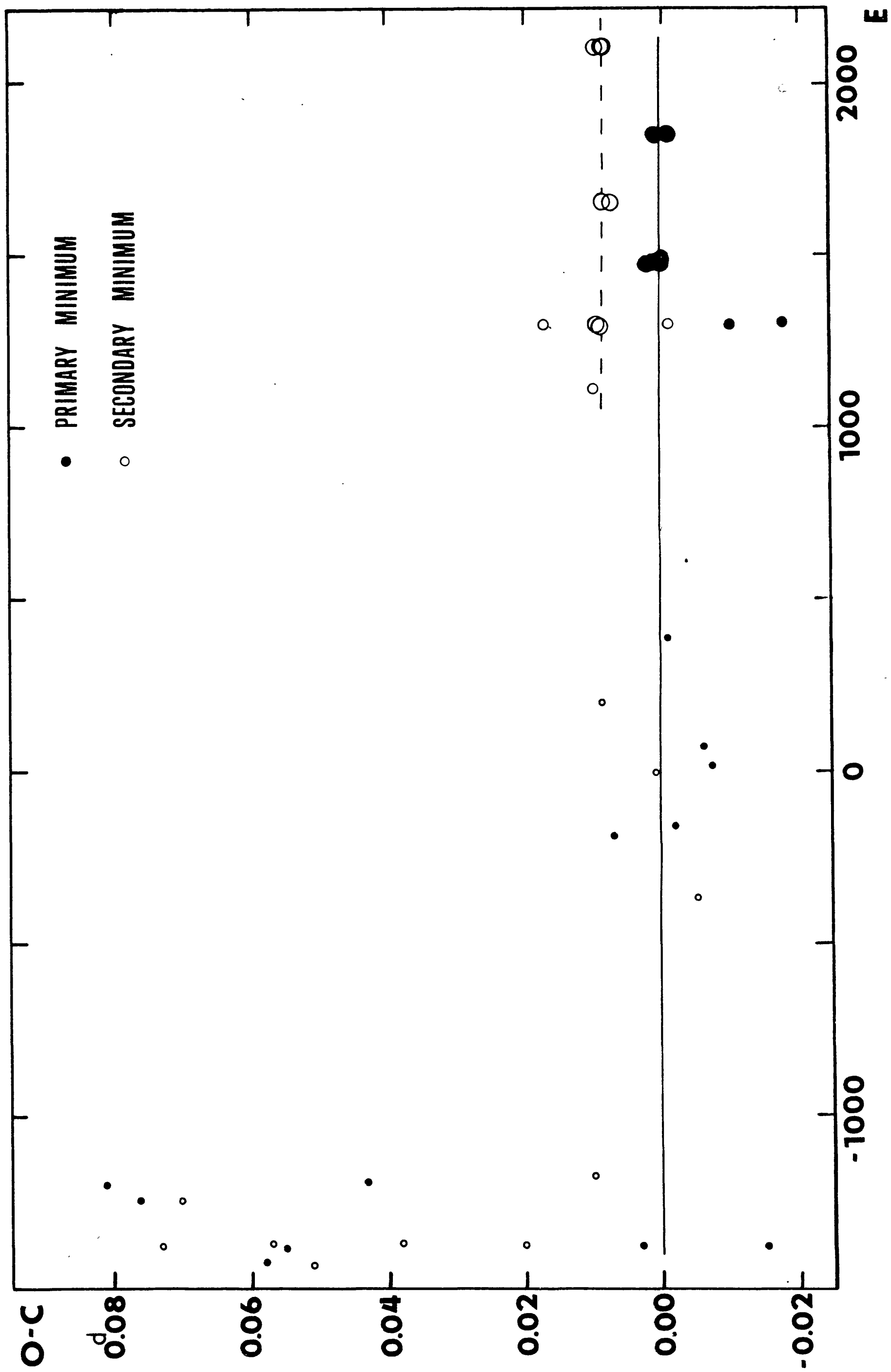

Fig. 1. The deviation of the observed epochs from the linear ephemeris.

much from the circular orbit and it might be possible to find a special rectification process allowing to transform the solution into the domain of the theory of circular orbits. A short numerical analysis substantiated our competence to rectify the light curve by shifting the secondary minimum exactly in the middle of the two opposite primary minima and to find its orbital solution using the standard theory of circular orbits.

All three light curves rectified in such a manner were treated by means of a small computer MINSK 22 using the direct iterative minimization method of Horák (1966) and the sphere-sphere model of the system. The minima of the function

$$\sigma(i, r_1, r_2, u_1, u_2, L_1) =$$

$$= \sum_{k=1}^{N} [L_{\rm calc}\, i, r_1, r_2, u_1, u_2, L_1, Q_k - L_{\rm obs}]^2$$

were found for the set of parameters given in

Table 3a. Light curve of MY Cyg in *V* colour

Phase	Θ	Δm	*I*	*n*
0.0010	0.35	−0.548	0.5422	20
0.0071	2.55	−0.450	0.5936	41
0.0126	4.52	−0.319	0.6696	72
0.0177	6.38	−0.193	0.7517	55
0.0221	7.97	−0.114	0.8083	15
0.0270	9.72	−0.022	0.8802	51
0.0335	12.04	0.050	0.9404	43
0.0381	13.71	0.091	0.9769	39
0.0438	15.77	0.112	0.9959	7
0.0468	16.85	0.112	0.9956	12
0.0533	19.20	0.112	0.9958	23
0.0566	20.39	0.122	1.0052	40
0.0623	22.44	0.103	0.9871	30
0.0680	24.49	0.138	1.0198	21
0.0735	26.45	0.135	1.0168	36
0.0783	28.17	0.126	1.0081	38
0.0822	29.59	0.118	1.0008	37
0.0878	31.60	0.131	1.0129	27
0.0934	33.63	0.129	1.0115	20
0.0983	35.40	0.137	1.0184	19
0.1023	36.84	0.133	1.0146	10
0.1063	38.28	0.135	1.0164	16
0.1219	43.88	0.108	0.9921	21
0.1280	46.09	0.117	1.0001	30
0.1327	47.77	0.112	0.9955	43
0.1381	49.73	0.114	0.9970	39
0.1433	51.59	0.108	0.9916	32
0.1474	53.08	0.103	0.9870	15
0.1536	55.31	0.106	0.9899	50
0.1584	57.01	0.121	1.0038	47
0.1622	58.38	0.115	0.9981	63
0.1677	60.37	0.122	1.0046	50
0.1724	62.08	0.111	0.9943	38
0.1779	64.04	0.111	0.9942	40
0.1833	65.98	0.123	1.0058	31
0.1855	66.79	0.114	0.9970	7
0.1900	68.42	0.141	1.0220	10
0.2020	72.70	0.075	0.9620	5
0.2081	74.90	0.118	1.0010	5
0.2145	77.21	0.120	1.0025	5
0.2225	80.10	0.149	1.0304	8
0.2273	81.83	0.135	1.0166	5
0.2330	83.88	0.114	0.9972	32
0.2365	85.14	0.116	0.9993	25
0.2418	87.05	0.119	1.0020	20
0.2467	88.80	0.119	1.0022	26
0.2520	90.73	0.117	0.9999	15
0.2575	92.68	0.115	0.9980	21
0.2626	94.52	0.123	1.0054	24
0.2652	95.45	0.122	1.0050	2
0.2748	98.94	0.121	1.0040	1
0.2785	100.26	0.124	1.0067	59
0.2817	101.43	0.121	1.0038	11
0.2919	105.10	0.121	1.0035	45
0.2984	107.43	0.119	1.0015	9
0.3022	108.79	0.120	1.0032	16
0.3068	110.45	0.114	0.9973	30
0.3136	112.89	0.115	0.9983	39
0.3177	114.37	0.131	1.0126	28
0.3227	116.16	0.121	1.0038	22

Table 3a. cont.

Phase	Θ	Δm	*I*	*n*
0.3276	117.95	0.110	0.9940	29
0.3324	119.68	0.085	0.9717	33
0.3362	121.04	0.115	0.9985	11
0.3471	124.97	0.135	1.0170	24
0.3530	127.07	0.133	1.0147	23
0.3584	129.02	0.127	1.0094	21
0.3636	130.88	0.124	1.0067	19
0.3674	132.25	0.105	0.9892	10
0.3714	133.70	0.107	0.9906	20
0.3885	139.86	0.105	0.9893	13
0.3927	141.39	0.138	1.0198	12
0.3970	142.92	0.113	0.9965	35
0.4030	145.07	0.109	0.9925	23
0.4086	147.09	0.088	0.9742	8
0.4126	148.52	0.108	0.9919	6
0.4169	150.09	0.108	0.9921	9
0.4223	152.03	0.112	0.9959	30
0.4271	153.74	0.115	0.9983	14
0.4317	155.42	0.128	1.0107	13
0.4423	159.23	0.114	0.9971	17
0.4469	160.87	0.101	0.9859	11
0.4508	162.30	0.102	0.9865	34
0.4583	165.00	0.080	0.9660	30
0.4669	168.10	0.052	0.9417	36
0.4746	107.87	−0.056	0.8530	19
0.4775	171.91	−0.114	0.8084	28
0.4823	173.62	−0.201	0.7466	26
0.4869	175.28	−0.306	0.6773	59
0.4921	177.15	−0.416	0.6123	50
0.4977	179.18	−0.524	0.5543	34
0.5017	180.61	−0.536	0.5480	33
0.5076	182.72	−0.428	0.6059	49
0.5129	184.66	−0.294	0.6852	42
0.5179	186.44	−0.198	0.7486	25
0.5238	188.55	−0.973	0.8397	22
0.5330	191.89	0.059	0.9481	18
0.5439	195.81	0.129	1.0109	19
0.5537	199.32	0.145	1.0264	20
0.5726	206.12	0.092	0.9778	7
0.6315	227.34	0.120	1.0030	11
0.6438	231.76	0.119	1.0020	11
0.6483	233.40	0.125	1.0072	29
0.6523	234.84	0.106	0.9896	12
0.6575	236.71	0.110	0.9938	11
0.6624	238.48	0.102	0.9865	11
0.6795	244.62	0.117	1.0006	11
0.6825	245.69	0.111	0.9951	21
0.6873	247.42	0.128	1.0099	24
0.6924	249.26	0.106	0.9903	28
0.6981	251.30	0.117	1.0006	25
0.7017	252.61	0.112	0.9956	21
0.7077	154.78	0.122	1.0052	12
0.7113	256.05	0.120	1.0027	12
0.7172	258.20	0.127	1.0100	13
0.7214	259.72	0.148	1.0288	6
0.7273	261.82	0.140	1.0217	7
0.7585	273.05	0.124	1.0070	7
0.7632	274.77	0.122	1.0051	15
0.7655	275.56	0.120	1.0028	4
0.7746	278.85	0.118	1.0011	3

Table 3a. cont.

Phase	Θ	Δm	I	n
0.7774	279.88	0.121	1.0035	13
0.7824	281.67	0.119	1.0018	18
0.7853	282.70	0.119	1.0024	2
0.7929	285.44	0.123	1.0055	17
0.7955	286.37	0.122	1.0051	5
0.8031	289.10	0.121	1.0036	13
0.8054	289.96	0.122	1.0049	3
0.8227	296.16	0.122	1.0049	21
0.8268	297.65	0.138	1.0194	25
0.8318	299.46	0.125	1.0076	32
0.8374	301.45	0.116	0.9990	20
0.8426	303.32	0.111	0.9945	30
0.8478	305.20	0.103	0.9872	20
0.8524	306.87	0.119	1.0024	44
0.8571	308.56	0.118	1.0009	16
0.8630	310.70	0.128	1.0099	19
0.8678	312.39	0.127	1.0090	48
0.8726	314.13	0.130	1.0124	46
0.8774	315.85	0.116	0.9999	34
0.8833	317.98	0.102	0.9868	40
0.8880	319.69	0.099	0.9841	30
0.8931	321.51	0.120	1.0035	56
0.8971	322.96	0.099	0.9845	37
0.9032	325.13	0.067	0.9547	16
0.9079	326.86	0.090	0.9763	47
0.9124	328.45	0.072	0.9602	38
0.9175	330.29	0.145	1.0261	37
0.9225	332.11	0.116	0.9992	20
0.9288	334.36	0.111	0.9948	5
0.9329	335.83	0.130	1.0126	41
0.9384	337.84	0.125	1.0072	22
0.9411	338.78	0.110	0.9936	23
0.9482	341.35	0.117	1.0002	11
0.9528	343.00	0.111	0.9949	18
0.9570	344.52	0.109	0.9929	14
0.9894	356.20	−0.363	0.6425	20
0.9956	358.40	−0.502	0.5657	21

Table 3b. Light curve of MY Cyg in *B* colour

Phase	Θ	Δm	I	n
0.0008	0.27	−0.547	0.5414	20
0.0070	2.54	−0.440	0.5979	41
0.0120	4.31	−0.322	0.6530	58
0.0160	5.75	−0.226	0.7277	55
0.0216	7.76	−0.118	0.8039	36
0.0268	9.65	−0.020	0.8800	38
0.0323	11.62	0.041	0.9314	43
0.0360	12.94	0.080	0.9653	33
0.0419	15.10	0.111	0.9931	28
0.0468	16.85	0.119	1.0001	12
0.0533	19.20	0.117	0.9983	23
0.0565	20.32	0.117	0.9985	20
0.0833	30.00	0.123	1.0042	1
0.0851	30.63	0.111	0.9930	1
0.1571	56.57	0.111	0.9932	15
0.1610	57.96	0.130	1.0103	20
0.1672	60.18	0.134.	1.0145	26
0.1717	61.81	0.117	0.9981	18

Table 3b. cont.

Phase	Θ	Δm	I	n
0.1760	63.35	0.130	1.0107	16
0.1883	67.80	0.115	0.9961	10
0.2179	78.43	0.129	1.0095	9
0.2236	80.51	0.115	0.9960	5
0.2293	82.55	0.110	0.9922	5
0.2328	83.81	0.118	0.9995	22
0.2361	85.01	0.125	1.0053	16
0.2427	87.37	0.126	1.0071	11
0.2481	89.31	0.131	1.0117	13
0.2520	90.73	0.133	1.0131	15
0.2575	92.68	0.125	1.0052	21
0.2626	94.52	0.126	1.0068	24
0.2652	95.45	0.111	0.9928	2
0.2748	98.94	0.138	1.0181	1
0.2783	100.20	0.129	1.0090	58
0.2817	101.43	0.129	1.0091	11
0.2919	105.08	0.120	1.0009	52
0.2984	107.43	0.126	1.0067	9
0.3022	108.79	0.127	1.0077	16
0.3057	110.07	0.138	1.0181	20
0.3146	113.26	0.116	0.9974	20
0.3158	113.69	0.125	1.0056	8
0.3224	116.08	0.122	1.0033	12
0.3293	118.53	0.124	1.0047	9
0.3331	119.93	0.120	1.0014	10
0.3352	120.67	0.128	1.0087	2
0.3940	141.82	0.129	1.0090	18
0.3974	143.05	0.125	1.0060	5
0.4013	144.49	0.119	0.9997	7
0.4066	146.37	0.114	0.9952	12
0.4124	148.45	0.114	0.9955	8
0.4187	150.75	0.089	0.9729	14
0.4233	152.38	0.118	0.9994	22
0.4266	153.57	0.114	0.9956	16
0.4333	155.99	0.115	0.9965	25
0.4381	157.73	0.127	1.0072	27
0.4422	159.19	0.133	1.0135	27
0.4469	160.90	0.120	1.0011	13
0.4509	162.31	0.119	1.0001	11
0.4590	165.23	0.107	0.9889	5
0.4656	167.63	0.065	0.9512	11
0.4740	170.65	−0.045	0.8602	19
0.4819	173.47	0.193	0.7505	16
0.4879	175.65	−0.331	0.6608	29
0.5132	184.77	−0.292	0.6847	17
0.5237	188.52	−0.075	0.8363	21
0.5329	191.84	0.058	0.9453	19
0.5408	194.69	0.111	0.9930	9
0.5726	206.12	0.110	0.9918	7
0.6837	246.12	0.100	0.9832	14
0.6874	247.46	0.125	1.0055	6
0.6921	249.16	0.118	0.9995	32
0.6972	251.00	0.105	0.9875	46
0.7026	252.94	0.127	1.0072	39
0.7071	254.56	0.127	1.0071	25
0.7123	256.44	0.093	0.9763	41
0.7173	258.22	0.120	1.0014	25
0.7209	259.51	0.121	1.0018	22
0.7271	261.75	0.136	1.0162	8
0.7585	273.07	0.135	1.0152	8

Table 3b. cont.

Phase	Θ	Δm	I	n
0.7632	274.77	0.129	1.0097	15
0.7655	275.56	0.129	1.0092	4
0.7746	278.85	0.128	1.0088	3
0.7774	279.88	0.134	1.0145	13
0.7823	281.62	0.131	1.0116	17
0.7853	282.70	0.134	1.0144	2
0.7929	285.44	0.131	1.0117	17
0.7955	286.38	0.131	1.0109	6
0.8029	289.05	0.135	1.0150	12
0.8240	296.63	0.123	1.0041	10
0.8282	298.16	0.116	0.9974	15
0.8323	299.64	0.097	0.9802	3
0.8495	305.84	0.112	0.9936	9
0.8533	307.19	0.124	1.0050	11
0.8579	308.83	0.125	1.0058	28
0.8617	310.21	0.113	0.9944	10
0.8675	312.31	0.115	0.9968	7
0.8718	313.86	0.119	0.9998	4
0.8763	315.45	0.117	0.9985	8
0.8828	317.82	0.087	0.9711	41
0.8867	319.23	0.133	1.0131	7
0.8924	321.27	0.143	1.0226	8
0.8953	322.32	0.138	1.0178	3
0.9222	332.99	0.118	0.9995	24
0.9290	334.46	0.126	1.0070	4
0.9347	336.49	0.116	0.9974	20
0.9390	338.04	0.110	0.9925	5
0.9423	339.23	0.114	0.9951	5
0.9482	341.35	0.122	1.0032	11
0.9528	343.00	0.122	1.0033	18
0.9570	344.52	0.121	1.0016	14
0.9955	358.38	−0.514	0.5585	21

Table 3c. Light curve of MY Cyg in U colour

Phase	Θ	Δm	I	n
0.0009	0.31	−0.735	0.5334	20
0.0060	2.14	−0.651	0.5769	20
0.0110	3.97	−0.546	0.6362	20
0.0165	5.95	−0.418	0.7164	52
0.0240	8.64	−0.268	0.8232	20
0.0298	10.71	−0.166	0.9048	23
0.0376	13.54	−0.094	0.9675	23
0.0429	15.46	−0.072	0.9873	12
0.1588	57.18	−0.046	1.0119	6
0.1614	58.11	−0.016	1.0404	11
0.1679	60.45	−0.048	1.0092	15
0.1722	61.99	−0.008	1.0478	8
0.1758	63.31	−0.036	1.0215	7
0.2029	73.04	−0.125	0.9404	5
0.2062	74.25	−0.052	1.0059	4
0.2122	76.38	−0.066	0.9933	5
0.2173	78.23	−0.028	1.0334	9
0..2267	81.61	−0.031	1.0257	9
0.2326	83.73	−0.045	1.0129	22
0.2368	85.25	−0.048	1.0098	15
0.2425	87.29	−0.037	1.0196	10
0.2481	89.31	−0.049	1.0089	13

Table 3c. cont.

Phase	Θ	Δm	I	n
0.2520	90.73	−0.048	1.0097	15
0.2575	92.68	−0.049	1.0092	21
0.2625	94.50	−0.047	1.0104	23
0.2652	95.45	−0.059	0.9995	2
0.2785	100.26	−0.087	0.9740	46
0.2919	105.09	−0.103	0.9594	48
0.3058	110.09	−0.117	0.9466	19
0.3145	113.23	−0.005	1.0511	19
0.4192	150.91	−0.045	1.0125	3
0.4222	151.99	−0.049	1.0088	12
0.4265	153.53	−0.067	0.9921	22
0.4352	156.69	−0.078	0.9817	9
0.4462	160.62	−0.086	0.9751	14
0.4546	163.65	−0.065	0.9943	9
0.4640	167.05	−0.117	0.9471	8
0.4722	169.98	−0.204	0.8739	6
0.4768	171.66	−0.304	0.7960	9
0.4867	175.22	−0.473	0.6804	21
0.5128	184.62	−0.505	0.6605	19
0.5236	188.50	−0.278	0.8159	22
0.5328	191.82	−0.118	0.9462	20
0.5408	194.70	−0.067	0.9918	9
0.6833	245.98	−0.097	0.9656	14
0.6874	247.46	−0.052	1.0059	6
0.6924	249.27	−0.054	1.0039	9
0.6970	250.92	−0.075	0.9845	21
0.7023	252.82	−0.050	1.0074	15
0.7077	254.78	−0.051	1.0071	12
0.7113	256.05	−0.040	1.0168	12
0.7172	258.20	−0.051	1.0067	13
0.7214	259.72	−0.059	0.9990	6
0.7271	261.75	−0.050	1.0083	8
0.9219	331.88	−0.046	1.0117	12
0.9288	334.36	−0.046	1.0110	5
0.9385	337.87	−0.088	0.9738	6
0.9423	339.23	−0.059	0.9994	5
0.9482	341.35	−0.053	1.0054	11
0.9528	343.00	−0.050	1.0080	18
0.9570	344.52	−0.056	1.0021	14
0.9893	356.16	−0.540	0.398	7
0.9954	358.36	−0.666	0.5691	21

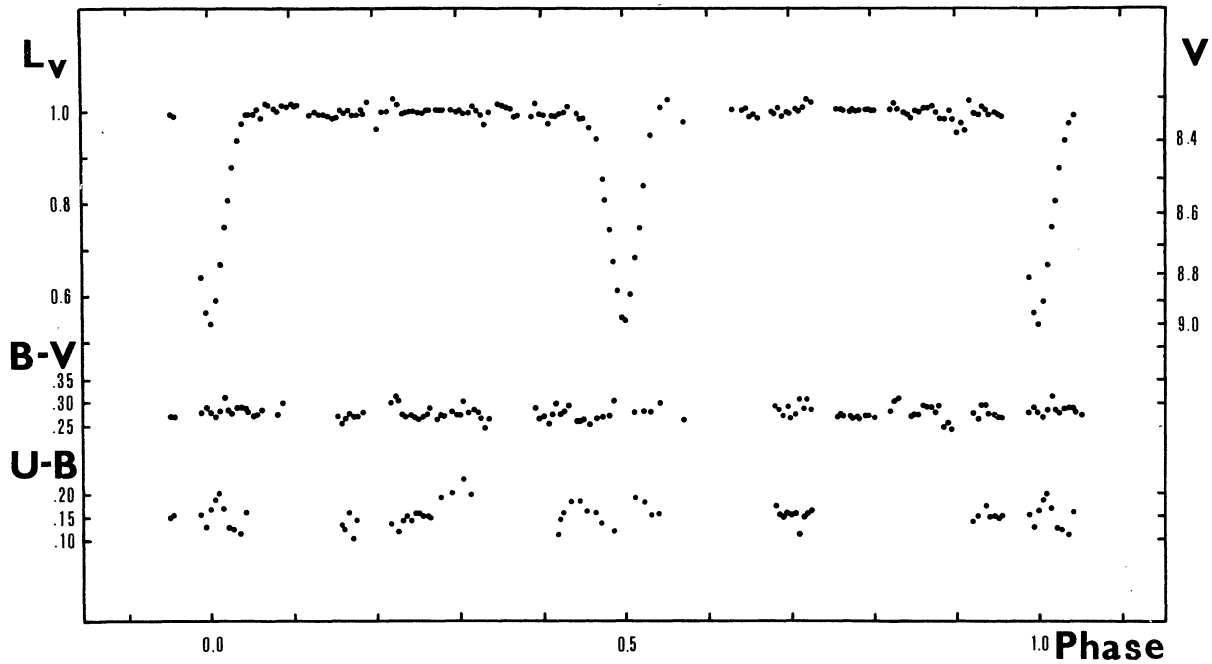

Fig. 2. The light curve of MY Cygni.

Table 4. Coefficients of the light outside the minima

Colour	A'_0	A'_1	A'_2	A'_3	B_1	B_2	B_3
V	1.000	0.002	−0.002	0.001	−0.000	0.000	0.002
	±1	±3	±2	±2	±1	±2	±2
B	1.000	0.003	−0.001	0.004	0.002	0.001	−0.007
	±2	±6	±5	±5	±3	±2	±2
U	1.000	0.012	−0.000	−0.15	−0.001	−0.002	0.007
	±6	±9	±7	±7	±5	±7	±6

Table 5 where L_{calc} and L_{obs} are the theoretical as well as the observed lights of the system, i is the inclination of the orbit, r_1 and r_2 the radii of the primary and the secondary components, u_1 and u_2 the corresponding limb darkening coefficients, and $L_1 = 1 - L_2$ is the light of the primary component.

For the initial approximation the preliminary elements of Popper (1971) were chosen. The iteration process was first carried out using the constant theoretical values for the darkening coefficients u_1 and u_2 and changing only the geometrical elements and the light L_1. After the iteration process was finished the condition of constancy of the darkening coefficients was removed, and the solution was finished for all six parameters changed.

It should be noted that there were great complications first and that no solution was long found at the beginning of our computations. Because of a wrong assumption of the old orbital period connected with a wrong interpetation of the light curve no solution fitted our observations. After using the new value of the period all complications disappeared and the system suddenly became quite simple. The difficulties mentioned above had, on the other hand, also a virtue; they allowed to discover the real nature of the system consisting of two nearly equal bodies at the time when spectroscopic results of Popper (1971) had not yet been known to us.

As it follows from the data in Table 5 the orbital solutions are very similar in all three colours observed; the geometrical elements do not differ at all in V and B colours and the deviations of the solution in U colour can be easily explained by observational errors. The computed mean errors of the parameters are probably overestimated and should be diminished by the factor 2 to 3. One may say therefore that the new solution presented

Table 5. Orbital solution of MY Cyg

Parameter	Colour V	Colour B	Colour U
i	88.6 ±0.1	88.6 ±0.1	88.0 ±0.2
r_1	0.139±0.001	0.139±0.001	0.143±0.002
r_2	0.132±0.001	0.132±0.001	0.135±0.001
u_1	0.65 ±0.10	0.65 ±0.07	0.90 ±0.08
u_2	0.70 ±0.11	0.77 ±0.15	0.93 ±0.16
L_1	0.528±0.003	0.528±0.003	0.529±0.004
L_2	0.472±0.003	0.472±0.003	0.471±0.004
I_1/I_2	1.009±0.022	1.009±0.022	1.001±0.033

here seems to be very promising including the plausible limb darkening coefficients — the comparison of the experimental and theoretical values (Grygar et al., 1972) is given in Table 6 — and together with the spectroscopic solution by Popper (1971) classes MY Cyg among the well-known close binary systems with absolutely determined dimensions.

Table 6. Comparison of the theoretical and observed limb darkening coefficients

Colour	Observed coefficients		Theoretical coefficients	
	u_1	u_2	sp. F2	sp. A7
V	0.65±0.10	0.70±0.11	0.60	0.58
B	0.65±0.10	0.77±0.15	0.77	0.72
U	0.90±0.08	0.93±0.16	0.91	0.89

6. Properties of the Components of the System

As metioned above the excellent spectroscopic orbit derived by Popper (1971) was at our disposal when analysing the system of MY Cyg. We used his parameters for the masses of the components and sizes of the system to summarize the basic data about MY Cyg in absolute dimensions (Tab. 7) and to draw other conclusions about this system. The luminosities given in this table are consistent with the radii and effective temperatures of the two bodies, 7160 and 7140°K, respectively.

Table 7. Properties of the components of MY Cyg

Parameter	Primary component	Secondary component
Mass $\mathfrak{M}$ ($\mathfrak{M}_\odot$)	1.81±0.03	1.79±0.03
Radius $R(R_\odot)$	2.26±0.08	2.15±0.08
Luminosity $\mathscr{L}(\mathscr{L}_\odot)$	12.0 ±1.0	10.7 ±0.7
Eff. temperature (°K)	7160°	7140°
Spectrum	F2 IV—V	F2 IV—V
M_{bol}	1.9	2.1
M_v	2.1	2.2
Surface gravity $g(g_\odot)$	0.35±0.02	0.39±0.03

The effective surface temperatures could not be derived directly from the spectral type because of the metallicity effects observed in the spectrum of MY Cyg. As they had to be chosen with relatively high accuracy when computing the luminosities according to the Stefan—Boltzmann relation the following procedure was used. The ratio of the temperatures was taken to fall in with the relation of Stefan and Boltzmann, with the surface brightnesses of both components, and also with the lights L_1 and L_2 of the orbital solution. Their absolute values were then chosen in such a manner as to be in the best possible agreement with the common statistical mass-luminosity relations. As for the effective temperatures mentioned above they satisfy strictly all the first three conditions; the statistical mass-luminosity relation

$$\log \mathfrak{M} = -0.01 + 0.005 \log R + 0.24 \log \mathfrak{L}$$

(Parenago and Massevich, 1950, 1951) and also the mass-luminosity relation in the paper by Popper (1971) are well fulfilled in the case of the secondary component while the luminosity of the primary one is slightly, by about a unit, overestimated with regard to these relations.

The effective temperatures above correspond well to the spectral type F2, i.e. to that derived from the metallic lines in the spectrum of MY Cyg. Using the results of narrow-band photometry performed by McNamara (1966) it is possible to support this conclusion with another argument. This author observed MY Cyg in the narrow-band photometric system defined by Strömgren (1958) and derived the absolute magnitude M_v of the star as 3.1. His value seems, however, too great in comparison with the estimate following from our luminosities in Table 7. Really, taking McNamara's value for M_v, the corresponding bolometric correction, and calculating back the luminosities and effective temperatures of the two components we obtain much later spectral types than the observations allow. In our opinion

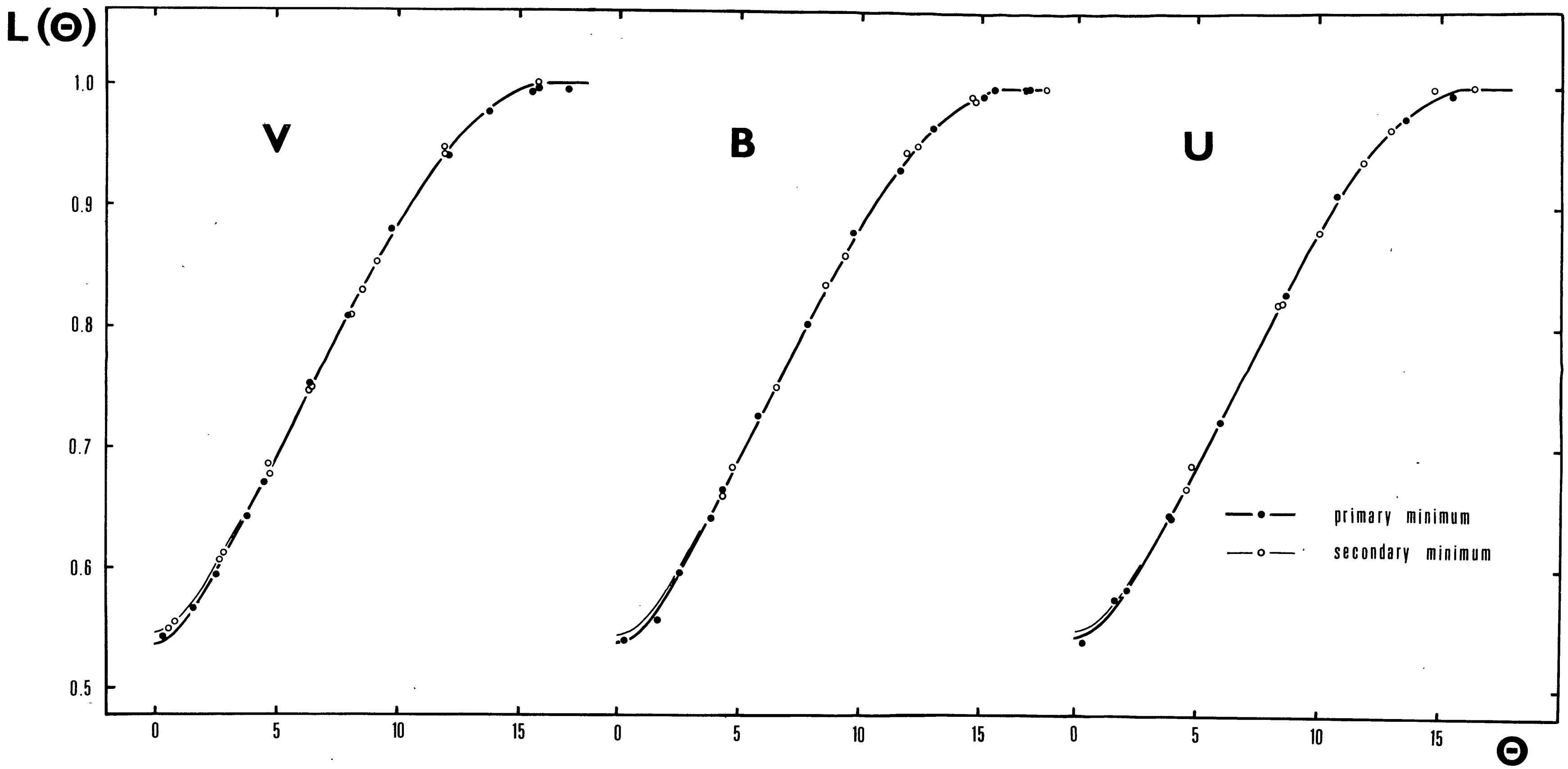

Fig. 3. The solution of the light curve.

McNamara's $(B—V)_0$ and M_v for MY Cyg are overestimated in the opposite case they would lead to unreliably late spectral types. On the other hand we may conclude from it again that the effective temperature of MY Cyg corresponds much better to the later spectral type F2 than to A7 or A5 derived from the K line and hydrogen lines. Our direct photometry of MY Cyg in the *UBV* system also supports this conclusion.

Table 8. Observations in *V* made at Skalnaté Pleso Observatory

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
243 8650			.5150	0.097	.1719
.4409	0.117	.1534	.5161	0.093	.1722
.4422	0.114	.1537	.5172	0.094	.1724
.4433	0.115	.1540	.5185	0.096	.1728
.4445	0.120	.1543	.5196	0.097	.1730
.4458	0.118	.1546	.5209	0.095	.1734
.4471	0..117	.1549	.5221	0.104	.1737
.4479	0.113	.1551	.5233	0.111	.1740
.4487	0.113	.1553	.5245	0.110	.1743
.4494	0.113	.1555	.5259	0.117	.1746
.4501	0.108	.1557	.5310	0.111	.1759
.4560	0.109	.1572	.5321	0.101	.1762
.4576	0.101	.1576	.5332	0.115	.1765
.4590	0.102	.1579	.5342	0.100	.1767
.4603	0.091	.1582	.5353	0.098	.1770
.4617	0.100	.1586	.5367	0.100	.1773
.4628	0.106	.1589	.5377	0.101	.1776
.4638	0.096	.1591	.5391	0.106	.1779
.4652	0.102	.1595	.5403	0.113	.1782
.4667	0.107	.1598	.5416	0.104	.1785
.4680	0.108	.1602	.5429	0.112	.1789
.4693	0.120	.1605			
.4742	0.108	.1617	243 8652		
.4755	0.108	.1620	.3484	0.108	.6296
.4770	0.112	.1624	.3496	0.111	.6299
.4781	0.109	.1627	.3510	0.119	.6303
.4795	0.111	.1630	.3523	0.123	.6306
.4805	0.131	.1633	.3538	0.122	.6310
.4818	0.118	.1636	.3551	0.124	.6313
.4830	0.126	.1639	.3566	0.123	.6317
.4848	0.110	.1643	.3578	0.123	.6320
.4864	0.128	.1647	.3592	0.120	.6323
.4874	0.129	.1650	.3624	0.128	.6331
.4885	0.133	.1653	.3639	0.121	.6335
.4932	0.118	.1664	.3978	0.108	.6420
.4949	0.124	.1669	.3932	0.110	.6423
.4965	0.135	.1673	.4006	0.110	.6427
.4978	0.114	.1676	.4020	0.108	.6430
.4991	0.122	.1679	.4033	0.132	.6433
.5006	0.125	.1683	.4049	0.120	.6437
.5020	0.112	.1686	.4063	0.123	.6441
.5034	0.132	.1690	.4077	0.127	.6444
.5048	0.114	.1693	.4088	0.126	.6447
.5062	0.112	.1697	.4101	0.135	.6450
.5078	0.119	.1701	.4115	0.111	.6454
.5090	0.122	.1704	.4163	0.110	.6466
.5103	0.125	.1707	.4175	0.131	.6469

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4193	0.104	.6473	.4502	0.096	.1544
.4220	0.101	.6480	.4517	0.107	.1548
.4236	0.097	.6484	.4533	0.108	.1552
.4247	0.090	.6487	.4548	0.116	.1556
.4259	0.110	.6490	.4564	0.100	.1560
.4271	0.122	.6492	.4579	0.100	.1563
.4284	0.130	.6496	.4644	0.105	.1580
.4299	0.130	.6500	.4661	0.104	.1584
.4313	0.129	.6503	.4681	0.107	.1589
.4328	0.133	.6507	.4700	0.106	.1594
.4340	0.115	.6510	.4718	0.103	.1598
.4353	0.125	.6513	.4736	0.104	.1603
.4368	0.105	.6517	.4757	0.101	.1608
.4381	0.128	.6520	.4774	0.111	.1612
			.4791	0.113	.1616
243 8654			.4805	0.112	.1620
.3416	0.134	.1273	.4865	0.101	.1635
.3425	0.130	.1275	.4880	0.101	.1638
.3436	0.125	.1278	.4896	0.111	.1642
.3450	0.125	.1281	.4912	0.111	.1646
.3465	0.133	.1285	.4927	0.116	.1650
.3478	0.134	.1288	.4944	0.113	.1654
.3492	0.136	.1292	.4965	0.118	.1660
.3504	0.130	.1295	.4986	0.126	.1665
.3515	0.126	.1298	.4998	0.127	.1668
.3528	0.134	.1301	.5004	0.111	.1669
.3595	0.113	.1318	.5084	0.116	.1689
.3611	0.118	.1322	.5102	0.115	.1694
.3628	0.095	.1326	.5120	0.115	.1698
.3643	0.129	.1330	.5133	0.111	.1702
.3657	0.123	.1333	.5147	0.115	.1705
.3673	0.107	.1337	.5162	0.107	.1709
.3688	0.121	.1341	.5177	0.107	.1713
.3706	0.126	.1345	.5191	0.123	.1716
.3723	0.129	.1350	.5209	0.101	.1721
.3743	0.121	.1355	.5227	0.106	.1725
.3812	0.133	.1372			
.3836	0.109	.1378	243 8665		
.3852	0.113	.1382	.3564	0.084	.8774
.3867	0.109	.1386	.3576	0.077	.8777
.3884	0.105	.1390	.3591	0.074	.8781
.3902	0.121	.1394	.3605	0.054	.8785
.3920	0.114	.1399	.3618	0.057	.8788
.3938	0.099	.1403	.3631	0.062	.8791
.3955	0.104	.1408	.3643	0.055	.8794
.3968	0.112	.1411	.3652	0.055	.8796
.4007	0.096	.1421	.3783	0.103	.8829
.4017	0.098	.1423	.3793	0.096	.8831
.4026	0.100	.1425	.3806	0.110	.8835
.4035	0.102	.1428	.3816	0.107	.8837
.4046	0.104	.1430	.3827	0.102	.8840
.4055	0.106	.1433	.3840	0.090	.8843
.4066	0.106	.1435	.3849	0.100	.8845
.4077	0.112	.1438	.3865	0.116	.8849
.4087	0.112	.1440	.3874	0.095	.8852
.4098	0.112	.1443	.3885	0.095	.8854
.4450	0.105	.1531	.3896	0.099	.8857
.4463	0.115	.1534	.3951	0.071	.8871
.4465	0.115	.1535	.3968	0.069	.8875
.4487	0.095	.1540	.3984	0.078	.8879

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.3999	0.066	.8883	.4422	0.129	.6479
.4003	0.069	.8884	.4435	0.126	.6482
.4025	0.102	.8889	.4449	0.130	.6486
.4046	0.088	.8895	.4503	0.118	.6599
.4066	0.093	.8900	.4516	0.111	.6602
.4080	0.081	.8903	.4556	0.100	.6612
.4093	0.090	.8906	.4568	0.097	.6615
.4104	0.092	.8909	.4581	0.099	.6619
.4121	0.087	.8913	.4596	0.087	.6622
.4170	0.103	.8926	.4609	0.126	.6625
.4194	0.103	.8932	.4624	0.106	.6629
.4207	0.104	.8935	.4636	0.113	.6632
.4217	0.104	.8937	.4646	0.109	.6635
.4232	0.110	.8941	.4657	0.101	.6637
.4246	0.114	.8945	.4666	0.100	.6640
.4258	0.106	.8948	.4734	0.100	.6657
.4273	0.108	.8951	.4748	0.095	.6660
.4286	0.109	.8955	.4759	0.106	.6663
.4297	0.115	.8957	.4773	0.111	.6666
.4308	0.114	.8960	.4794	0.105	.6672
.4321	0.112	.8963	.4814	0.103	.6677
.4713	0.104	.9061	.4822	0.115	.6679
.4728	0.109	.9065	.4832	0.120	.6681
.4744	0.107	.9069	.4842	0.114	.6684
.4757	0.104	.9072	.4865	0.119	.6689
.4772	0.106	.9076	.4877	0.124	.6692
.4787	0.116	.9080	.4943	0.104	.6709
.4801	0.119	.9083	.4952	0.101	.6711
.4815	0.109	.9087	.4962	0.097	.6714
.4830	0.115	.9090	.4974	0.110	.6717
.4844	0.108	.9094	.4987	0.109	.6720
.4898	0.113	.9107	.5002	0.097	.6724
.4914	0.106	.9111	.5015	0.109	.6727
.4929	0.116	.9115	.5030	0.104	.6731
.4939	0.117	.9118	.5040	0.101	.6733
.4959	0.104	.9123	.5051	0.094	.6736
.4976	0.114	.9127	.5061	0.097	.6738
.4991	0.105	.9131			
.5009	0.114	.9135	243 8675		
.5022	0.109	.9138	.4069	0.117	.3868
.5036	0.121	.9142	.4081	0.118	.3871
.5091	0.143	.9156	.4091	0.106	.3874
.5105	0.138	.9159	.4102	0.090	.3876
.5119	0.136	.9163	.4113	0.107	.3879
.5135	0.128	.9167	.4123	0.105	.3881
.5147	0.132	.9170	.4134	0.101	.3884
.5162	0.126	.9173	.4145	0.100	.3887
.5174	0.122	.9176	.4155	0.096	.3889
			.4166	0.098	.3892
243 8668			.4177	0.099	.3895
.4319	0.144	.6453	.4187	0.117	.3897
.4327	0.144	.6455	.4197	0.114	.3900
.4337	0.141	.6458	.4242	0.123	.3911
.4346	0.136	.6460	.4254	0.126	.3914
.4356	0.141	.6462	.4265	0.119	.3917
.4365	0.135	.6465	.4276	0.122	.3920
.4374	0.136	.6467	.4286	0.123	.3922
.4385	0.130	.6470	.4298	0.131	.3925
.4397	0.132	.6473	.4309	0.137	.3928
.4409	0.130	.6476	.4321	0.156	.3931

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.4332	0.155	.3934	.3793	0.119	.8728
.4343	0.146	.3936	.3800	0.113	.8730
.4354	0.149	.3939	.3810	0.128	.8732
.4363	0.171	.3941	.3819	0.111	.8734
.4408	0.099	.3953	.3843	0.116	.8740
.4421	0.091	.3956	.3853	0.107	.8743
.4434	0.096	.3959	.3913	0.102	.8758
.4445	0.100	.3962	.3923	0.122	.8760
.4456	0.107	.3965			
.4470	0.106	.3968	243 8698		
.4485	0.096	.3972	.3670	0.093	.1194
.4496	0.108	.3975	.3678	0.098	.1196
.4508	0.107	.3978	.3686	0.099	.1198
.4520	0.104	.3981	.3694	0.095	.1200
.4531	0.104	.3983	.3703	0.098	.1202
.4540	0.095	.3986	.3711	0.098	.1204
.4551	0.095	.3988	.3719	0.097	.1206
.4561	0.101	.3991	.3727	0.094	.1210
.4623	0.127	.4006	.3736	0.101	.1210
.4635	0.130	.4009	.3744	0.103	.1212
.4646	0.127	.4012	.3776	0.105	.1220
.4660	0.116	.4016	.3785	0.108	.1223
.4669	0.120	.4018	.3793	0.104	.1225
.4680	0.120	.4021	.3802	0.095	.1227
.4691	0.116	.4023	.3813	0.099	.1230
.4702	0.126	.4026	.3824	0.103	.1232
.4717	0.124	.4030	.3833	0.104	.1235
.4731	0.119	.4033	.3841	0.104	.1237
.4742	0.112	.4036	.3851	0.107	.1239
.4751	0.108	.4038	.3860	0.102	.1242
.4767	0.115	.4042	.3868	0.100	.1243
.4783	0.123	.4046	.3897	0.110	.1251
.4794	0.121	.4049	.3906	0.099	.1253
.4861	0.103	.4066	.3916	0.112	.1255
.4874	0.108	.4069	.3925	0.101	.1258
.4887	0.101	.4072	.3931	0.103	.1259
			.3944	0.093	.1262
243 8697			.3952	0.092	.1264
.3492	0.114	.8653	.3962	0.105	.1267
.3502	0.124	.8655	.3970	0.096	.1269
.3512	0.113	.8658	.3979	0.110	.1271
.3522	0.113	.8660	.4016	0.102	.1280
.3544	0.110	.8666	.4025	0.101	.1283
.3552	0.103	.8668	.4036	0.103	.1285
.3563	0.111	.8670	.4045	0.109	.1288
.3585	0.114	.8676	.4055	0.116	.1290
.3619	0.118	.8684	.4965	0.090	.1293
.3628	0.112	.8687	.4075	0.094	.1295
.3637	0.111	.8689	.4083	0.095	.1297
.3648	0.106	.8692	.4090	0.101	.1299
.3658	0.101	.8694	.4100	0.110	.1301
.3669	0.110	.8697	.4136	0.106	.1310
.3681	0.122	.8700	.4144	0.103	.1312
.3693	0.106	.8703	.4152	0.103	.1314
.3703	0.126	.8705	.4159	0.095	.1316
.3714	0.129	.8708	.4167	0.104	.1318
.3725	0.127	.8711	.4175	0.103	.1320
.3760	0.109	.8720	.4185	0.088	.1323
.3770	0.127	.8722	.4190	0.093	.1324
.3785	0.139	.8726	.4231	0.099	.1334

Table 8 — continued

J.D.$_{\text{hel.}}$	Δm	Phase	J.D.$_{\text{hel.}}$	Δm	Phase
.4238	0.104	.1336	.3254	−0.476	.4962
.4246	0.096	.1338	.3261	−0.484	.4964
.4253	0.105	.1339	.3267	−0.434	.4965
			.3274	−0.445	.4967
243 9048			.3281	−0.441	.4969
.2609	−0.121	.4796	.3290	−0.448	.4971
.2618	−0.122	.4798	.3298	−0.447	.4973
.2627	−0.125	.4800	.3305	−0.463	.4975
.2636	−0.129	.4803	.3337	−0.526	.4983
.2647	−0.141	.4805	.3345	−0.534	.4985
.2655	−0.146	.4807	.3352	−0.527	.4986
.2666	−0.149	.4810	.3359	−0.536	.4988
.2674	−0.154	.4812	.3367	−0.491	.4990
.2681	−0.152	.4814	.3374	−0.488	.4992
.2688	−0.154	.4815	.3381	−0.501	.4994
.2722	−0.174	.4829	.3389	−0.506	.4996
.2729	−0.171	.4831	.3396	−0.515	.4997
.2736	−0.192	.4832	.3403	−0.510	.4999
.2742	−0.191	.4834	.3410	−0.508	.5001
.2749	−0.185	.4836	.3417	−0.518	.5002
.2887	−0.255	.4866	.3449	−0.526	.5005
.2885	−0.260	.4870	.3457	−0.532	.5007
.2892	−0.263	.4871	.3476	−0.533	.5012
.2899	−0.270	.4873	.3485	−0.535	.5014
.2907	−0.276	.4875	.3492	−0.538	.5016
.2914	−0.276	.4877	.3500	−0.538	.5018
.2922	−0.287	.4879	.3511	−0.537	.5021
.2928	−0.281	.4880	.3520	−0.550	.5023
.2936	−0.277	.4882	.3528	−0.542	.5025
.2943	−0.295	.4884	.3537	−0.549	.5027
.2949	−0.301	.4886	.3545	−0.555	.5029
.2981	−0.313	.4894	.3552	−0.555	.5031
.2987	−0.317	.4895	.3577	−0.554	.5037
.2994	−0.321	.4897	.3585	−0.555	.5039
.3000	−0.318	.4898	.3593	−0.571	.5041
.3018	−0.335	.4903	.3612	−0.568	.5046
.3026	−0.335	.4905	.3620	−0.551	.5048
.3032	−0.337	.4906	.3628	−0.528	.5050
.3040	−0.343	.4908	.3636	−0.547	.5052
.3047	−0.345	.4910	.3643	−0.527	.5054
.3054	−0.352	.4912	.3651	−0.533	.5056
.3062	−0.352	.4914	.3684	−0.521	.5064
.3069	−0.354	.4916	.3694	−0.491	.5067
.3075	−0.363	.4917	.3702	−0.484	.5069
.3108	−0.384	.4925	.3710	−0.464	.5071
.3115	−0.383	.4927	.3717	−0.465	.5072
.3122	−0.384	.4929	.3725	−0.474	.5074
.3129	−0.387	.4931	.3734	−0.474	.5077
.3135	−0.389	.4932	.3743	−0.483	.5079
.3141	−0.393	.4934	.3754	−0.504	.5082
.3148	−0.396	.4935	.3765	−0.484	.5084
.3154	−0.403	.4937	.3798	−0.491	.5093
.3160	−0.406	.4938	.3808	−0.462	.5095
.3166	−0.403	.4940	.3817	−0.465	.5097
.3173	−0.415	.4942	.3828	−0.431	.5100
.3222	−0.473	.4954	.3838	−0.431	.5103
.3228	−0.459	.4955	.3849	−0.418	.5105
.3234	−0.451	.4957	.3863	−0.431	.5109
.3241	−0.463	.4959	.3874	−0.378	.5112
.3248	−0.466	.4960	.3883	−0.378	.5114

Table 8 — continued

J.D.$_{\text{hel.}}$	Δm	Phase	J.D.$_{\text{hel.}}$	Δm	Phase
.3891	−0.389	.5116	.2842	−0.153	.4828
.3900	−0.383	.5118	.2854	−0.172	.4831
.3909	−0.377	.5120	.2866	−0.178	.4834
.3914	−0.380	.5122	.2873	−0.179	.4836
.3922	−0.357	.5124	.2884	−0.190	.4839
.3956	−0.354	.5132	.2912	−0.198	.4846
.3964	−0.329	.5134	.2955	−0.207	.4856
.3971	−0.337	.5136	.2963	−0.224	.4858
.3979	−0.320	.5138	.2969	−0.217	.4860
.3988	−0.313	.5140	.2976	−0.229	.4861
.3997	−0.311	.5142	.2983	−0.235	.4863
.4005	−0.309	.5144	.2989	−0.233	.4865
.4012	−0.313	.5146	.2996	−0.246	.4866
.4019	−0.315	.5148	.3004	−0.246	.4868
			.3011	−0.247	.4870
243 9051			.3018	−0.253	.4872
.2734	0.118	.2317	.3025	−0.252	.4874
.2745	0.116	.2320	.3034	−0.265	.4876
.2754	0.112	.2322	.3065	−0.264	.4884
.2763	0.115	.2324	.3073	−0.280	.4886
.2775	0.109	.2327	.3080	−0.287	.4887
.2784	0.115	.2330	.3087	−0.290	.4889
.2795	0.110	.2332	.3094	−0.292	.4891
.2805	0.111	.2335	.3100	−0.294	.4892
.2816	0.112	.2338	.3111	−0.294	.4895
.2826	0.107	.2340	.3119	−0.294	.4897
.2866	0.139	.2350	.3128	−0.305	.4899
.2878	0.124	.2353	.3135	−0.316	.4901
.2889	0.126	.2356	.3142	−0.321	.4903
.2901	0.134	.2359	.3149	−0.314	.4905
.2913	0.137	.2362	.3190	−0.359	.4915
.2926	0.121	.2365	.3197	−0.349	.4917
.2939	0.144	.2368	.3205	−0.352	.4919
.2950	0.116	.2371	.3212	−0.357	.4920
.2962	0.112	.2374	.3219	−0.370	.4922
.2973	0.120	.2377	.3226	−0.377	.4924
.3024	0.113	.2390	.3233	−0.381	.4926
.3036	0.114	.2393	.3241	−0.387	.4928
.3142	0.117	.2419	.3248	−0.394	.4929
3152	0.114	.2422	.3256	−0.397	.4931
.3160	0.113	.2424	.3262	−0.400	.4933
.3168	0.113	.2426	.3268	−0.400	.4934
.3175	0.110	.2427	.3276	−0.405	.4936
.3182	0.111	.2429	.3283	−0.407	.4938
.3213	0.121	.2437	.3311	−0.426	.4945
.3224	0.120	.2440	.3323	−0.420	.4948
.3236	0.116	.2443	.3332	−0.417	.4950
.3246	0.122	.2445	.3340	−0.430	.4952
.3267	0.120	.2450	.3347	−0.427	.4954
.3278	0.119	.2453	.3353	−0.416	.4956
.3288	0.112	.2456	.3360	−0.419	.4957
.3300	0.120	.2459	.3366	−0.418	.4959
.3310	0.118	.2461	.3374	−0.464	.4961
.3320	0.119	.2464	.3382	−0.448	.4963
			.3389	−0.452	.4965
243 9056			.3398	−0.434	.4967
.2801	−0.132	.4817	.3457	−0.494	.4982
.2813	−0.148	.4821	.3467	−0.496	.4984
.2822	−0.143	.4823	.3475	−0.493	.4986
.2832	−0.148	.4826	.3482	−0.503	.4988

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3489	−0.505	.4990	.4133	−0.303	.5150
.3496	−0.513	.4991	.4143	−0.289	.5153
.3507	−0.523	.4994	.4150	−0.287	.5155
.3516	−0.519	.4996	.4157	−0.291	.5156
.3522	−0.526	.4998	.4162	−0.277	.5158
.3530	−0.528	.5000	.4172	−0.274	.5160
.3538	−0.530	.5002	.4179	−0.276	.5162
.3546	−0.535	.5004	.4186	−0.273	.5164
.3576	−0.541	.5011	.4218	−0.247	.5172
.3583	−0.536	.5013	.4228	−0.248	.5174
.3594	−0.542	.5016	.4240	−0.244	.5177
.3604	−0.554	.5018	.4252	−0.234	.5180
.3612	−0.547	.5020	.4264	−0.224	.5183
.3621	−0.554	.5023	.4275	−0.225	.5186
.3629	−0.555	.5025	.4287	−0.222	.5189
.3636	−0.545	.5026	.4298	−0.220	.5192
.3642	−0.552	.5028	.4305	−0.221	.5193
.3650	−0.555	.5030	.4314	−0.212	.5196
.3657	−0.552	.5032	.4322	−0.213	.5198
.3685	−0.513	.5039	.4329	−0.196	.5199
.3692	−0.518	.5040	.4336	−0.206	.5201
.3699	−0.521	.5042	.4368	−0.185	.5209
.3707	−0.522	.5044	.4375	−0.181	.5211
.3715	−0.532	.5046	.4383	−0.164	.5213
.3726	−0.532	.5049	.4392	−0.175	.5215
.3735	−0.532	.5051	.4400	−0.170	.5217
.3741	−0.539	.5052	.4408	−0.168	.5217
.3747	−0.520	.5054	.4415	−0.166	.5221
.3756	−0.519	.5056	.4422	−0.161	.5223
.3765	−0.520	.5058	.4430	−0.167	.5225
.3772	−0.518	.5060	.4439	−0.165	.5227
.3816	−0.475	.5071	.4447	−0.169	.5229
.3827	−0.472	.5074	.4456	−0.164	.5231
.3835	−0.474	.5076			
.3843	−0.460	.5078	243 9268		
.3850	−0.463	.5080	.4359	0.081	.4520
.3859	−0.458	.5082	.4370	0.109	.4523
.3869	−0.442	.5084	.4380	0.121	.4526
.3879	−0.442	.5087	.4389	0.123	.4528
.3884	−0.445	.5088	.4401	0.100	.4531
.3892	−0.447	.5090	.4412	0.104	.4534
.3899	−0.437	.5092	.4424	0.117	.4537
.3909	−0.435	.5094	.4435	0.105	.4539
.3943	−0.401	.5103	.4443	0.091	.4541
.3952	−0.408	.5105	.4453	0.118	.4544
.3961	−0.384	.5107	.4462	0.131	.4546
.3969	−0.388	.5109	.4473	0.133	.4549
.3976	−0.377	.5111	.4482	0.118	.4551
.3984	−0.377	.5113	.4492	0.104	.4554
.3992	−0.377	.5115	.4540	0.086	.4566
.3999	−0.373	.5117	.4552	0.072	.4569
.4006	−0.366	.5119	.4565	0.081	.4572
.4019	−0.366	.5122	.4577	0.072	.4575
.4026	−0.363	.5124	.4591	0.064	.4587
.4034	−0.364	.5126	.4604	0.076	.4582
.4044	−0.352	.5128	.4619	0.076	.4585
.4091	−0.344	.5140	.4634	0.077	.4589
.4104	−0.342	.5143	.4682	0.104	.4601
.4115	−0.305	.5146	.4693	0.104	.4604
.4125	−0.291	.5148	.4707	0.104	.4607

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4719	0.104	.4610	.3246	−0.285	.0140
.4728	0.081	.4612	.3253	−0.264	.0141
.4738	0.080	.4615	.3262	−0.270	.0144
.4748	0.081	.4617	.3272	−0.252	.0146
.4758	0.071	.4620	.3280	−0.256	.0148
.4767	0.058	.4622	.3287	−0.254	.0150
.4778	0.056	.4625	.3323	−0.225	.0159
.4794	0.062	.4629	.3330	−0.230	.0161
.4809	0.048	.4633	.3337	−0.227	.0162
.4820	0.049	.4635	.3346	−0.225	.0165
.4836	0.062	.4639	.3352	−0.207	.0166
.4850	0.063	.4643	.3360	−0.207	.0168
.4901	0.076	.4656	.3367	−0.205	.0170
.4914	0.076	.4659	.3375	−0.207	.0172
.4925	0.081	.4662	.3384	−0.213	.0174
.4937	0.084	.4665	.3396	−0.194	.0177
.4949	0.076	.4668	.3427	−0.176	.0185
.4961	0.067	.4671	.3437	−0.176	.0187
.4974	0.021	.4674	.3442	−0.173	.0189
.4984	0.025	.4676	.3450	−0.165	.0191
.4997	0.033	.4680	.3457	−0.165	.0192
.5010	0.040	.4682	.3465	−0.161	.0194
.5020	0.048	.4685	.3472	−0.149	.0196
.5031	0.070	.4688	.3481	−0.144	.0198
.5043	0.063	.4691	.3517	−0.133	.0207
.5054	0.065	.4694	.3524	−0.125	.0209
.5156	0.072	.4719	.3532	−0.124	.0211
.5168	0.049	.4722	.3567	−0.112	.0220
.5177	0.037	.4725	.3571	−0.108	.0221
.5188	0.040	.4727	.3579	−0.101	.0223
.5197	0.037	.4730	.3586	−0.097	.0225
.5207	0.044	.4732	.3594	−0.119	.0227
.5215	0.035	.4734	.3602	−0.092	.0229
.5224	0.031	.4736	.3610	−0.085	.0231
.5276	0.027	.4749	.3618	−0.090	.0233
.5286	0.027	.4752	.3626	−0.079	.0235
.5296	0.036	.4754	.3634	−0.086	.0237
.5306	0.041	.4757	.3663	−0.079	.0224
.5319	0.041	.4760	.3671	−0.077	.0246
.5370	0.024	.4773	.3678	−0.073	.0248
.5383	0.041	.4776	.3686	−0.069	.0250
.5394	0.042	.4779	.3693	−0.060	.0251
.5410	0.045	.4783	.3700	−0.060	.0253
.5424	0.068	.4786	.3708	−0.056	.0255
.5436	0.054	.4789	.3715	−0.053	.0257
.5446	0.068	.4792	.3723	−0.045	.0259
.5455	0.067	.4794	.3733	−0.052	.0261
.5466	0.066	.4797	.3767	−0.031	.0270
.5477	0.069	.4800	.3775	−0.025	.0272
.5489	0.075	.4902	.3783	−0.020	.0274
.5500	0.073	.4905	.3791	−0.016	.0276
.5512	0.092	.4908	.3798	−0.015	.0278
.5524	0.102	.4911	.3806	−0.015	.0280
			.3813	−0.004	.0281
243 9763			.3821	−0.005	.0283
.3202	−0.295	.0129	.3828	0.002	.0285
.3210	−0.290	.0131	.3876	−0.001	.0297
.3223	−0.300	.0134	.3884	0.008	.0299
.3232	−0.283	.0136	.3891	0.006	.0301
.3238	−0.280	.0138	.3899	0.010	.0303

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3906	0.018	.0304	.2727	−0.489	.9945
.3914	0.020	.0307	.2735	−0.472	.9947
.3921	0.010	.0308	.2743	−0.485	.9949
.3928	0.026	.0310	.2777	−0.520	.9958
.3936	0.020	.0312	.2786	−0.528	.9960
.3943	0.030	.0314	.2793	−0.524	.9962
.3973	0.029	.0321	.2800	−0.527	.9964
.3980	0.040	.0323	.2808	−0.531	.9966
.3987	0.038	.0325	.2815	−0.536	.9967
.3996	0.038	.0327	.2823	−0.534	.9969
.4063	0.056	.0344	.2830	−0.548	.9971
.4070	0.065	.0345	.2838	−0.548	.9973
.4077	0.055	.0347	.2844	−0.538	.9975
.4085	0.064	.0349	.2852	−0.538	.9977
.4117	0.072	.0357	.2891	−0.551	.9986
.4125	0.069	.0359	.2901	−0.569	.9989
.4133	0.068	.0361	.2908	−0.556	.9991
.4141	0.073	.0363	.2919	−0.560	.9993
.4149	0.064	.0365	.2927	−0.569	.9995
.4156	0.070	.0367	.2935	−0.560	.9997
.4163	0.081	.0369	.2942	−0.560	.9999
.4171	0.081	.0371	.2950	−0.547	.0001
.4198	0.087	.0377	.2957	−0.548	.0003
.4205	0.090	.0379	.2964	−0.548	.0005
.4235	0.087	.0387	.2999	−0.546	.0013
.4242	0.090	.0388	.3006	−0.550	.0015
.4249	0.097	.0390	.3014	−0.554	.0017
.4257	0.089	.0392	.3021	−0.550	.0019
.4265	0.100	.0394	.3029	−0.550	.0021
.4272	0.094	.0396	.3036	−0.537	.0023
.4280	0.094	.0398	.3043	−0.537	.0024
.4287	0.091	.0400	.3052	−0.524	.0027
.4295	0.104	.0402	.3059	−0.520	.0028
.4302	0.111	.0403	.3067	−0.520	.0030
.4357	0.109	.0417	.3101	−0.511	.0039
.4364	0.108	.0419	.3109	−0.503	.0041
.4372	0.120	.0421	.3116	−0.494	.0043
.4380	0.112	.0423	.3124	−0.494	.0045
.4387	0.112	.0425	.3131	−0.503	.0046
.4395	0.117	.0427	.3139	−0.490	.0048
.4402	0.113	.0428	.3146	−0.490	.0050
.4442	0.122	.0438	.3154	−0.490	.0052
.4474	0.128	.0446	.3161	−0.486	.0054
.4480	0.124	.0448	.3168	−0.478	.0056
			.3202	−0.468	.0064
243 9783			.3209	−0.456	.0066
.2496	−0.321	.9888	.3216	−0.456	.0067
.2504	−0.328	.9890	.3223	−0.452	.0069
.2512	−0.328	.9892	.3231	−0.456	.0071
.2520	−0.342	.9894	.3239	−0.447	.0073
.2527	−0.345	.9895	.3246	−0.440	.0075
.2535	−0.368	.9897	.3254	−0.432	.0077
.2542	−0.372	.9899	.3261	−0.432	.0079
.2674	−0.452	.9932	.3269	−0.424	.0081
.2682	−0.452	.9934	.3301	−0.413	.0089
.2689	−0.464	.9936	.3308	−0.389	.0090
.2696	−0.464	.9938	.3317	−0.385	.0093
.2705	−0.464	.9940	.3324	−0.381	.0094
.2714	−0.460	.9942	.3331	−0.374	.0096
.2720	−0.460	.9944	.3338	−0.385	.0098

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3871	−0.374	.0100	.3475	0.114	.2846
.3353	−0.366	.0102	.3485	0.104	.2849
.3361	−0.363	.0104	.3497	0.101	.2852
.3368	−0.366	.0105	.3507	0.101	.2854
.3407	−0.330	.0115	.3519	0.101	.2857
.3415	−0.326	.0117	.3530	0.128	.2860
.3422	−0.322	.0119	.3598	0.097	.2877
.3430	−0.311	0.0121	.3608	0.088	.2879
.3437	−0.311	.0123	.3619	0.074	.2882
.3444	−0.308	.0124	.3630	0.071	.2885
.3452	−0.301	.0126	.3630	0.071	.2885
.3459	−0.304	.0128	.3643	0.077	.2888
.3466	−0.294	.0130	.3654	0.065	.2891
.3473	−0.290	.0132	.3665	0.079	.2894
.3510	−0.258	.0141	.3730	0.090	.2910
.3517	−0.265	0.143	.3745	0.084	.2913
.3525	−0.258	.0145	.3756	0.090	.2916
.3532	−0.261	.0146	.3767	0.093	.2919
.3540	−0.261	.0148	.3778	0.109	.2922
.3547	−0.248	.0150	.3789	0.096	.2925
.3554	−0.241	.0152	.3799	0.093	.2927
.3562	−0.241	.0154	.3810	0.113	.2930
.3570	−0.248	.0156	.3822	0.116	.2933
.3578	−0.229	.0158	.3833	0.105	.2936
.3610	−0.203	.0166	.3946	0.155	.2964
.3617	−0.206	.0168	.3957	0.142	.2967
.3624	−0.203	.0169	.3968	0.136	.2969
.3632	−0.199	.0171	.3978	0.128	.2972
.3639	−0.180	.0173	.3991	0.141	.2975
.3646	−0.196	.0175	.4002	0.141	.2978
.3654	−0.193	.0177	.4012	0.130	.2980
.3661	−0.196	.0179	.4023	0.135	.2983
.3668	−0.205	.0180	.4034	0.127	.2986
.3676	−0.205	.0182	.4045	0.140	.2989
.3710	−0.112	.0191	.4172	0.150	.3020
.3717	−0.143	.0193	.4182	0.158	.3023
			.4193	0.123	.3025
244 0489			.4204	0.115	.3028
.2973	0.122	.2721	.4214	0.124	.3031
.2983	0.137	.2723	.4214	0.124	.3031
.2994	0.137	.2726	.4227	0.106	.3034
.3006	0.141	.2729	.4236	0.093	.3036
.3017	0.151	.2732	.4248	0.073	.3039
.3028	0.138	.2735	.4259	0.097	.3042
.3039	0.153	.2737	.4269	0.058	.3044
.3152	0.133	.2741	.4370	0.136	.3070
.3163	0.124	.2768	.4381	0.150	.3072
.3174	0.150	.2771	.4392	0.136	.3075
.3184	0.140	.2774	.4403	0.130	.3078
.3196	0.130	.2777	.4414	0.149	.3081
.3207	0.116	.2779	.4425	0.131	.3083
.3218	0.147	.2782	.4436	0.137	.3086
.3228	0.147	.2785	.4448	0.128	.3089
.3240	0.137	.2788	.4459	0.116	.3092
.3250	0.139	.2790	.4470	0.107	.3095
.3262	0.168	.2793	.4542	0.090	.3113
.3428	0.116	.2834	.4556	0.109	.3116
.3439	0.117	.2837	.4568	0.125	.3119
.3452	0.125	.2840	.4590	0.134	.3125
.3465	0.114	.2844	.4601	0.122	.3127

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4612	0.135	.3130	.2673	−0.315	.5130
.4626	0.141	.3134	.2684	−0.323	.5133
.4637	0.138	.3136	.2695	−0.330	.5135
.4700	0.128	.3152	.2706	−0.332	.5138
.4714	0.130	.3156	.2716	−0.328	.5141
.4725	0.134	.3158	.2726	−0.302	.5143
.4735	0.135	.3161	.2737	−0.267	.5146
.4746	0.135	.3164	.2796	−0.253	.5161
.4757	0.132	.3166	.2807	−0.243	.5163
.4769	0.145	.3169	.2818	−0.250	.5166
.4780	0.130	.3172	.2829	−0.231	.5168
.4791	0.130	.3175	.2839	−0.227	.5171
.4802	0.139	.3178	.2850	−0.212	.5174
			.2860	−0.211	.5176
244 0493			.2871	−0.205	.5179
.3108	0.105	.2742	.2882	−0.187	.5182
.3119	0.092	.2744	.2893	−0.127	.5185
.3130	0.095	.2747	.3053	−0.130	.5225
.3141	0.102	.2750	.3064	−0.120	.5227
.3152	0.111	.2753	.3075	−0.120	.5230
.3162	0.114	.2755	.3086	−0.102	.5233
.3173	0.111	.2758	.3097	−0.095	.5236
.3184	0.092	.2761	.3107	−0.089	.5238
.3195	0.117	.2763	.3118	−0.105	.5241
.3207	0.141	.2766	.3129	−0.098	.5244
.3218	0.135	.2769	.3140	−0.098	.5246
.3401	0.128	.2815	.3151	−0.083	.5249
.3413	0.131	.2818	.3219	−0.058	.5266
.3424	0.119	.2821	.3229	−0.040	.5269
.3435	0.134	.2823	.3240	−0.055	.5271
.3446	0.119	.2826	.3251	−0.055	.5274
.3457	0.134	.2829	.3262	−0.043	.5277
.3468	0.146	.2832	.3273	−0.037	.5280
.3584	0.123	.2860	.3284	−0.046	.5282
.3595	0.117	.2863	.3295	−0.037	.5285
.3604	0.137	.2865	.3305	−0.025	.5288
.3615	0.125	.2868	.3316	−0.017	.5290
.3626	0.150	.2871	.3327	−0.020	.5293
.3697	0.129	.2889	.3387	0.004	.5308
.3708	0.132	.2891	.3398	−0.002	.5311
.3719	0.138	.2894	.3409	0.024	.5314
.3733	0.135	.2898	.3420	0.021	.5316
.3746	0.150	.2901	.3431	0.024	.5319
.3757	0.138	.2904	.3511	0.055	.5339
.3769	0.132	.2907	.3521	0.047	.5342
.3780	0.138	.2909	.3532	0.061	.5344
.3791	0.147	.2912	.3601	0.070	.5361
.3802	0.132	.2915	.3610	0.083	.5364
.3862	0.132	.2930	.3621	0.067	.5366
.3873	0.108	.2933	.3632	0.080	.5369
.3884	0.147	.2935	.3643	0.080	.5372
.3895	0.120	.2938	.3654	0.091	.5375
.3906	0.132	.2941	.3665	0.090	.5377
.3917	0.117	.2944	.3676	0.088	.5380
			.3686	0.090	.5383
244 0494			.3697	0.090	.5385
.2623	−0.357	.5117	.3829	0.105	.5418
.2640	−0.352	.5122	.3840	0.112	.5421
.2651	−0.340	.5124	.3850	0.110	.5424
.2662	−0.336	.5127	.3860	0.113	.5426

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3871	0.119	.5429	.4012	0.148	.9253
.3882	0.116	.5432	.4023	0.148	.9256
.3892	0.127	.5434	.4032	0.153	.9258
.3904	0.114	.5437	.4048	0.155	.9262
.3915	0.120	.5440	.4063	0.144	.9266
.3926	0.120	.5443	.4284	0.152	.9321
.4081	0.108	.5481	.4293	0.149	.9323
.4092	0.134	.5484	.4304	0.144	.9326
.4107	0.140	.5488	.4313	0.143	.9328
.4118	0.134	.5491	.4323	0.138	.9331
.4130	0.145	.5494	.4333	0.133	.9333
.4141	0.154	.5496	.4344	0.140	.9336
.4158	0.151	.5401	.4354	0.139	.9339
.4169	0.156	.5403	.4363	0.132	.9341
.4180	0.165	.5406	.4373	0.130	.9343
.4256	0.151	.5425	.4385	0.204	.9346
.4267	0.155	.5428	.4564	0.098	.9391
.4277	0.155	.5420	.4573	0.119	.9393
.4288	0.155	.5433	.4584	0.113	.9396
.4299	0.143	.5436	.4593	0.120	.9398
.4310	0.139	.5439	.4604	0.117	.9401
.4322	0.121	.5442	.4613	0.117	.9403
.4332	0.153	.5444	.4624	0.108	.9406
.4351	0.174	.5449	.4634	0.117	.9408
.4362	0.153	.5451	.4643	0.116	.9411
.4373	0.157	.5454	.4654	0.116	.9413
.4392	0.140	.5459			
.4403	0.178	.5462	244 0869		
.4464	0.143	.5477	.3292	0.177	.1570
.4475	0.130	.5480	.3298	0.174	.1572
.4486	0.116	.5482	.3304	0.182	.1573
.4508	0.133	.5488	.3310	0.182	.1575
.4519	0.131	.5491	.3316	0.172	.1576
.4530	0.140	.5493	.3322	0.169	.1578
.4541	0.136	.5496	.3328	0.171	.1579
			.3333	0.176	.1580
244 0844			.3339	0.166	.1582
.2893	0.136	.9051	.3344	0.167	.1583
.2904	0.131	.9054	.3474	0.170	.1616
.2914	0.120	.9057	.3481	0.155	.1617
.2926	0.121	.9060	.3487	0.138	.1619
.2936	0.159	.9062	.3494	0.130	.1621
.2990	0.129	.9076	.3503	0.144	.1623
.2999	0.119	.9078	.3509	0.147	.1624
.3010	0.118	.9081	.3515	0.158	.1626
.3023	0.120	.9084	.3522	0.177	.1628
.3033	0.117	.9086	.3528	0.181	.1629
.3045	0.129	.9089	.3536	0.171	.1631
.3084	0.123	.9099	.3543	0.172	.1633
.3095	0.156	.9102	.3700	0.158	.1672
.3107	0.143	.9105	.3716	0.133	.1676
.3121	0.146	.9108	.3722	0.125	.1678
.3162	0.138	.9119	.3729	0.154	.1679
.3177	0.137	.9122	.3735	0.175	.1681
.3191	0.118	.9126	.3739	0.152	.1682
			.3348	0.159	.1684
244 0868			.3755	0.154	.1686
.3722	0.115	.9181	.3760	0.167	.1687
.3766	0.115	.9192	.3765	0.157	.1688
.3800	0.008	.9200	.3772	0.149	.1690

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3897	0.133	.1721	.2260	0.147	.8660
.3903	0.124	.1723	.2267	0.139	.8662
.3910	0.120	.1724	.2274	0.132	.8664
.3917	0.132	.1726	.2281	0.130	.8666
3923	0.124	.1728	.2302	0.125	.8671
.3930	0.130	.1729	.2309	0.129	.8673
.3937	0.124	.1731	.2316	0.157	.8674
.3944	0.120	.1733	.2323	0.129	.8676
.3950	0.120	.1734	.2330	0.127	.8678
.3958	0.125	.1736	.2337	0.134	.8680
.4086	0.101	.1768	.2344	0.129	.8681
.4094	0.105	.1770	.2351	0.128	.8683
.4102	0.123	.1772	.2358	0.130	.8685
.4111	0.126	.1775	.2365	0.130	.8687
.4119	0.115	.1777	.2392	0.137	.8688
.4129	0.113	.1779	.2379	0.150	.8690
.4143	0.109	.1783	.2386	0.141	.8692
.4162	0.103	.1787	.2392	0.152	.8693
.4173	0.114	.1790	.2420	0.137	.8700
.4185	0.116	.1793	.2427	0.131	.8702
.4190	0.135	.1794	.2434	0.125	.8704
.4199	0.135	.1797	.2441	0.130	.8705
.4580	0.158	.1892	.2448	0.133	.8707
.4584	0.157	.1893	.2455	0.128	.8709
.4591	0.167	.1894	.2462	0.134	.8711
.4597	0.160	.1896	.2469	0.128	.8712
.4604	0.169	.1898	.2476	0.133	.8714
.4613	0.206	.1900	.2483	0.131	.8716
.4621	0.117	.1902	.2490	0.133	.8718
.4628	0.118	.1904	.2511	0.138	.8723
.4636	0.121	.1906	.2521	0.164	.8725
.4642	0.132	.1907	.2529	0.149	.8727
			.2535	0.164	.8729
244 0870			.2542	0.167	.8731
.2748	0.150	.3931	.2549	0.155	.8732
.2754	0.144	.3933	.2557	0.140	.8724
.2761	0.150	.3934	.2566	0.145	.8737
.2803	0.154	.3945	.2572	0.157	.8738
.2827	0.156	.3951	.2579	0.156	.8740
.2833	0.164	.3952	.2587	0.138	.8742
.2934	0.162	.3978	.2594	0.139	.8744
.2948	0.149	.3981	.2622	0.142	.8751
.2953	0.143	.3982	.2629	0.148	.8752
.2960	0.143	.3984	.2636	0.133	.8754
			.2642	0.142	.8756
244 0916			.2649	0.145	.8757
.2135	0.142	.8629	.2656	0.152	.8759
.2142	0.130	.8631	.2663	0.139	.8761
.2149	0.179	.8633	.2670	0.143	.8763
.2156	0.143	.8634	.2678	0.152	.8765
.2163	0.144	.8636	.2685	0.139	.8766
.2140	0.136	.8638	.2692	0.148	.8768
.2177	0.109	.8640	.2699	0.138	.8770
.2185	0.104	.8642	.2706	0.143	.8772
.2192	0.118	.8643	.2713	0.144	.8773
.2198	0.142	.8645	.2719	0.144	.8775
.2232	0.140	.8653			
.2239	0.139	.8655	244 1173		
.2246	0.141	.8657	.3889	0.125	.0735
.2252	0.130	.8658	.3896	0.132	.0737

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3903	0.126	.0738	.4506	0.138	.0889
.3910	0.130	.0740	.4513	0.133	.0891
.3917	0.113	.0742	.4521	0.139	.0893
.3924	0.121	.0744	.4535	0.145	.0896
.3931	0.121	.0745	.4545	0.137	.0899
.3938	0.123	.0747	.4553	0.143	.0901
.3945	0.107	.0749	.4560	0.140	.0902
.3954	0.122	.0751	.4568	0.123	.0904
.3963	0.133	.0753	.4573	0.120	.0906
.3973	0.123	.0756	.4605	0.135	.0914
.4017	0.106	.0767	.4612	0.135	.0915
.4031	0.111	.0779	.4619	0.137	.0917
.4048	0.118	.0773	.4626	0.130	.0919
.4054	0.126	.0776	.4633	0.130	.0921
.4061	0.131	.0778	.4640	0.129	.0922
.4068	0.130	.0780	.4647	0.137	.0924
.4075	0.132	.0781	.4654	0.127	.0926
.4081	0.120	.0783	.4660	0.127	.0927
.4089	0.118	.0785	.4666	0.127	.0929
.4097	0.115	.0787	.4691	0.125	.0935
.4104	0.117	.0789	.4698	0.124	.0937
.4136	0.120	.0797	.4705	0.124	.0939
.4143	0.139	.0798	.4713	0.119	.0941
.4150	0.124	.0800	.4724	0.125	.0943
.4156	0.117	.0802	.4732	0.131	.0945
.4163	0.113	.0803	.4739	0.132	.0947
.4170	0.134	.0805	.4746	0.131	.0949
.4177	0.121	.0807	.4754	0.130	.0951
.4184	0.134	.0809	.4761	0.132	.0953
.4191	0.120	.0810	.4789	0.133	.0960
.4202	0.124	.0813	.4799	0.125	.0962
.4211	0.126	.0815	.4807	0.125	.0964
.4218	0.106	.0817	.4817	0.132	.0967
.4240	0.119	.0823	.4826	0.138	.0969
.4248	0.110	.0825	.4833	0.143	.0971
.4258	0.099	.0827	.4840	0.137	.0972
.4264	0.111	.0829	.4847	0.137	.0974
.4271	0.111	.0830	.4853	0.128	.0976
.4279	0.121	.0832	.4860	0.131	.0977
.4288	0.110	.0835	.4884	0.134	.0983
.4297	0.094	.0837	.4897	0.135	.0987
.4307	0.103	.0839	.4905	0.138	.0989
.4315	0.101	.0841	.4913	0.141	.0991
.4343	0.120	.0848	.4922	0.143	.0993
.4350	0.119	.0850	.4930	0.140	.0995
.4358	0.130	.0852	.4937	0.141	.0997
.4365	0.123	.0854	.4945	0.146	.0999
.4375	0.114	.0856	.4954	0.144	.1001
.4386	0.122	.0859	.4965	0.140	.1004
.4395	0.137	.0861	.4993	0.143	.1011
.4403	0.125	.0863	.5002	0.145	.1013
.4410	0.128	.0865	.5016	0.131	.1016
.4420	0.130	.0867	.5026	0.131	.1019
.4429	0.140	.0870	.5037	0.119	.1022
.4438	0.110	.0872	.5045	0.125	.1024
.4464	0.116	.0878	.5055	0.137	.1026
.4473	0.128	.0881	.5062	0.133	.1028
.4485	0.141	.0884	.5071	0.130	.1030
.4492	0.148	.0885	.5080	0.132	.1032
.4499	0.151	.0887	.5118	0.132	.1042

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.5128	0.135	.1044	.3764	0.113	.3200
.5137	0.128	.1046	.3771	0.094	.3202
.5148	0.127	.1049	.3779	0.122	.3204
.5161	0.131	.1052	.3786	0.129	.3206
.5175	0.128	.1056	.3827	0.132	.3216
.5185	0.130	.1058	.3835	0.129	.3218
.5193	0.129	.1060	.3841	0.119	.3220
.5201	0.137	.1062	.3848	0.148	.3221
.5208	0.131	.1064	.3882	0.127	.3230
.5237	0.152	.1071	.3890	0.135	.3232
.5244	0.151	.1073	.3897	0.135	.3234
.5255	0.130	.1076	.3905	0.121	.3236
.5262	0.137	.1078	.3912	0.115	.3237
.5268	0.132	.1079	.3918	0.116	.3239
.5275	0.143	.1081	.3954	0.092	.3248
			.3960	0.118	.3249
244 1174			.3968	0.115	.3251
.3276	0.091	.3079	.3975	0.085	.3253
.3283	0.116	.3080	.3981	0.100	.3255
.3290	0.092	.3082	.3987	0.112	.3256
.3296	0.072	.3084	.3995	0.123	.3258
.3303	0.077	.3085	.4002	0.121	.3260
.3310	0.071	.3087	.4009	0.096	.3262
.3319	0.111	.3089	.4016	0.103	.3263
.3325	0.116	.3091	.4051	0.099	.3272
.3331	0.125	.3092	.4058	0.122	.3274
.3338	0.126	.3094	.4065	0.119	.3276
.3366	0.112	.3101	.4072	0.083	.3277
.3373	0.084	.3103	.4080	0.095	.3279
.3381	0.098	.3105	.4086	0.086	.3281
.3387	0.113	.3106	.4093	0.102	.3283
.3397	0.118	.3108	.4100	0.120	.3284
.3402	0.116	.3110	.4107	0.118	.3286
.3416	0.071	.3114	.4114	0.099	.3288
.3423	0.071	.3115	.4143	0.100	.3295
.3430	0.101	.3117	.4151	0.092	.3297
.3492	0.081	.3133	.4161	0.088	.3300
.3499	0.112	.3134	.4170	0.118	.3302
.3506	0.109	.3136	.4178	0.090	.3304
.3513	0.118	.3138	.4186	0.081	.3306
.3520	0.096	.3140	.4194	0.080	.3308
.3527	0.108	.3141	.4200	0.088	.3309
.3533	0.136	.3143	.4209	0.064	.3312
.3542	0.123	.3145	.4217	0.068	.3314
.3549	0.121	.3147	.4224	0.086	.3315
.3604	0.095	.3160	.4233	0.066	.3318
.3611	0.142	.3162	.4291	0.058	.3332
.3618	0.138	.3164	.4296	0.003	.3333
.3626	0.139	.3166	.4303	0.069	.3335
.3632	0.149	.3167	.4310	0.067	.3337
.3639	0.153	.3169	.4317	0.051	.3339
.3651	0.143	.3172	.4324	0.086	.3340
.3661	0.125	.3175	.4330	0.102	.3342
.3668	0.133	.3176	.4338	0.110	.3344
.3724	0.139	.3190	.4374	0.106	.3353
.3729	0.138	.3192	.4387	0.114	.3356
.3736	0.161	.3193	.4394	0.109	.3358
.3743	0.132	.3195	.4401	0.110	.3359
.3750	0.142	.3197	.4409	0.117	.3361
.3757	0.147	.3199	.4430	0.100	.3367

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.4440	0.114	.3369	.5326	0.125	.3577
.4447	0.130	.3371	.5333	0.126	.3579
.4456	0.124	.3373	.5370	0.136	.3588
			.5378	0.135	.3590
244 1178			.5385	0.134	.3592
.4770	0.124	.3439	.5393	0.135	.3594
.4778	0.122	.3441	.5400	0.128	.3596
.4785	0.131	.3442	.5408	0.117	.3598
.4818	0.140	.3451	.5415	0.124	.3600
.4829	0.146	.3452	.5422	0.132	.3601
.4832	0.150	.3454	.5430	0.124	.3603
.4840	0.130	.3456	.5438	0.120	.3605
.4848	0.141	.3458	.5463	0.112	.3612
.4857	0.153	.3460	.5471	0.110	.3614
.4870	0.160	.3464	.5482	0.109	.3616
.4877	0.110	.3465	.5492	0.121	.3619
.4886	0.108	.3468	.5499	0.120	.3621
.4893	0.136	.3469	.5506	0.121	.3622
.4921	0.144	.3476	.5514	0.120	.3624
.4931	0.131	.3479	.5522	0.123	.3626
.4941	0.169	.3481	.5529	0.110	.3628
.4951	0.163	.3484	.5537	0.120	.3630
.4959	0.125	.3486	.5562	0.134	.3636
.4966	0.135	.3488	.5572	0.139	.3639
.4973	0.142	.3489	.5579	0.134	.3641
.4984	0.134	.3492	.5587	0.127	.3643
.4991	0.123	.3494	.5596	0.123	.3645
.4998	0.110	.3496	.5603	0.128	.3647
.5007	0.117	.3498	.5612	0.139	.3649
.5038	0.155	.3506	.5625	0.129	.3652
.5045	0.136	.3507	.5633	0.130	.3654
.5053	0.105	.3509	.5642	0.126	.3656
.5061	0.139	.3511	.5671	0.124	.3664
.5063	0.134	.3513	.5679	0.122	.3666
.5074	0.119	.3515	.5686	0.121	.3667
.5083	0.142	.3517	.5693	0.123	.3669
.5089	0.144	.3518	.5701	0.088	.3671
.5097	0.146	.3520	.5709	0.105	.3673
.5112	0.114	.3524	.5726	0.095	.3675
.5119	0.126	.3526	.5726	0.090	.3677
.5127	0.134	.3528	.5735	0.097	.3680
.5156	0.151	.3535	.5743	0.086	.3682
.5165	0.151	.3537	.5778	0.092	.3690
.5174	0.153	.3540	.5786	0.091	.3692
.5182	0.130	.3542	.5793	0.078	.3694
.5191	0.120	.3544	.5801	0.096	.3696
.5198	0.140	.3546	.5811	0.099	.3699
.5203	0.131	.3547	.5818	0.105	.3700
.5210	0.137	.3549	.5827	0.107	.3703
.5218	0.123	.3551	.5827	0.103	.3705
.5226	0.129	.3553	.5846	0.105	.3707
.5254	0.128	.3560	.5854	0.120	.3709
.5263	0.122	.3562	.5861	0.099	.3711
.5270	0.124	.3564	.5891	0.109	.3719
.5278	0.127	.3566	.5899	0.114	.3721
.5286	0.139	.3568	.5907	0.109	.3723
.5293	0.118	.3569	.5914	0.128	.3724
.5301	0.130	.3571	.5924	0.127	.3727
.5308	0.124	.3573	.5937	0.104	.3730
.5316	0.121	.3575	.5946	0.111	.3732

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.5953	0.117	.3734	.4475	0.125	.8346
.5959	0.120	.3736	.4482	0.118	.8347
			.4488	0.121	.8349
244 1184			.4510	0.112	.8354
.3949	0.160	.8214	.4516	0.121	.8356
.3958	0.134	.8217	.4524	0.115	.8358
.3967	0.131	.8219	.4530	0.114	.8359
.3973	0.141	.8220	.4538	0.118	.8361
.3994	0.144	.8225	.4544	0.125	.8363
.4001	0.130	.8227	.4551	0.137	.8365
.4008	0.126	.8229	.4558	0.127	.8366
.4015	0.089	.8231	.4566	0.125	.8368
.4022	0.107	.8232	.4571	0.121	.8370
.4030	0.117	.8234	.4593	0.109	.8375
.4036	0.132	.8236	.4600	0.108	.8377
.4043	0.120	.8238	.4607	0.098	.8379
.4050	0.118	.8329	.4615	0.120	.8381
.4057	0.111	.8241	.4621	0.125	.8382
.4079	0.132	.8247	.4628	0.109	.8384
.4085	0.138	.8248	.4634	0.104	.8385
.4092	0.110	.8250	.4641	0.110	.8387
.4098	0.114	.8251	.4648	0.100	.8389
.4106	0.140	.8253	.4655	0.119	.8391
.4113	0.131	.8255	.4676	0.092	.8396
.4120	0.130	.8257	.4683	0.092	.8398
.4127	0.135	.8259	.4690	0.095	.8399
.4134	0.166	.8260	.4697	0.095	.8401
.4140	0.159	.8262	.4704	0.137	.8403
.4173	0.145	.8270	.4711	0.140	.8405
.4183	0.159	.8273	.4718	0.273	.8406
.4190	0.142	.8274	.4724	0.142	.8408
.4197	0.151	.8276	.4732	0.122	.8410
.4204	0.158	.8278	.4738	0.118	.8411
.4211	0.161	.8280	.4759	0.105	.8416
.4218	0.165	.8281	.4766	0.100	.8418
.4225	0.162	.8283	.4773	0.089	.8420
.4231	0.165	.8285	.4780	0.087	.8422
.4257	0.144	.8291	.4787	0.088	.8423
.4266	0.155	.8293	.4794	0.104	.8425
.4274	0.179	.8295	.4801	0.104	.8427
.4281	0.179	.8298	.4807	0.071	.8428
.4288	0.124	.8299	.4814	0.085	.8430
.4294	0.127	.8300	.4821	0.082	.8432
.4302	0.139	.8302	.4842	0.138	.8437
.4309	0.130	.8304	.4849	0.118	.8439
.4315	0.136	.8306	.4857	0.130	.8441
.4322	0.125	.8307	.4863	0.136	.8442
.4350	0.150	.8314	.4871	0.125	.8444
.4358	0.123	.8316	.4878	0.124	.8446
.4364	0.115	.8318	.4884	0.115	.8448
.4371	0.101	.8320	.4891	0.111	.8449
.4378	0.100	.8322	.4898	0.126	.8451
.4385	0.094	.8323	.4905	0.120	.8453
.4428	0.125	.8334	.4927	0.110	.8458
.4433	0.113	.8335	.4933	0.091	.8460
.4440	0.121	.8337	.4940	0.113	.8462
.4447	0.117	.8339	.4947	0.121	.8463
.4455	0.124	.8341	.4956	0.096	.8466
.4461	0.123	.8342	.4961	0.098	.8467
.4468	0.127	.8344	.4968	0.079	.8469

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.4974	0.099	.8470	.3475	0.127	.0593
.4982	0.079	.8472	.3482	0.147	.0594
.4987	0.076	.8473	.3489	0.127	.0596
.5009	0.130	.8479	.3496	0.123	.0598
.5016	0.117	.8481	.3503	0.117	.0600
.5022	0.137	.8482	.3510	0.099	.0601
.5030	0.115	.8484	.3517	0.088	.0603
.5036	0.103	.8486	.3524	0.113	.0605
.5043	0.106	.8487	.3531	0.110	.0607
.5050	0.089	.8489	.3537	0.114	.0608
.5057	0.096	.8491	.3559	0.099	.0614
.5064	0.102	.8493	.3565	0.079	.0615
.5071	0.101	.8494	.3572	0.108	.0617
.5093	0.098	.8500	.3579	0.100	.0619
.5100	0.095	.8502	.3586	0.128	.0620
.5107	0.149	.8503	.3593	0.115	.0622
.5112	0.135	.8505	.3600	0.110	.0624
.5119	0.112	.8506	.3606	0.118	.0625
.5128	0.106	.8509	.3613	0.109	.0627
.5133	0.116	.8510	.3621	0.107	.0629
.5140	0.119	.8512	.3649	0.087	.0636
.5147	0.108	.8513	.3655	0.085	.0638
.5154	0.119	.8515	.3662	0.090	.0639
.5175	0.116	.8520	.3670	0.090	.0641
.5182	0.129	.8522	.3677	0.101	.0643
.5189	0.127	.8524	.3682	0.088	.0644
.5196	0.132	.8526	.3690	0.097	.0646
.5202	0.140	.8527	.3697	0.115	.0648
.5210	0.125	.8529	.3704	0.079	.0650
.5218	0.121	.8531	.3711	0.089	.0652
.5224	0.108	.8533	.3732	0.138	.0657
.5232	0.111	.8535	.3739	0.142	.0659
.5237	0.110	.8536	.3752	0.082	.0662
.5258	0.133	.8541	.3760	0.101	.0664
.5265	0.131	.8543	.3766	0.100	.0665
.5272	0.125	.8545	.3774	0.091	.0667
.5279	0.130	.8546	.3780	0.121	.0669
.5286	0.156	.8548	.3787	0.129	.0671
			.3813	0.144	.0677
244 1185			.3821	0.156	.0679
.3294	0.124	.0547	.3828	0.152	.0681
.3300	0.145	.0549	.3836	0.144	.0683
.3308	0.138	.0551	.3842	0.150	.0685
.3315	0.145	.0553	.3850	0.145	.0686
.3322	0.158	.0554	.3856	0.152	.0688
.3329	0.157	.0556	.3864	0.160	.0690
.3336	0.155	.0558	.3871	0.155	.0692
.3342	0.148	.0559	.3878	0.164	.0693
.3350	0.136	.0561	.3885	0.155	.0695
.3357	0.136	.0563	.3892	0.159	.0697
.3385	0.138	.0570	.3899	0.155	.0699
.3392	0.128	.0572	.3927	0.155	.0706
.3398	0.112	.0573	.3934	0.152	.0707
.3405	0.100	.0575	.3941	0.123	.0709
.3412	0.109	.0577	.3948	0.125	.0711
.3419	0.124	.0579	.3955	0.159	.0713
.3426	0.110	.0580	.3961	0.131	.0714
.3433	0.129	.0582	.3968	0.125	.0716
.3447	0.112	.0586	.3976	0.116	.0718
.3454	0.104	.0587	.3982	0.120	.0719

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.3989	0.116	.0721	.4298	0.112	.6929
.3996	0.117	.0732	.4305	0.116	.6930
.4003	0.121	.0725	.4312	0.123	.6932
.4010	0.122	.0726	.4319	0.113	.6934
.4038	0.109	.0733	.4326	0.114	.6936
.4045	0.116	.0735	.4333	0.111	.6937
.3052	0.130	.0737	.4340	0.120	.6939
.4059	0.156	.0738	.4347	0.097	.6941
.4066	0.156	.0740	.4437	0.105	.6963
.4072	0.156	.0742	.4444	0.108	.6965
.4079	0.152	.0743	.4459	0.115	.6969
.4086	0.140	.0745	.4465	0.112	.6970
.4093	0.160	.0747	.4472	0.117	.6972
.4099	0.160	.0748	.4479	0.115	.6974
.4106	0.164	.0750	.4486	0.098	.6975
.4134	0.155	.0757	.4493	0.098	.6977
.4142	0.143	.0759	.4500	0.097	.6979
.4149	0.156	.0761	.4506	0.103	.6980
.4156	0.105	.0763	.4550	0.128	.6991
.4163	0.137	.0764	.4563	0.101	.6995
.4169	0.131	.0766	.4570	0.126	.6996
.4176	0.137	.0768	.4577	0.113	.6998
.4183	0.132	.0769	.4583	0.106	.7000
.4190	0.131	.0771	.4590	0.119	.7001
.4197	0.123	.0773			
.4204	0.118	.0775	244 1613		
.4211	0.128	.0776	.2370	0.159	.8930
.4218	0.140	.0778	.2378	0.135	.8933
.4224	0.123	.0780	.2385	0.200	.8935
.4253	0.112	.0787	.2392	0.195	.8936
.4260	0.118	.0789	.2398	0.158	.8938
.4266	0.116	.0790	.2405	0.167	.8940
.4273	0.110	.0792	.2413	0.165	.8942
.4281	0.129	.0794	.2419	0.160	.8943
.4287	0.133	.0795	.2426	0.187	.8945
.4294	0.124	.0797	.2433	0.152	.8947
.4302	0.124	.0799	.2440	0.167	.8948
.4308	0.120	.0801	.2447	0.145	.8950
.4315	0.109	.0802	.2495	0.168	.8962
.4322	0.097	.0804	.2502	0.162	.8964
.4330	0.098	.0806	.2509	0.180	.8966
.4336	0.101	.0808	.2516	0.120	.8967
.4364	0.112	.0815	.2522	0.149	.8969
.4371	0.114	.0816	.2530	0.119	.8971
.4377	0.112	.0818	.2536	0.100	.8972
.4384	0.113	.0820	.3232	0.147	.9146
.4391	0.105	.0821	.3239	0.135	.9148
.4398	0.115	.0823	.3246	0.120	.9150
.4405	0.123	.0825	.3260	0.120	.9153
.4411	0.115	.0826	.3267	0.140	.9155
.4418	0.135	.0828	.3273	0.126	.9156
.4425	0.137	.0830	.3280	0.126	.9158
.4432	0.132	.0832	.3287	0.067	.9160
.4439	0.130	.0833	.3315	0.137	.9167
.4446	0.121	.0835	.3323	0.167	.9169
.4453	0.128	.0837	.3329	0.100	.9170
			.3342	0.150	.9174
244 1608			.3349	0.125	.9175
.4287	0.117	.6926	.3426	0.160	.9195
.4292	0.104	.6927	.3433	0.131	.9196

Table 8 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.3440	0.160	.9198	244 1616		
.3447	0.146	.9200	.3808	0.131	.6780
.3454	0.152	.9202	.3816	0.134	.6782
.3461	0.117	.9203	.3826	0.139	.6785
.3468	0.131	.9205	.3837	0.115	.6788
3834	0.133	.9297	.3849	0.125	.6791
.3841	0.117	.9298	.3860	0.122	.6793
.3848	0.142	.9300	.3872	0.095	.6796
.3855	0.144	.9302	.3882	0.108	.6799
.3862	0.105	.9303	.3892	0.110	.6801
.3869	0.116	.9305	.3910	0.106	.6806
.3876	0.124	.9307	.3918	0.108	.6808
.3882	0.125	.9308	.3975	0.107	.6822
.3889	0.141	.9310	.3982	0.125	.6824
.3896	0.159	.9312	.3993	0.141	.6826
.3903	0.130	.9314	.4001	0.135	.6828
.3921	0.108	.9319	.4010	0.115	.6831
.3931	0.126	.9321	.4017	0.117	.6832
.3938	0.129	.9322	.4027	0.133	.6835
.3945	0.113	.9324	.4037	0.098	.6837
.3952	0.105	.9326	.4042	0.110	.6839
.3959	0.118	.9328	.4050	0.130	.6841
.3967	0.128	.9330	.4099	0.125	.6853
.3974	0.134	.9331	.4108	0.118	.6855
.3980	0.110	.9333	.4116	0.139	.6857
.3987	0.106	.9335	.4123	0.149	.6859
.3998	0.117	.9337	.4130	0.137	.6861
.4016	0.115	.9342	.4137	0.134	.6862
.4022	0.120	.9343	.4143	0.120	.6864
.4029	0.115	.9345	.4150	0.101	.6866
.4039	0.131	.9348	.4157	0.136	.6867
.4050	0.116	.9350	.4164	0.146	.6869
.4058	0.123	.9352	.4195	0.110	.6877
.4064	0.142	.9354	.4202	0.124	.6879
.4071	0.151	.9356	.4209	0.118	.6880
.4113	0.142	.9366	.4216	0.125	.6882
.4121	0.142	.9368	.4223	0.121	.6884
.4128	0.135	.9370	.4230	0.121	.6886
.4133	0.147	.9371	.4237	0.144	.6887
.4139	0.126	.9373	.4247	0.152	.6890
.4146	0.123	.9374			
.4167	0.119	.9380	244 1621		
.4184	0.121	.9384	.1989	0.087	.8810
.4191	0.110	.9386	.1992	0.100	.8811
.4196	0.104	.9387	.1999	0.105	.8812
.4203	0.132	.9389	.2008	0.092	.8815
.4209	0.130	.9390	.2015	0.081	.8816
.4215	0.106	.9392	.2022	0.096	.8818
.4222	0.087	.9393	.2029	0.092	.8820
.4229	0.126	.9395	.2036	0.077	.8822
.4236	0.134	.9397	.2043	0.109	.8823
.4243	0.132	.9399	.2050	0.114	.8825
.4267	0.130	.9405	.2058	0.112	.8827
.4274	0.115	.9406	.2079	0.104	.8832
.4280	0.126	.9408	2085	0.084	.8834
.4286	0.130	.9409	.2092	0.094	.8836
.4293	0.091	.9411	.2099	0.099	.8837
.4300	0.088	.9413	.2106	0.096	.8839
.4307	0.112	.9415	.2114	0.099	.8841
.4314	0.102	.9416	.2121	0.084	.8843

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2128	0.099	.8845	.2675	0.061	.8981
.2135	0.104	.8847	.2682	0.059	.8983
.2141	0.101	.8848	.2709	0.059	.8989
.2181	0.115	.8858	.2718	0.072	.8992
.2188	0.113	.8860	.2727	0.085	.8994
.2195	0.106	.8861	.2735	0.097	.8996
.2202	0.105	.8863	.2766	0.066	.9004
.2209	0.104	.8865	.2773	0.068	.9006
.2216	0.096	.8867	.2780	0.068	.9007
.2223	0.089	.8868	.2809	0.064	.9015
.2241	0.002	.8873	.2816	0.048	.9016
.2259	0.084	.8877	.2823	0.076	.9018
.2266	0.093	.8879	.2829	0.065	.9020
.2273	0.098	.8881	.2836	0.074	.9021
.2280	0.111	.8883	.2843	0.076	.9023
.2287	0.114	.8884	.2867	0.091	.9029
.2294	0.099	.8886	.2874	0.089	.9031
.2300	0.100	.8888	.2881	0.059	.9033
.2307	0.098	.8889	.2889	0.073	.9035
.2314	0.109	.8891	.2895	0.068	.9036
.2322	0.107	.8893	.2902	0.064	.9038
.2343	0.110	.8898	.2909	0.063	.9040
.2350	0.101	.8900	.2915	0.053	.9041
.2357	0.125	.8902	.2922	0.055	.9043
.2364	0.083	.8904	.2929	0.048	.9045
.2371	0.089	.8905	.2953	0.059	.9051
.2378	0.113	.8907	.2960	0.053	.9052
.2385	0.116	.8909	.2967	0.044	.9054
.2392	0.084	.8911	.2974	0.039	.9056
.2399	0.071	.8912	.2982	0.038	.9058
.2406	0.073	.8914	.2989	0.042	.9060
.2427	0.080	.8919	.2996	0.033	.9061
.2434	0.083	.8921	.3003	0.053	.9063
.2442	0.083	.8923	.3012	0.040	.9065
.2449	0.104	.8925	.3019	0.048	.9067
.2456	0.094	.8927	.3045	0.053	.9074
.2463	0.098	.8928	.3052	0.040	.9075
.2470	0.110	.8930	.3060	0.056	.9077
.2479	0.132	.8932	.3068	0.053	.9079
.2485	0.143	.8934	.3076	0.026	.9081
.2492	0.124	.8936	.3083	0.038	.9083
.2499	0.129	.8937	.3090	0.041	.9085
.2518	0.107	.8942	.3097	0.045	.9087
.2524	0.094	.8944	.3106	0.034	.9089
.2530	0.140	.8945	.3113	0.043	.9091
.2537	0.104	.8947	.3138	0.050	.9097
.2544	0.100	.8949	.3145	0.039	.9099
.2552	0.108	.8951	.3157	0.049	.9102
.2559	0.081	.8952	.3165	0.062	.9104
.2566	0.120	.8954	.3173	0.035	.9106
.2573	0.084	.8956	.3180	0.046	.9107
.2579	0.085	.8957	.3188	0.041	.9109
.2619	0.067	.8966	.3195	0.024	.9111
.2626	0.084	.8069	.3202	0.040	.9113
.2632	0.092	.8970	.3209	0.045	.9115
.2640	0.060	.8972	.3232	0.039	.9120
.2647	0.047	.8974	.3240	0.041	.9122
.2654	0.076	.8976	.3247	0.048	.9124
.2661	0.067	.8978	.3255	0.050	.9126
.2668	0.092	.8979	.3262	0.040	.9128

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3271	0.038	.9130	.2441	0.105	.1420
.3280	0.042	.9132	.2448	0.113	.1421
.3287	0.036	.9134	.2455	0.111	.1423
			.2462	0.112	.1425
244 1622			.2469	0.105	.1427
.1971	0.118	.1302	.2496	0.095	.1433
.1978	0.122	.1304	.2503	0.094	.1435
.1985	0.124	.1306	.2510	0.097	.1437
.1992	0.102	.1307	.2517	0.084	.1439
.1999	0.111	.1309	.2524	0.082	.1440
.2007	0.119	.1311	.2530	0.114	.1442
.2020	0.115	.1314	.2537	0.130	.1444
.2026	0.105	.1316	.2544	0.110	.1445
.2034	0.104	.1318	.2551	0.120	.1447
.2040	0.106	.1319	.2558	0.104	.1449
.2066	0.110	.1326	.2565	0.115	.1451
.2073	0.104	.1328	.2572	0.099	.1452
.2080	0.124	.1330	.2592	0.100	.1457
.2087	0.108	.1331	.2599	0.104	.1459
.2094	0.129	.1333	.2606	0.106	.1461
.2100	0.120	.1334	.2613	0.126	.1463
.2107	0.099	.1336	.2620	0.082	.1464
.2114	0.095	.1338	.2628	0.077	.1466
.2121	0.101	.1340	.2635	0.086	.1468
.2128	0.106	.1341	.2640	0.091	.1469
.2151	0.113	.1347	.2647	0.100	.1471
.2158	0.110	.1349	.2654	0.111	.1473
.2165	0.115	.1351	.2675	0.103	.1478
.2172	0.114	.1352	.2718	0.128	.1489
.2179	0.115	.1354	.2725	0.123	.1490
.2186	0.105	.1356	.2732	0.101	.1492
.2193	0.116	.1358	.2739	0.102	.1494
.2200	0.118	.1359	.2760	0.106	.1499
.2207	0.118	.1361	.2767	0.093	.1501
.2214	0.105	.1363	.2773	0.102	.1503
.2237	0.108	.1369	.2780	0.101	.1504
.2244	0.109	.1370	.2787	0.118	.1506
.2251	0.108	.1372	.2793	0.116	.1507
.2258	0.110	.1374	.2800	0.106	.1509
.2265	0.115	.1376	.2807	0.109	.1511
.2272	0.104	.1377	.2814	0.110	.1513
.2279	0.109	.1379	.2821	0.112	.1514
.2286	0.104	.1381	.2842	0.130	.1520
.2294	0.107	.1383	.2849	0.115	.1521
.2301	0.109	.1385	.2856	0.093	.1523
.2324	0.112	.1390	.2863	0.095	.1525
.2331	0.107	.1392	.2870	0.088	.1527
.2338	0.145	.1394	.2877	0.092	.1529
.2345	0.139	.1396	.2884	0.087	.1530
.2352	0.100	.1397	.2891	0.097	.1532
.2359	0.128	.1399	.2898	0.105	.1534
.2366	0.129	.1401	.2905	0.088	.1535
.2373	0.128	.1403	.2925	0.108	.1540
.2380	0.130	.1404	.2932	0.136	.1542
.2387	0.104	.1406	.2939	0.091	.1544
.2407	0.116	.1411	.2946	0.105	.1546
.2413	0.130	.1423	.2953	0.101	.1547
.2420	0.113	.1414	.2960	0.099	.1549
.2427	0.127	.1416	.2967	0.107	.1551
.2435	0.123	.1418	.2974	0.095	.1553

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2981	0.103	.1554	.4041	0.102	.1819
.2988	0.090	.1556	.4048	0.094	.1821
.3013	0.101	.1562	.4065	0.085	.1825
.3018	0.103	.1564	.4072	0.108	.1827
.3015	0.110	.1565	.4078	0.099	.1828
.3032	0.113	.1567	.4085	0.094	.1830
.3039	0.109	.1569	.4092	0.099	.1832
.3046	0.107	.1571	.4099	0.102	.1834
.3051	0.107	.1572	.4106	0.100	.1835
.3058	0.104	.1574	.4113	0.111	.1837
.3064	0.112	.1575	.4120	0.104	.1839
.3071	0.113	.1577	.4127	0.114	.1841
.3100	0.117	.1584	.4134	0.112	.1842
.3107	0.108	.1586	.4158	0.103	.1848
.3114	0.101	.1588	.4167	0.121	.1851
.3121	0.093	.1589	.4174	0.112	.1852
.3127	0.096	.1591	.4181	0.113	.1854
.3134	0.104	.1593	.4188	0.116	.1856
.3140	0.099	.1594	.4195	0.115	.1857
.3147	0.100	.1596	.4202	0.115	.1859
.3154	0.088	.1598			
.3161	0.090	.1599	244 2300		
.3189	0.085	.1606	.3266	0.171	.4430
.3196	0.083	.1608	.3273	0.181	.4432
.3203	0.083	.1610	.3399	0.112	.4463
.3210	0.092	.1612	.3406	0.122	.4465
.3217	0.091	.1613	.3587	0.126	.4510
.3224	0.082	.1615	.3592	0.132	.4512
.3231	0.079	.1617	.3599	0.125	.4513
.3238	0.079	.1619			
.3245	0.103	.1620	244 2307		
.3252	0.089	.1622	.3696	0.081	.2015
.3271	0.086	.1627	.3701	0.076	.2016
.3278	0.089	.1629	.3705	0.085	.2017
.3285	0.104	.1630	.3714	0.065	.2019
.3290	0.096	.1632	.3722	0.067	.2021
.3297	0.102	.1633	.3942	0.122	.2076
.3304	0.118	.1635	.3947	0.108	.2078
.3311	0.112	.1637	.3953	0.129	.2079
.3319	0.077	.1639	.3960	0.115	.2081
.3326	0.104	.1641	.3967	0.116	.2083
.3333	0.105	.1642	.4195	0.127	.2140
.3902	0.105	.1784	.4203	0.117	.2142
.3909	0.106	.1786	.4209	0.107	.2143
.3916	0.099	.1788	.4217	0.110	.2145
.3923	0.107	.1790	.4223	0.137	.2147
.3930	0.093	.1791	.4443	0.138	.2201
.3937	0.089	.1793	.4457	0.151	.2205
.3944	0.111	.1795	.4466	0.132	.2207
.3951	0.103	.1797	.4472	0.135	.2209
.3958	0.110	.1798	.4591	0.159	.2238
.3965	0.105	.1800	.4598	0.155	.2240
.3985	0.110	.1805	.4608	0.157	.2242
.3992	0.098	.1807	.4613	0.168	.2244
.3999	0.097	.1809	.4718	0.168	.2270
.4006	0.099	.1810	.4725	0.120	.2272
.4013	0.106	.1812	.4732	0.127	.2274
.4020	0.108	.1814	.4738	0.137	.2275
.4028	0.105	.1816	.4746	0.137	.2277
.4034	0.093	.1817	.4954	0.110	.2329

Table 8 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4960	0.144	.2331	.4485	0.079	.4709
.4967	0.146	.2332	.4564	0.000	.4728
.4974	0.145	.2334	.4571	0.029	.4730
.4981	0.144	.2336	.4578	0.030	.4732
.5110	0.055	.2368	.4760	−0.096	.4777
.5118	0.107	.2370	.4767	−0.054	.4779
.5124	0.074	.2372	.4774	−0.057	.4781
.5131	0.101	.2373	.4856	−0.083	.4801
.5138	0.077	.2375	.4863	−0.118	.4803
.5236	0.131	.2399	.4870	−0.121	.4805
.5240	0.110	.2400	.4949	−0.103	.4825
.5249	0.070	.2403	.4963	−0.169	.4828
.5257	0.123	.2405	.5210	−0.293	.4890
.5263	0.120	.2406	.5217	−0.273	.4891
.5449	0.105	.2453	.5224	−0.275	.4893
.5456	0.106	.2454	.5320	−0.319	.4917
.5468	0.110	.2457	.5327	−0.307	.4919
			.5333	−0.317	.4920
244 2308					
.2583	0.120	.4233	244 2309		
.2589	0.165	.4235	.2719	0.091	.6765
.2597	0.168	.4237	.2726	0.083	.6766
.2688	0.099	.4260	.3018	0.094	.6839
.2695	0.117	.4262	.3025	0.096	.6841
.2702	0.135	.4264	.3030	0.136	.6842
.2798	0.122	.4288	.3180	0.114	.6882
.2805	0.155	.4289	.3196	0.117	.6884
.2812	0.167	.4291	.3203	0.116	.6885
.2962	0.095	.4328	.3305	0.113	.6911
.2970	0.139	.4330	.3313	0.086	.6913
.2977	0.145	.4332	.3319	0.107	.6914
.3060	0.134	.4353	.3396	0.080	.6934
.3066	0.119	.4354	.3402	0.052	.6935
.3073	0.132	.4356	.3407	0.044	.6936
.3151	0.144	.4376	.3598	0.087	.6984
.3157	0.125	.43377	.3607	0.049	.6986
.3163	0.108	.4379	.3615	0.042	.6988
.3325	0.110	.4419	.3719	0.087	.7014
.3331	0.108	.4421	.3728	0.082	.7016
.3421	0.114	.4443	.3736	0.026	.7018
.3429	0.103	.4445			
.3436	0.115	.4447	244 2379		
.3525	0.052	.4469	.2019	0.075	.1363
.3533	0.061	.4471	.2028	0.069	.1365
.3540	0.086	.4473	.2036	0.116	.1367
.3714	0.094	.4516	.2114	0.122	.1387
.3721	0.113	.4518	.2121	0.106	.1389
.3728	0.082	.4520	.2127	0.095	.1390
.3970	0.095	.4590	.2320	0.175	.1438
.3977	0.096	.4582	.2327	0.136	.1440
.3984	0.096	.4584	.2333	0.162	.1442
.4090	0.108	.4610	.2456	0.166	.1472
.4097	0.108	.4612	.2465	0.190	.1474
.4104	0.105	.4614	.2474	0.204	.1477
.4186	0.071	.4634	.2569	0.138	.1500
.4193	0.103	.4636	.2576	0.165	.1502
.4200	0.093	.4638	.2583	0.145	.1504
.4292	0.071	.4661			
.4471	0.076	.4705			
.4479	0.084	.4707			

Table 9. Observations in B made at Skalnaté Pleso Observatory

$J.D._{hel.}$	Δm	Phase	$J.D._{hel.}$	Δm	Phase
243 9763			.3810	−0.027	.0281
.3199	−0.317	.0128	.3818	−0.028	.0283
.3207	−0.322	.0130	.3825	−0.015	.0284
.3220	−0.316	.0133	.3873	−0.004	.0296
.3229	−0.307	.0135	.3881	0.002	.0298
.3235	−0.302	.0137	.3888	0.003	.0300
.3243	−0.296	.0139	.3896	0.010	.0302
.3250	−0.289	.0141	.3903	0.010	.0304
.3259	−0.282	.0143	.3911	0.010	.0306
.3269	−0.287	.0145	.3918	0.009	.0308
.3277	−0.284	.0147	.3925	0.011	.0309
.3284	−0.281	.0149	.3933	0.013	.0311
.3320	−0.236	.0158	.3940	0.022	.0313
.3327	−0.241	.0160	.3970	0.032	.0321
.3335	−0.239	.0162	.3977	0.034	.0322
.3343	−0.238	.0164	.3984	0.037	.0324
.3349	−0.239	.0165	.3993	0.045	.0326
.3357	−0.224	.0167	.4060	0.048	.0343
.3364	−0.221	.0169	.4067	0.051	.0345
.3372	−0.220	.0171	.4074	0.056	.0346
.3381	−0.211	.0173	.4082	0.051	.0348
.3393	−0.218	.0176	.4114	0.054	.0356
.3424	−0.184	.0184	.4122	0.055	.0358
.3434	−0.193	.0187	.4130	0.066	.0360
.3439	−0.196	.0188	.4138	0.062	.0362
.3447	−0.183	.0190	.4146	0.062	.0364
.3454	−0.181	.0192	.4153	0.087	.0366
.3462	−0.177	.0194	.4160	0.064	.0368
.3469	−0.166	.0195	.4168	0.070	.0370
.3478	−0.173	.0198	.4195	0.082	.0377
.3514	−0.154	.0207	.4202	0.076	.0378
.3521	−0.149	.0208	.4232	0.087	.0386
.3529	−0.143	.0210	.4239	0.086	.0388
.3564	−0.121	.0219	.4246	0.091	.0389
.3568	−0.108	.0220	.4254	0.100	.0391
.3576	−0.108	.0222	.4262	0.095	.0393
.3583	−0.112	.0224	.4269	0.093	.0395
.3591	−0.098	.0226	.4277	0.090	.0397
.3599	−0.103	.0228	.4284	0.091	.0399
.3607	−0.098	.0230	.4292	0.100	.0401
.3615	−0.096	.0232	.4299	0.096	.0403
.3623	−0.095	.0234	.4354	0.118	.0416
.3631	−0.091	.0236	.4361	0.105	.0418
.3660	−0.086	.0243	.4369	0.106	.0420
.3668	−0.088	.0245	.4377	0.106	.0422
.3675	−0.088	.0247	.4384	0.105	.0424
.3683	−0.077	.0249	.4392	0.106	.0426
.3690	−0.071	.0251	.4399	0.106	.0428
.3697	−0.072	.0252	.4414	0.101	.0431
.3705	−0.065	.0254	.4439	0.096	.0438
.3712	−0.066	.0256	.4471	0.098	.0446
.3720	−0.060	.0258	.4477	0.102	.0447
.3730	−0.057	.0261			
.3764	−0.016	.0269			
.3772	−0.029	.0271	243 9783		
.3780	−0.039	.0273	.2493	−0.336	.9887
.3788	−0.028	.0275	.2501	−0.347	.9889
.3795	−0.028	.0277	.2509	−0.353	.9891
.3803	−0.032	.0279	.2517	−0.360	.9893

Table 9 — continued

$J.J._{hel.}$	Δm	Phase	$J.D._{hel.}$	Δm	Phase
.2524	−0.370	.9895	.3243	−0.448	.0074
.2532	−0.374	.9897	.3251	−0.441	.0076
.2539	−0.384	.9898	.3258	−0.433	.0078
.2671	−0.493	.9931	.3266	−0.437	.0080
.2679	−0.493	.9933	.3298	−0.415	.0088
.2686	−0.493	.9935	.3305	−0.430	.0090
.2693	−0.504	.9937	.3314	−0.408	.0092
.2702	−0.493	.9939	.3321	−0.411	.0094
.2710	−0.508	.9941	.3328	−0.393	.0095
.2717	−0.508	.9943	.3335	−0.393	.0097
.2724	−0.508	.9945	.3342	−0.401	.0099
.2732	−0.520	.9947	.3350	−0.401	.0101
.2740	−0.516	.9949	.3358	−0.376	.0103
.2774	−0.540	.9957	.3365	−0.383	.0105
.2783	−0.585	.9959	.3404	−0.359	.0114
.2790	−0.544	.9961	.3412	−0.342	.0116
.2797	−0.548	.9963	.3419	−0.359	.0118
.2805	−0.556	.9965	.3427	−0.345	.0120
.2812	−0.552	.9967	.3434	−0.335	.0122
.2820	−0.568	.9969	.3441	−0.342	.0124
.2827	−0.572	.9970	.3449	−0.325	.0126
.2835	−0.576	.9972	.3456	−0.339	.0127
.2841	−0.586	.9974	.3463	−0.328	.0129
.2849	0.576	.9976	.3470	−0.322	.0131
.2888	−0.575	.9986	.3507	−0.300	.0140
.2898	−0.571	.9988	.3514	−0.290	.0142
.2905	−0.571	.9990	.3522	−0.274	.0144
.2916	−0.624	.9993	.3529	−0.277	.0146
.2924	−0.583	.9995	.3537	−0.264	.0148
.2932	−0.592	.9997	.3544	−0.267	.0149
.2939	−0.571	.9998	.3551	−0.261	.0151
.2947	−0.567	.0000	.3559	−0.248	.0153
.2954	−0.583	.0002	.3567	−0.245	.0155
.2961	−0.571	.0004	.3575	−0.223	.0157
.2996	−0.575	.0013	.3607	−0.229	.0165
.3003	−0.575	.0014	.3614	−0.232	.0167
.3011	−0.571	.0016	.3621	−0.223	.0169
.3018	−0.558	.0018	.3629	−0.223	.0171
.3026	−0.558	.0020	.3636	−0.232	.0172
.3033	−0.558	.0022	.3643	−0.217	.0174
.3040	−0.554	.0024	.3651	−0.223	.0176
.3049	−0.571	.0026	.3658	−0.213	.0178
.3056	−0.546	.0028	.3665	−0.210	.0180
.3064	−0.538	.0030	.3673	−0.207	.0182
.3098	−0.528	.0038			
.3106	−0.540	.0040	244 0147		
.3113	−0.520	.0042	.2700	0.011	.8760
.3121	−0.508	.0044	.2710	0.015	.8763
.3128	−0.508	.0046	.2720	0.020	.8765
.3136	−0.512	.0048	.2729	0.022	.8768
.3143	−0.500	.0049	.2738	0.016	.8770
.3151	−0.496	.0051	.2748	0.021	.8772
.3158	−0.492	.0053	.2759	0.025	.8775
.3165	−0.496	.0055	.2769	0.026	.8777
.3199	−0.467	.0063	.2781	0.025	.8780
.3206	−0.456	.0065	.2791	0.035	.8783
.3213	−0.459	.0067	.2836	0.034	.8794
.3220	−0.459	.0068	.2847	0.036	.8798
.3228	−0.459	.0070	.2855	0.023	.8799
.3236	−0.448	.0072	.2865	0.023	.8801

Table 9 — continued

J.J.$_{\cdot hel.}$	Δm	Phase	J.D.$_{\cdot hel.}$	Δm	Phase
.2874	0.019	.8804	.3829	0.114	.2935
.2883	0.019	.8896	.4008	0.185	.2979
.2894	0.021	.8809	.4019	0.159	.2982
.2903	0.025	.8811	.4030	0.167	.2985
.2914	0.014	.8814	.4041	0.150	.2988
.2927	0.016	.8817	.4168	0.151	.3019
.2963	0.028	.8826	.4178	0.158	.3021
.2974	0.027	.8828	.4189	0.147	.3024
.2986	0.033	.8821	.4200	0.116	.3027
.2994	0.032	.8833	.4210	0.115	.3030
.3003	0.034	.8836	.4223	0.117	.3033
.3012	0.036	.8838	.4366	0.173	.3069
.3020	0.038	.8840	.4377	0.176	.3071
.3029	0.040	.8842	.4388	0.176	.3074
.3039	0.051	.8845	.4399	0.173	.3077
.3049	0.059	.8847	.4410	0.170	.3080
.3056	0.058	.8849	.4421	0.167	.3082
			.4432	0.161	.3085
244 0489			.4444	0.158	.3088
.2969	0.107	.2719	.4455	0.147	.3091
.2979	0.103	.2722	.4466	0.150	.3094
.2990	0.112	.2725	.4538	0.094	.3112
.3002	0.124	.2728	.4552	0.115	.3115
.3013	0.149	.2731	.4564	0.127	.3118
.3024	0.127	.2734	.4575	0.139	.3121
.3035	0.153	.2736	.4586	0.142	.3124
.3147	0.150	.2764	.4597	0.159	.3126
.3159	0.145	.2767	.4608	0.132	.3129
.3170	0.154	.2770	.4622	0.135	.3133
.3180	0.127	.2773	.4633	0.147	.3135
.3192	0.137	.2776	.4696	0.117	.3151
.3203	0.121	.2778	.4710	0.108	.3155
.3214	0.149	.2781	.4721	0.102	.3157
.3224	0.144	.2784	.4731	0.102	.3160
.3236	0.144	.2787	.4742	0.091	.3163
.3246	0.153	.2789	.4753	0.091	.3165
.3435	0.128	.2836	.4765	0.106	.3168
.3448	0.0132	.2839	.4776	0.094	.3171
.3461	0.115	.2843	.4787	0.097	.3174
.3471	0.114	.2845	.4798	0.100	.3177
.3481	0.119	.2848			
.3493	0.111	.2851	244 0493		
.3503	0.108	.2853	.3104	0.119	.2740
.3515	0.118	.2856	.3115	0.116	.2743
.3526	0.107	.2859	.3126	0.130	.2746
.3594	0.112	.2876	.3148	0.114	.2752
.3604	0.134	.2878	.3158	0.136	.2754
.3615	0.107	.2881	.3169	0.133	.2757
.3626	0.090	.2884	.3180	0.125	.2760
.3639	0.091	.2887	.3191	0.117	.2762
.3650	0.072	.2890	.3203	0.131	.2765
.3661	0.063	.2893	.3214	0.137	.2768
3726	0.049	.2909	.3409	0.131	.2817
.3752	0.063	.3915	.3420	0.129	.2820
.3763	0.093	.2918	.3431	0.123	.2822
.3774	0.100	.2921	.3442	0.123	.2825
.3785	0.091	.2924	.3453	0.134	.2828
.3795	0.098	.2926	.3464	0.125	.2831
.3806	0.105	.2929	.3571	0.113	.2857
.3818	0.114	.2932	.3580	0.109	.2859

Table 9 — continued

J.J.$_{\cdot hel.}$	Δm	Phase	J.D.$_{\cdot hel.}$	Δm	Phase
.3591	0.109	.2862	.3312	−0.046	.5289
.3600	0.111	.2864	.3323	−0.048	.5292
.3611	0.104	.2867	.3383	−0.044	.5307
.3622	0.090	.2870	.3394	−0.039	.5310
.3693	0.085	.2888	.3405	−0.031	.5313
.3704	0.107	.2890	.3416	−0.028	.5315
.3715	0.110	.2893	.3427	−0.028	.5318
.3729	0.098	.2897	.3507	0.036	.5338
.3742	0.108	.2900	.3514	0.028	.5340
.3753	0.085	.2903	.3528	0.033	.5343
.3765	0.118	.2906	.3539	−0.004	.5346
.3776	0.098	.2908	.3550	0.045	.5349
.3787	0.131	.2911	.3597	0.037	.5360
.3858	0.119	.2929	.3606	0.036	.5363
.3869	0.098	.2932	.3617	0.024	.5365
.3880	0.121	.2934	.3628	0.029	.5368
.3891	0.119	.2937	.3639	0.031	.5371
.3902	0.124	.2940	.3650	0.015	.5374
.3913	0.124	.2943	.3661	0.021	.5376
			.3672	0.018	.5379
244 0494			.3682	0.021	.5382
.2636	−0.373	.5121	.3693	0.024	.5384
.2658	−0.364	.5126	.3825	0.101	.5417
.2669	−0.353	.5129	.3836	0.101	.5420
.2680	−0.348	.5132	.3846	0.115	.5423
.2691	−0.335	.5134	.3856	0.123	.5425
.2702	−0.333	.5137	.3867	0.110	.5428
.2712	−0.331	.5140	.3878	0.110	.5431
.2722	−0.335	.5142	.3889	0.112	.5433
.2733	−0.318	.5145	.3900	0.102	.5436
.2792	−0.274	.5160	.3911	0.126	.5439
.2803	−0.271	.5162	.3922	0.113	.5442
.2814	−0.259	.5165			
.2825	−0.257	.5168	244 0838		
.2835	−0.245	.5170	.3985	0.159	.4344
.2846	−0.241	.5173	.3994	0.153	.4346
.2856	−0.243	.5175	.4001	0.145	.4348
.2867	−0.231	.5178	.4008	0.163	.4349
.2878	−0.223	.5181	.4015	0.137	.4351
.2889	−0.223	.5184	.4030	0.127	.4355
.3049	−0.148	.5224	.4058	0.118	.4362
.3060	−0.151	.5226	.4072	0.121	.4365
.3071	−0.145	.5229	.4078	0.131	.4367
.3082	−0.142	.5232	.4086	0.120	.4369
.3093	−0.136	.5235	.4093	0.140	.4371
.3103	−0.116	.5237	.4101	0.122	.4373
.3114	−0.125	.5240	.4108	0.118	.4374
.3125	−0.113	.5243	.4115	0.126	.4376
.3136	−0.101	.5245	.4122	0.122	.4378
.3147	−0.113	.5248	.4129	0.140	.4379
.3158	−0.116	.5251	.4152	0.113	.4385
.3215	−0.075	.5265	.4159	0.113	.4387
.3225	−0.075	.5268	.4166	0.125	.4389
.3236	−0.083	.5270	.4173	0.137	.4390
.3247	−0.075	.5273	.4180	0.115	.4392
.3258	−0.069	.5276	.4187	0.120	.4394
.3269	−0.061	.5279	.4197	0.149	.4396
.3280	−0.059	.5281	.4204	0.149	.4398
.3291	−0.075	.5284	.4212	0.151	.4400
.3301	−0.054	.5287	.4221	0.142	.4402

Table 9 — continued

J.J.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4232	0.151	.4405	.4743	0.130	.7030
.4260	0.159	.4412	.4750	0.131	.7031
.4267	0.154	.4414	.4756	0.128	.7033
.4273	0.159	.4415	.4764	0.123	.7035
.4281	0.152	.4417	.4771	0.120	.7037
			.4778	0.133	.7038
244 0839			.4784	0.138	.7040
.4207	0.115	.6896	.4791	0.132	.7042
.4214	0.100	.6897	.4798	0.141	.7043
.4224	0.120	.6900	.4805	0.145	.7045
.4231	0.120	.6902	.4812	0.142	.7047
.4238	0.134	.6903	.4819	0.139	.7049
.4245	0.113	.6905	.4868	0.125	.7061
.4252	0.112	.6907	.4875	0.118	.7063
.4259	0.100	.6909	.4882	0.123	.7064
.4266	0.115	.6910	.4888	0.124	.7066
.4273	0.119	.6912	.4895	0.126	.7068
.4280	0.114	.6914	.4902	0.121	.7069
.4287	0.123	.6916	.4909	0.127	.7071
.4294	0.117	.6917	.4916	0.126	.7073
.4317	0.122	.6923	.4923	0.129	.7075
.4323	0.126	.6925	.4985	0.092	.7090
.4346	0.118	.6930	.4992	0.088	.7092
.4353	0.123	.6932	.5000	0.071	.7094
.4360	0.126	.6934	.5008	0.074	.7096
.4367	0.123	.6936	.5047	0.085	.7105
.4374	0.109	.6937	.5060	0.089	.7109
.4381	0.117	.6939	.5068	0.086	.7111
.4387	0.107	.6941	.5075	0.097	.7112
.4394	0.103	.6942	.5090	0.111	.7116
.4431	0.097	.6952	.5096	0.095	.7118
.4437	0.095	.6953	.5102	0.090	.7119
.4445	0.090	.6955	.5110	0.081	.7121
.4452	0.098	.6957	.5117	0.099	.7123
.4459	0.98	.6959	.5125	0.087	.7125
.4466	0.080	.6960	.5132	0.095	.7127
.4473	0.100	.6962	.5153	0.085	.7132
.4484	0.114	.6965	.5159	0.080	.7133
.4495	0.105	.6968	.5167	0.072	.7135
.4506	0.112	.6970	.5174	0.079	.7137
.4539	0.128	.6979	.5185	0.083	.7140
.4548	0.120	.6981	.5191	0.071	.7141
.4583	0.116	.6990	.5198	0.072	.7143
.4590	0.113	.6991	.5219	0.080	.7148
.4597	0.124	.6993	.5226	0.085	.7150
.4604	0.119	.6995	.5233	0.074	.7152
.4611	0.121	.6997	.5240	0.081	.7154
.4618	0.108	.6998	.5249	0.099	.7156
.4646	0.112	.7005	.5271	0.104	.7161
.4652	0.115	.7007	.5280	0.099	.7164
.4660	0.110	.7009	.5287	0.114	.7165
.4667	0.110	.7011	.5295	0.115	.7167
.4674	0.125	.7012	.5303	0.127	.7169
.4680	0.109	.7014	.5312	0.127	.7172
.4687	0.116	.7016	.5320	0.117	.7174
.4694	0.120	.7017	.5327	0.123	.7175
.4701	0.122	.7019	.5334	0.117	.7177
.4708	0.126	.7021	.5341	0.117	.7179
.4715	0.103	.7023	.5349	0.107	.7181
.4722	0.115	.7024	.5358	0.122	.7183

Table 9 — continued

J.J.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.5381	0.115	.7189	.3395	0.145	.1596
.5390	0.113	.7191	.3402	0.139	.1598
.5399	0.116	.7193	.3409	0.142	.1599
.5408	0.113	.7196	.3415	0.145	.1601
.5415	0.119	.7197	.3422	0.150	.1603
.5424	0.122	.7200	.3431	0.117	.1605
.5434	0.126	.7202	.3438	0.120	.1607
.5443	0.127	.7204	.3446	0.118	.1609
.5455	0.114	.7207	.3454	0.114	.1611
.5464	0.110	.7210	.3461	0.104	.1612
.5474	0.098	.7212	.3616	0.137	.1651
.5480	0.113	.7214	.3621	0.145	.1652
.5487	0.097	.7215	.3629	0.144	.1654
.5495	0.117	.7217	.3636	0.141	.1656
.5504	0.113	.7220	.3643	0.157	.1658
.5511	0.112	.7221	.3650	0.145	.1660
			.3656	0.211	.1661
244 0868			.3663	0.147	.1663
.3687	0.106	.9172	.3672	0.158	.1665
.3694	0.109	.9174	.3684	0.139	.1668
.3701	0.105	.9176	.3823	0.129	.1703
.3933	0.121	.9233	.3828	0.129	.1704
.3942	0.124	.9236	.3834	0.135	.1705
.3953	0.132	.9238	.3811	0.126	.1707
.3962	0.123	.9241	.3848	0.118	.1709
.3972	0.110	.9243	.3853	0.125	.1710
.3983	0.106	.9246	.3861	0.110	.1712
.3993	0.109	.9248	.3868	0.105	.1714
.4002	0.098	.9251	.3873	0.116	.1715
.4181	0.098	.9295	.3883	0.122	.1718
.4201	0.090	.9300	.4024	0.129	.1753
.4213	0.106	.9303	.4030	0.123	.1754
.4222	0.099	.9306	.4038	0.122	.1756
.4233	0.105	.9308	.4044	0.120	.1758
.4245	0.105	.9311	.4050	0.119	.1759
.4253	0.106	.9313	.4058	0.142	.1761
.4264	0.112	.9316	.4062	0.133	.1762
.4272	0.111	.9318	.4069	0.140	.1764
.4464	0.125	.9366	.4078	0.149	.1766
.4474	0.118	.9369	.4510	0.135	.1874
.4483	0.121	.9371	.4516	0.119	.1876
.4494	0.124	.9373	.4522	0.119	.1877
.4503	0.124	.9376	.4530	0.110	.1879
.4509	0.127	.9377	.4537	0.118	.1881
.4516	0.139	.9379	.4546	0.133	.1883
.4524	0.131	.9381	.4553	0.100	.1885
.4529	0.128	.9382	.4558	0.114	.1886
.4543	0.124	.9386	.4564	0.109	.1888
.4552	0.128	.9388	.4572	0.109	.1890
244 0869			244 0870		
.3220	0.122	.1552	.2663	0.165	.3910
.3228	0.092	.1554	.2672	0.149	.3912
.3234	0.141	.1556	.2679	0.168	.3914
.3241	0.140	.1557	.2685	0.146	.3915
.3248	0.099	.1559	.2703	0.149	.3920
.3254	0.093	.1560	.2716	0.157	.3923
.3260	0.064	.1562	.2722	0.146	.3925
.3267	0.087	.1564	.2728	0.137	.3926
.3274	0.102	.1566	.2903	0.112	.3970

Table 9 — continued

J.J.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2910	0.106	.3972	.3310	0.079	.4415
.2916	0.098	.3973	.3396	0.097	.4437
.2923	0.103	.3975	.3403	0.127	.4439
.2929	0.104	.3976	.3410	0.124	.4440
			.3575	0.060	.4482
244 2300			.3582	0.160	.4483
.3248	0.127	.4426	.3588	0.111	.4485
.3257	0.123	.4428	.3791	0.114	.4535
.3441	0.124	.4474	.3798	0.103	.4537
.3447	0.129	.4475	.3926	0.117	.4569
.3454	0.120	.4477	.3933	0.103	.4571
.3565	0.139	.4505	.3940	0.087	.4573
.3572	0.136	.4507	.4070	0.129	.4605
.3578	0.133	.4508	.4083	0.124	.4608
			.4164	0.092	.4629
244 2307			.4170	0.129	.4630
.4275	0.103	.2160	.4337	0.94	.4672
.4288	0.122	.2163	.4344	0.118	.4674
.4302	0.144	.2166	.4350	0.119	.4675
.4411	0.135	.2193	.4447	0.087	.4699
.4425	0.113	.2197	.4455	0.051	.4701
.4431	0.136	.2198	.4614	−0.035	.4741
.4562	0.117	.2231	.4620	0.003	.4742
.4568	0.129	.2233	.4628	−0.032	.4744
.4576	0.127	.2235	.4739	−0.078	.4772
.4584	0.127	.2237	.4746	−0.067	.4774
.4792	0.128	.2289	.4753	−0.063	.4776
.4804	0.122	.2292	.4833	−0.114	.4796
.4810	0.111	.2293	.4840	−0.096	.4797
.4817	0.113	.2295	.4846	−0.110	.4799
.4916	0.102	.2320	.4995	−0.165	.4836
.4924	0.100	.2322	.5003	−0.205	.4838
.4930	0.091	.2323	.5019	−0.183	.4840
.4944	0.093	.2327	.5088	−0.242	.4859
.5059	0.127	.2355	.5095	−0.215	.4861
.5066	0.116	.2357	.5102	−0.269	.4963
.5073	0.112	.2359	.5187	−0.304	.4884
.5080	0.100	.2361	.5194	−0.293	.4886
.5087	0.135	.2362	.5370	−0.384	.4930
.5094	0.135	.2364	.5379	−0.385	.4932
.5101	0.138	.2366	.5385	−0.389	.4933
.5323	0.109	.2421	.5471	−0.467	.4955
.5330	0.118	.2423			
.5337	0.144	.2425	244 2309		
			.2776	0.105	.6779
244 2308			.2782	0.041	.6780
.2667	0.118	.4255	.2788	0.104	.6782
.2675	0.126	.4257	.3067	0.074	.6851
.2681	0.122	.4258	.3075	0.047	.6853
.2845	0.108	.4299	.3083	0.111	.6855
.2852	0.094	.4301	.3166	0.084	.6876
.2953	0.122	.4326	.3173	0.093	.6878
.3037	0.098	.4347	.3181	0.089	.6880
.3044	0.110	.4349	.3274	0.114	.6903
.3052	0.106	.4351	.3283	0.107	.6905
.3188	0.112	.4385	.3290	0.110	.6907
.3199	0.100	.4388	.3296	0.123	.6909
.3204	0.098	.4389	.3465	0.074	.6951
.3296	0.113	.4412	.3473	0.077	.6953
.3303	0.104	.4414	.3559	0.061	.6974

Table 9 — continued

J.J.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3569	0.074	.6977	.3712	0.093	.7012
.3575	0.058	.6978			
.3585	0.098	.6981	244 2319		
.3590	0.100	.6982	.2701	0.101	.1728
.3692	0.056	.7007	.2711	0.061	.1730
.3699	0.088	.7009	.2719	0.058	.1732
.3705	0.093	.7011			

Table 10. Observations in *U* made at Skalnaté Pleso Observatory

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
243 9763			.3681	−0.279	.0248
.3197	−0.449	.0127	.3688	−0.274	.0250
.3205	−0.470	.0129	.3695	−0.269	.0252
.3218	−0.467	.0133	.3703	−0.257	.0254
.3227	−0.468	.0135	.3710	−0.244	.0256
.3233	−0.477	.0136	.3718	−0.244	.0258
.3241	−0.480	.0138	.3728	−0.214	.0260
.3248	−0.463	.0140	.3762	−0.207	.0269
.3257	−0.443	.0142	.3770	−0.193	.0271
.3267	−0.434	.0145	.3778	−0.208	.0273
.3275	−0.455	.0147	.3786	−0.198	.0274
.3282	−0.450	.0149	.3793	−0.208	.0276
.3318	−0.387	.0158	.3801	−0.195	.0278
.3325	−0.398	.0159	.3808	−0.180	.0280
.3333	−0.398	.0161	.3816	−0.182	.0282
.3341	−0.419	.0163	.3823	−0.174	.0284
.3347	−0.404	.0165	.3871	−0.159	.0296
.3355	−0.378	.0167	.3879	−0.164	.0298
.3362	−0.387	.0169	.3886	−0.180	.0299
.3370	−0.378	.0171	.3894	−0.178	.0301
.3379	−0.373	.0173	.3901	−0.178	.0303
.3391	−0.378	.0176	.3909	−0.168	.0305
.3422	−0.366	.0184	.3916	−0.180	.0307
.3432	−0.396	.0186	.3923	−0.180	.0309
.3437	−0.377	.0187	.3931	−0.173	.0311
.3445	−0.366	.0189	.3938	−0.180	.0312
.3452	−0.274	.0191	.3968	−0.148	.0320
.3460	−0.380	.0193	.3975	−0.183	.0322
.3467	−0.344	.0195	.3982	−0.153	.0323
.3476	−0.339	.0197	.3991	−0.142	.0326
.3512	−0.331	.0206	.4058	−0.125	.0342
.3519	−0.336	.0208	.4072	−0.121	.0346
.3527	−0.333	.0210	.4080	−0.137	.0348
.3562	−0.294	.0219	.4112	−0.078	.0356
.3566	−0.294	.0220	.4120	−0.090	.0358
.3574	−0.296	.0222	.4128	−0.080	.0360
.3581	−0.292	.0223	.4136	−0.083	.0362
.3589	−0.291	.0225	.4144	−0.073	.0364
.3597	−0.299	.0227	.4151	−0.087	.0366
.3605	−0.291	.0229	.4158	−0.090	.0367
.3613	−0.295	.0231	.4166	−0.085	.0369
.3621	−0.301	.0233	.4192	−0.080	.0376
.3629	−0.285	.0235	.4200	−0.097	.0378
.3658	−0.296	.0243	.4230	−0.092	.0385
.3666	−0.307	.0245	.4237	−0.111	.0387
.3673	−0.304	.0246	.4244	−0.123	.0389

Table 10 — continued

$\mathrm{J.D._{hel.}}$	Δm	Phase	$\mathrm{J.D._{hel.}}$	Δm	Phase
.4252	−0.138	.0391	.3009	−0.714	.0016
.4260	−0.138	.0393	.3016	−0.749	.0018
.4267	−0.121	.0395	.3024	−0.697	.0020
.4275	−0.133	.0397	.3031	−0.749	.0021
.4282	−0.109	.0398	.3038	−0.749	.0023
.4290	−0.113	.0400	.3047	−0.697	.0025
.4297	−0.116	.0402	.3054	−0.731	.0027
.4352	−0.086	.0416	.3062	−0.714	.0029
.4359	−0.095	.0418	.3096	−0.714	.0038
.4367	−0.087	.0420	.3104	−0.697	.0040
.4375	−0.081	.0422	.3111	−0.697	.0041
.4382	−0.085	.0423	.3119	−0.714	.0043
.4390	−0.107	.0425	.3126	−0.663	.0045
.4397	−0.091	.0427	.3134	−0.680	.0047
.4404	−0.058	.0429	.3141	−0.680	.0049
.4437	−0.056	.0437	.3149	−0.647	.0051
.4469	−0.078	.0445	.3156	−0.647	.0053
.4475	−0.090	.0447	.3163	−0.680	.0054
			.3197	−0.674	.0063
243 9783			.3204	−0.657	.0064
.2491	−0.546	.9886	.3211	−0.657	.0066
.2499	−0.546	.9888	.3218	−0.624	.0068
.2507	−0.531	.9890	.3226	−0.657	.0070
.2515	−0.531	.9892	.3234	−0.592	.0072
.2522	−0.531	.9894	.3241	−0.608	.0074
.2530	−0.561	.9896	.3249	−0.561	.0076
.2537	−0.531	.9899	.3256	−0.576	.0077
.2669	−0.624	.9931	.3264	−0.592	.0079
.2677	−0.624	.9933	.3296	−0.624	.0087
.2684	−0.624	.9935	.3303	−0.592	.0089
.2691	−0.657	.9936	.3312	−0.608	.0091
.2700	−0.657	.9929	.3319	−0.576	.0093
.2708	−0.640	.9941	.3326	−0.576	.0095
.2715	−0.608	.9942	.3333	−0.592	.0097
.2722	−0.640	.9944	.3340	−0.608	.0098
.2730	−0.657	.9946	.3348	−0.576	.0100
.2738	−0.624	.9948	.3356	−0.561	.0102
.2772	−0.691	.9957	.3363	−0.576	.0104
.2781	−0.691	.9959	.3402	−0.585	.0114
.2788	−0.708	.9961	.3410	−0.538	.0116
.2795	−0.657	.9962	.3417	−0.569	.0118
.2803	−0.674	.9964	.3425	−0.538	.0120
.2810	−0.691	.9966	.3432	−0.538	.0121
.2818	−0.674	.9968	.3439	−0.507	.0123
.2825	−0.619	.9970	.3447	−0.538	.0125
.2833	−0.619	.9972	.3454	−0.507	.0127
.2839	−0.726	.9973	.3461	−0.523	.0129
.2847	−0.726	.9975	.3468	−0.523	.0130
.2886	−0.762	.9985	.3505	−0.505	.0140
.2896	−0.726	.9987	.3512	−0.459	.0141
.2903	−0.726	.9989	.3520	−0.505	.0143
.2914	−0.744	.9992	.3527	−0.489	.0145
.2922	−0.726	.9994	.3535	−0.445	.0147
.2930	−0.762	.9996	.3542	−0.430	.0149
.2937	−0.762	.9998	.3549	−0.474	.0151
.2945	−0.708	.0000	.3557	−0.445	.0153
.2952	−0.762	.0002	.3565	−0.445	.0155
.2959	−0.726	.0003	.3573	−0.459	.0157
.2994	−0.785	.0012	.3605	−0.394	.0165
.3001	−0.714	.0014	.3612	−0.409	.0166

Table 10 — continued

$\mathrm{J.D._{hel.}}$	Δm	Phase	$\mathrm{J.D._{hel.}}$	Δm	Phase
.3619	−0.394	.0168	.4396	−0.153	.3076
.3627	−0.379	.0170	.4407	−0.139	.3079
.3634	−0.379	.0172	.4429	−0.108	.3084
.3641	−0.379	.0174	.4441	−0.129	.3087
.3649	−0.365	.0176	.4463	−0.097	.3093
.3656	−0.365	.0177	.4535	−0.061	.3111
.3663	−0.365	.0179	.4549	−0.061	.3114
.3671	−0.351	.0181	.4561	−0.008	.3117
			.4572	−0.034	.3120
244 0489			.4693	−0.041	.3150
.2966	−0.078	.2719	.4718	−0.064	.3157
.2976	−0.129	.2722	.4773	0.056	.3170
.2987	−0.095	.2724			
.2999	−0.062	.2727	244 0493		
.3145	−0.089	.2739	.3101	−0.047	.2740
.3156	−0.142	.2742	.3112	−0.036	.2743
.3177	−0.089	.2747	.3123	−0.047	.2745
.3189	−0.160	.2750	.3134	−0.047	.2748
.3200	−0.160	.2776	.3145	−0.036	.2751
.3221	−0.107	.2783	.3155	−0.036	.2753
.3233	−0.142	.2786	.3166	−0.070	.2756
.3243	−0.124	.2788	.3177	−0.014	.2759
.3255	−0.160	.2791	.3188	−0.036	.2762
.3354	−0.141	.2816	.3200	−0.070	.2765
.3421	−0.141	.2833	.3211	−0.003	.2767
.3432	−0.102	.2835	.3406	−0.070	.2816
.3445	−0.109	.2839	.3417	−0.070	.2819
.3458	−0.100	.2842	.3428	−0.058	.2822
.3468	−0.095	.2844	.3439	−0.047	.2824
.3478	−0.076	.2847	.3450	−0.047	.2827
.3490	−0.086	.2850	.3461	−0.070	.2830
.3500	−0.082	.2852	.3577	−0.047	.2834
.3512	−0.102	.2855	.3597	−0.036	.2839
.3523	−0.123	.2858	.3619	−0.047	.2869
.3591	−0.092	.2875	.3726	−0.052	.2896
.3601	−0.113	.2878	.3750	−0.074	.2902
.3612	−0.102	.2880	.3762	−0.085	.2905
.3623	−0.157	.2883	.3773	−0.034	.2908
.3647	−0.136	.2889	.3784	−0.085	.2910
.3658	−0.126	.2892	.3795	−0.030	.2913
.3738	−0.169	.2912	.3866	−0.067	.2931
.3749	−0.129	.2915	.3910	−0.056	.2942
.3760	−0.169	.2917			
.3771	−0.096	.2920	244 0494		
.3782	−0.126	.2923	.2616	−0.559	.5116
.3815	−0.168	.2931	.2633	−0.542	.5120
.3939	−0.096	.2962	.2644	−0.551	.5123
.3961	−0.096	.2968	.2655	−0.551	.5125
.3971	−0.093	.2970	.2666	−0.516	.5128
.3984	−0.093	.2973	.2677	−0.516	.5131
.3995	−0.072	.2976	.2688	−0.530	.5134
.4005	−0.113	.2979	.2699	−0.530	.5136
.4027	−0.110	.2984	.2730	−0.487	.5144
.4207	−0.107	.3029	.2789	−0.465	.5159
.4220	−0.061	.3032	.2811	−0.431	.5164
.4229	−0.054	.3034	.2822	−0.442	.5167
.4241	−0.153	.3037	.2832	−0.436	.5169
.4262	−0.134	.3043	.2843	−0.429	.5172
.4374	−0.147	.3071	.2853	−0.442	.5175
.4385	−0.166	.3073	.2864	−0.442	.5177

Table 10 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2875	−0.434	.5180	.3876	−0.047	.2060
.2886	−0.412	.5183	.3883	−0.037	.2062
.3046	−0.326	.5223	.3890	−0.067	.2063
.3057	−0.314	.5226	.4110	−0.083	.2118
.3068	−0.314	.5228	.4117	−0.043	.2120
.3079	−0.303	.5231	.4124	−0.006	.2122
.3090	−0.292	.5234	.4130	−0.026	.2123
.3100	−0.303	.5236	.4381	−0.055	.2186
.3111	−0.303	.5239	.4388	−0.045	.2188
.3122	−0.303	.5242	.4629	−0.031	.2248
.3133	−0.291	.5245	.4636	−0.010	.2250
.3144	−0.279	.5247	.4643	0.005	.2251
.3155	−0.303	.5250	.4650	−0.023	.2253
.3212	−0.303	.5264	.4657	−0.038	.2255
.3222	−0.279	.5267	.4755	−0.030	.2279
.3233	−0.301	.5270	.4762	−0.069	.2281
.3244	−0.268	.5272	.4768	−0.027	.2283
.3255	−0.268	.5275	.4775	−0.046	.2284
.3277	−0.223	.5281	.4783	−0.055	.2286
.3288	−0.223	.5283	.4876	−0.050	.2310
.3298	−0.212	.5286	.4883	−0.041	.2311
.3309	−0.212	.5289	.4890	−0.004	.2313
.3320	−0.201	.5291	.4900	−0.034	.2316
.3391	−0.202	.5309	.4908	−0.016	.2318
.3402	−0.178	.5312	.5147	−0.067	.2388
.3413	−0.202	.5315	.5154	−0.048	.2379
.3424	−0.211	.5317	.5162	−0.050	.2381
.3453	−0.178	.5325	.5169	0.013	.2383
.3504	−0.102	.5337	.5176	−0.008	.2384
.3514	−0.123	.5340	.5286	−0.043	.2412
.3520	−0.113	.5341	.5394	−0.006	.2414
.3536	−0.134	.5345	.5300	−0.006	.2415
.3594	−0.099	.5360			
.3603	−0.110	.5362	244 2308		
.3614	−0.110	.5365	.2710	−0.037	.4266
.3625	−0.099	.5367	.2718	−0.082	.4268
.3636	−0.064	.5370	.2724	−0.086	.4269
,3647	−0.054	.5373	.2731	−0.092	.4271
.3658	−0.075	.5376	.2822	−0.053	.4294
.3669	−0.054	.5378	.2829	−0.071	.4295
.3679	−0.086	.5381	.2835	−0.062	.4297
.3690	−0.044	.5384	.2921	−0.090	.4318
.3822	−0.050	.5417	.2928	−0.115	.4320
.3833	−0.029	.5419	.2936	−0.058	.4322
.3843	−0.029	.5422	.3083	−0.068	.4359
.3853	−0.061	.5424	.3090	−0.060	.4360
.3864	−0.061	.5427	.3096	−0.100	.4362
.3886	−0.029	.5433	.3171	−0.109	.4381
.3897	−0.040	.5435	.3178	−0.091	.4382
.3908	−0.029	.5438	.3184	−0.086	.4384
.3919	−0.029	.5441	.3272	−0.069	.4406
			.3278	−0.080	.4407
244 2300			.3456	−0.093	.4452
.3308	−0.066	.4441	.3461	−0.084	.4453
.3312	−0.063	.4442	.3662	−0.112	.4503
.3320	−0.049	.4444	.3669	−0.069	.4505
.3548	−0.047	.4501	.3677	−0.093	.4507
.3556	−0.032	.4503	.3848	−0.051	.4550
244 2307			.3862	−0.054	.4553
.3869	−0.055	.2058	.3949	−0.048	.4575

Table 10 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3955	−0.061	.4576	.5344	−0.519	.4923
.3962	−0.054	.4578	.5353	−0.489	.4925
.4050	−0.063	.4600	.5359	−0.496	.4927
.4056	−0.064	.4602	.5450	−0.486	.4950
.4063	−0.076	.4603	.5457	−0.530	.4951
.4212	−0.154	.4641	.5464	−0.529	.4953
.4226	−0.151	.4644			
.4310	−0.112	.4665	244 2309		
.4320	−0.153	.4668	.3041	−0.069	.6845
.4422	−0.155	.4693	.3047	−0.064	.6846
.4427	−0.179	.4694	.3056	−0.064	.6849
.4435	−0.171	.4696	.3143	−0.108	.6870
.4589	−0.174	.4735	.3151	−0.096	.6872
.4596	−0.199	.4736	.3157	−0.094	.6874
.4603	−0.158	.4738	.3328	−0.066	.6917
.4718	−0.217	.4767	.3337	−0.022	.6919
.4725	−0.225	.4769	.3344	−0.057	.6921
.4732	−0.249	.4770	.3440	−0.115	.6945
.4877	−0.251	.4807	.3447	−0.091	.6946
.4885	−0.251	.4809	.3532	−0.075	.6967
.4892	−0.275	.4810	.3539	−0.058	.6969
.4971	−0.275	.4830	.3546	−0.093	.6971
.4977	−0.279	.4832	.3745	−0.090	.7021
.4984	−0.279	.4833	.3753	−0.147	.7023
.5066	−0.345	.4854	.3759	−0.146	.7024
.5073	−0.394	.4856			
.5079	−0.391	.4857	244 2319		
.5235	−0.447	.4896	.2674	−0.004	.1721
.5241	−0.432	.4897	.2682	−0.070	.1723
.5248	−0.443	.4899	.2691	−0.004	.1725

Table 11. Observations in *V* colour made at Brno Observatory

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
243 8607			.4119	0.090	.4100
.3513	0.110	.3949	.4127	0.093	.4103
.3521	0.104	.3951	.4136	0.097	.4105
.3528	0.098	.3953	.4294	0.125	.4144
.3535	0.089	.3955	.4302	0.117	.4146
.3646	0.072	.3982	.4313	0.125	.4149
.3654	0.092	.3984	.4321	0.113	.4151
.3661	0.086	.3986	.4329	0.105	.4153
.3668	0.090	.3988	.4337	0.100	.4155
.3677	0.097	.3990	.4352	0.123	.4159
.3686	0.096	.3992	.4361	0.109	.4161
.3694	0.090	.3994	.4368	0.113	.4163
.3818	0.081	.4025	.4521	0.121	.4201
.3827	0.084	.4028	.4556	0.113	.4210
.3835	0.090	.4030	.4566	0.102	.4212
.3843	0.081	.4031	.4574	0.098	.4214
.3850	0.089	.4033	.4582	0.106	.4216
.3857	0.088	.4035	.4590	0.087	.4218
.3864	0.096	.4037	.4598	0.082	.4220
.3872	0.86	.4039	.4607	0.077	.4222
.4080	0.088	.4091	.4614	0.075	.4224
.4087	0.072	.4093	.4903	0.141	.4296
.4095	0.079	.4094	.4911	0.138	.4298
.4102	0.083	.4096	.4919	0.138	.4300
.4112	0.072	.4099	.4927	0.142	.4302

Table 11 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.4935	0.101	.4304	.3209	0.109	.8661
.4944	0.148	.4306	.3218	0.112	.8662
.5337	0.119	.4404	.3230	0.104	.8665
.5344	0.097	.4406	.3240	0.110	.8667
.5351	0.121	.4408	.3250	0.100	.8670
.5359	0.098	.4410	.3366	0.109	.8699
.5514	0.077	.4449	.3376	0.113	.8701
.5522	0.088	.4451	.3386	0.108	.8704
.5529	0.106	.4452	.3395	0.109	.8706
.5537	0.109	.4454	.3404	0.102	.8708
.5544	0.103	.4456	.3411	0.101	.8710
.5552	0.104	.4458	.3473	0.110	.8726
.5561	0.105	.4460	.3484	0.102	.8728
.5568	0.116	.4462	.3494	0.099	.8731
.5575	0.108	.4464	.3502	0.128	.8733
.5690	0.093	.4493	.3511	0.120	.8735
.5700	0.087	.4495	.3522	0.116	.8738
.5707	0.096	.4497	.3530	0.115	.8740
.5716	0.106	.4499	.3539	0.134	.8742
.5722	0.104	.4501	.3550	0.128	.8745
.5729	0.088	.4502	.3654	0.114	.8771
.5735	0.098	.4504	.3666	0.130	.8774
.5743	0.102	.4506	.3674	0.127	.8776
.5757	0.094	.4510	.3682	0.105	.8778
.5764	0.108	.4511	.3691	0.108	.8780
.5773	0.120	.4513	.3702	0.124	.8783
.5797	0.102	.4519	.3709	0.119	.8784
.5805	0.129	.4521	.3718	0.115	.8787
.5813	0.095	.4524	.3728	0.114	.8789
			.3834	0.099	.8816
243 8673			.3841	0.121	.8817
.2577	0.124	.8502	.3850	0.129	.8820
.2605	0.137	.8509	.3858	0.124	.8822
.2612	0.127	.8511	.3869	0.127	.8824
.2620	0.116	.8513	.3879	0.123	.8827
.2628	0.124	.8515	.3889	0.118	.8829
.2636	0.123	.8517	.3897	0.114	.8831
.2709	0.109	.8535	.4018	0.121	.8862
.2719	0.102	.8537	.4025	0.114	.8863
.2729	0.109	.8540	.4033	0.121	.8866
.2737	0.115	.8542	.4050	0.121	.8869
.2746	0.110	.8544	.4060	0.125	.8872
.2754	0.105	.8546	.4070	0.147	.8875
.2764	0.109	.8548	.4084	0.126	.8878
.2854	0.127	.8571	.4098	0.118	.8882
.2862	0.125	.8573	.4107	0.139	.8884
.2869	0.119	.8575	.4122	0.132	.8887
.2877	0.124	.8577	.4128	0.123	.8889
.2886	0.123	.8579	.4216	0.142	.8911
.2894	0.126	.8581	.4226	0.117	.8913
.3015	0.107	.8611	.4236	0.124	.8916
.3022	0.122	.8613	.4246	0.135	.8919
.3030	0.139	.8615	.4256	0.121	.8921
.3041	0.130	.8618	.4265	0.128	.8923
.3050	0.107	.8620	.4273	0.109	.8925
.3064	0.120	.8623	.4282	0.119	.8927
.3077	0.115	.8627	.4293	0.107	.8930
.3086	0.114	.8629	.4302	0.124	.8933
.3097	0.121	.8632	.4312	0.128	.8935
.3199	0.112	.8657	244 1141		

Table 11 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.3773	0.101	.0810	.2887	0.057	.0343
.3954	0.106	.0855	.2894	0.063	.0344
			.2906	0.060	.0347
244 1148			.2921	0.060	.0351
.4638	0.124	.8503	.2927	0.075	.0352
.4646	0.108	.8505	.2934	0.078	.0354
.4652	0.120	.8507	.2940	0.084	.0356
.4659	0.111	.8508	.2947	0.077	.0358
.4655	0.105	.8510	.2953	0.088	.0359
.4813	0.125	.8547	.2959	0.082	.0361
.4826	0.114	.8550	.2966	0.087	.0362
.4832	0.120	.8552	.2973	0.085	.0364
.4838	0.123	.8553	.2980	0.086	.0366
.4845	0.102	.8555	.3569	0.120	.0513
.4852	0.113	.8556	.3584	0.113	.0517
.4935	0.118	.8577	.3591	0.112	.0518
.4942	0.114	.8579	.3597	0.114	.0520
.4948	0.116	.8581	.3604	0.119	.0522
.4954	0.107	.8582	.3611	0.116	.0523
.4960	0.114	.8584	.3617	0.116	.0525
			.3623	0.117	.0526
244 1152			.3630	0.120	.0528
.3491	0.118	.8204	.3626	0.123	.0530
.3498	0.121	.8206	.3643	0.117	.0531
.3559	0.109	.8221	.3700	0.100	.0545
.3566	0.123	.8223	.3707	0.108	.0547
.3574	0.119	.8225	.3714	0.118	.0549
.3580	0.115	.8226	.3720	0.123	.0550
.3587	0.118	.8228	.3725	0.128	.0552
.3696	0.124	.8255	.3732	0.123	.0554
.3703	0.110	.8257	.3739	0.118	.0555
.3709	0.123	.8258	.3746	0.117	.0557
.3716	0.107	.8260	.3752	0.119	.0558
.3863	0.109	.8297	.3758	0.124	.0560
.3871	0.106	.8299	.2764	0.119	.0563
.3877	0.113	.8301	.3780	0.108	.0565
.3884	0.113	.8303	.3798	0.112	.0570
.3891	0.127	.8304	.3804	0.118	.0571
.3897	0.112	.8305	.3811	0.115	.0573
.3903	0.107	.8307	.3818	0.116	.0575
.3910	0.097	.8308	.3823	0.114	.0576
			.3830	0.110	.0578
244 1217					
.2714	0.005	.0299			
.2727	0.007	.0303	244 1218		
.2734	0.004	.0304	.2519	0.121	.2747
.2762	0.019	.0312	.2534	0.126	.2751
.2774	0.025	.0314	.2542	0.125	.2753
.2780	0.028	.0316	.2552	0.126	.2756
.2787	0.023	.0318	.2562	0.116	.2758
.2794	0.020	.0319	.2572	0.115	.2761
.2814	0.029	.0324	.2583	0.116	.2763
.2821	0.030	.0326	.2594	0.130	.2766
.2827	0.034	.0328	.2631	0.127	.2775
.2833	0.042	.0329	.2641	0.120	.2778
.2840	0.048	.0331	.2654	0.125	.2781
.2857	0.057	.0335	.2664	0.119	.2784
.2864	0.056	.0337	.2675	0.118	.2786
.2873	0.061	.0339	.2683	0.108	.2788
.2880	0.060	.0341	.2747	0.123	.2804

Table 11 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2754	0.124	.2806	.4676	0.123	.3286
.2765	0.113	.2809	.4683	0.127	.3288
.2775	0.129	.2811	.4692	0.118	.3290
.2785	0.115	.2814	.4701	0.122	.3292
.2796	0.117	.2817	.4706	0.121	.3294
.2805	0.118	.2819	.4714	0.122	.3295
.2815	0.132	.2821	.4721	0.119	.3297
.2824	0.118	.2824	.4727	0.121	.3299
.2835	0.126	.2827	.4733	0.115	.3300
.2847	0.117	.2829	.4740	0.125	.3302
.3208	0.124	.2919	.4747	0.124	.3304
.3214	0.129	.2921	.4878	0.115	.3336
.3220	0.130	.2922	.4886	0.123	.3338
.3417	0.125	.2972	.4894	0.126	.3341
.3439	0.108	.2977	.4902	0.123	.3342
.3447	0.113	.2979	.4910	0.128	.3345
.3456	0.118	.2981	.4917	0.130	.3346
.3465	0.119	.2984	.4925	0.139	.3348
.3474	0.118	.2986	.4933	0.127	.3350
.3482	0.117	.2988	.4940	0.118	.3352
.3490	0.123	.2990			
.3499	0.125	.2992	244 1219		
.3534	0.131	.3001	.4418	0.105	.5718
.3543	0.122	.3003	.4431	0.109	.5722
.3555	0.123	.3006	.4437	0.104	.5723
.3562	0.116	.3008	.4445	0.109	.5725
.3571	0.125	.3010	.4450	0.075	.5726
.3579	0.120	.3012	.4457	0.071	.5728
.3586	0.110	.3014	.4464	0.073	.5730
.3592	0.109	.3015			
.3603	0.124	.3018	244 1248		
.3610	0.134	.3020	.2217	0.128	.7575
.3659	0.118	.3032	.2230	0.126	.7578
.3670	0.112	.3035	.2236	0.137	.7580
.3678	0.119	.3037	.2256	0.129	.7585
.3686	0.121	.3039	.2263	0.126	.7586
.3694	0.121	.3041	.2271	0.113	.7588
.3702	0.122	.3043	.2279	0.113	.7590
.4115	0.118	.3146	.2288	0.112	.7593
.4131	0.114	.3150	.2376	0.117	.7615
.4140	0.114	.3152	.2386	0.120	.7617
.4147	0.116	.3154	.2395	0.120	.7619
.4156	0.117	.3156	.2403	0.118	.7621
.4163	0.130	.3158	.2412	0.121	.7624
.4170	0.121	.3160	.2418	0.116	.7625
.4178	0.118	.3162	.2438	0.122	.7630
.4188	0.129	.3164	.2446	0.119	.7632
.4374	0.107	.3211	.2456	0.117	.7635
.4381	0.111	.3212	.2464	0.130	.7637
.4397	0.119	.3216	.2474	0.124	.7639
.4402	0.120	.3218	.2484	0.138	.7642
.4413	0.113	.3220	.2491	0.132	.7643
.4422	0.114	.3222	.2499	0.123	.7646
.4430	0.126	.3225	.2508	0.121	.7648
.4438	0.115	.3226	.2519	0.120	.7650
.4444	0.114	.3228	.2529	0.127	.7653
.4458	0.120	.3231	.2536	0.116	.7655
.4466	0.108	.3234	.2544	0.117	.7657
.4472	0.117	.3235	.2890	0.127	.7743
.4667	0.120	.3284	.2898	0.120	.7745

Table 11 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2906	0.107	.7747	.4029	0.127	.8027
.2915	0.117	.7749	.4037	0.117	.8029
.2938	0.122	.7755	.4044	0.123	.8031
.2940	0.122	.7756	.4053	0.123	.8033
.2947	0.117	.7757	.4061	0.132	.8035
.2955	0.123	.7759	.4078	0.117	.8040
.2963	0.119	.7761	.4088	0.109	.8042
.3038	0.121	.7780	.4096	0.114	.8044
.3047	0.121	.7782	.4105	0.122	.8046
.3054	0.120	.7784	.4117	0.124	.8049
.3073	0.119	.7789	.4138	0.125	.8055
.3075	0.130	.7789	.4145	0.117	.8056
.3102	0.124	.7796			
.3111	0.114	.7798	244 1249		
.3120	0.124	.7800	.2164	−0.468	.0058
.3130	0.110	.7803	.2164	−0.466	.0063
.3139	0.113	.7805	.2190	−0.480	.0065
.3148	0.120	.7807	.2195	−0.461	.0066
.3158	0.111	.7810	.2202	−0.447	.0068
.3165	0.114	.7812	.2216	−0.472	.0071
.3174	0.124	.7814	.2222	−0.459	.0073
.3181	0.119	.7816	.2229	−0.440	.0075
.3192	0.114	.7818	.2236	−0.421	.0076
.3199	0.114	.7820	.2243	−0.441	.0078
.3248	0.116	.7832	.2249	−0.447	.0080
.3251	0.128	.7833	.2256	−0.426	.0081
.3258	0.120	.7835	.2270	−0.416	.0085
.3267	0.122	.7837	.2277	−0.408	.0087
.3274	0.126	.7839	.2282	−0.402	.0088
.3292	0.118	.7843	.2322	−0.386	.0098
.3302	0.121	.7846	.2329	−0.388	.0100
.3311	0.124	.7848	.2336	−0.381	.0101
.3321	0.116	.7851	.2342	−0.375	.0103
.3331	0.123	.7853	.2349	−0.386	.0105
.3554	0.130	.7909	.2356	−0.372	.0106
.3560	0.114	.7910	.2363	−0.359	.0108
.3571	0.125	.7913	.2369	−0.350	.0110
.3580	0.125	.7915	.2376	−0.343	.0111
.3588	0.127	.7918	.2419	−0.328	.0122
.3595	0.119	.7919	.2418	−0.344	.0122
.3605	0.123	.7921	.2431	−0.308	.0125
.3615	0.115	.7924	.2437	−0.321	.0127
.3635	0.124	.7930	.2444	−0.320	.0128
.3643	0.121	.7932	.2452	−0.311	.0130
.3651	0.128	.7933	.2458	−0.300	.0132
.3660	0.137	.7935	.2465	−0.291	.0134
.3670	0.117	.7938	.2470	−0.296	.0135
.3679	0.113	.7940	.2495	−0.273	.0141
.3698	0.123	.7945	.2502	−0.268	.0143
.3704	0.124	.7946	.2511	−0.288	.0145
.3710	0.124	.7948	.2518	−0.270	.0147
.3717	0.118	.7950	.2525	−0.280	.0149
.3724	0.130	.7951	.2532	−0.259	.0150
.3731	0.126	.7953	.2538	−0.244	.0152
.3747	0.121	.7957	.2545	−0.222	.0153
.3755	0.118	.7959	.2549	−0.225	.0155
.3967	0.118	.8012	.2713	−0.153	.0195
.3974	0.122	.8014	.2718	−0.152	.0197
.3979	0.124	.8015	.2740	−0.148	.0202
.3986	0.123	.8017	.2748	−0.136	.0204

Table 11 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.2756	−0.139	.0206	.3770	0.113	.0459
.2763	−0.139	.0208	.3810	0.105	.0469
.2772	−0.139	.0210	.3817	0.113	.0471
.2782	−0.142	.0214	.3825	0.116	.0473
.2792	−0.125	.0216	.3834	0.110	.0475
.2831	−0.102	.0225	.3841	0.096	.0477
.2838	−0.088	.0227	.3849	0.102	.0479
.2843	−0.089	.0228	.3857	0.126	.0481
.2850	−0.100	.0230	.4054	0.121	.0530
.2857	−0.109	.0232	.4061	0.120	.0532
.2863	−0.086	.0233	.4067	0.098	.0534
.2871	−0.087	.0235	.4075	0.108	.0536
.2876	−0.087	.0236	.4082	0.111	.0537
.2928	−0.055	.0249	.4090	0.114	.0539
.2935	−0.063	.0251	.4110	0.107	.0544
.2942	−0.067	.0253	.4118	0.097	.0546
.2949	−0.057	.0254	.4124	0.095	.0548
.2956	−0.054	.0256	.4133	0.126	.0550
.2963	−0.062	.0258	.4185	0.111	.0563
.2970	−0.046	.0260	.4193	0.098	.0565
.2977	−0.044	.0261	.4200	0.085	.0567
.2985	−0.044	.0263	.4206	0.108	.0568
.3029	−0.035	.0274	244 1461		
.3036	−0.030	.0276	.4987	−0.415	.0077
.3045	−0.027	.0278	.5033	−0.411	.0088
.3052	−0.020	.0280	.5060	−0.394	.0095
.3060	−0.013	.0282	.5067	−0.380	.0097
.3069	0.002	.0284	.5072	−0.400	.0098
.3077	−0.009	.0286	.5088	−0.384	.0102
.3085	−0.010	.0288	.5095	−0.353	.0104
.3095	−0.002	.0291	.5101	−0.348	.0105
.3106	0.007	.0294	.5106	−0.363	.0106
.3180	0.032	.0312	.5113	−0.352	.0108
.3203	0.027	.0318	.5154	−0.320	.0119
.3213	0.014	.0320	.5161	−0.322	.0120
.3221	0.034	.0322	.5168	−0.333	.0122
.3285	0.062	.0338	.5248	−0.264	.0142
.3291	0.061	.0340	.5276	−0.254	.0149
.3317	0.055	.0346	.5335	−0.221	.0164
.3324	0.077	.0348	.5342	−0.223	.0165
.3332	0.075	.0350	.5349	−0.217	.0167
.3341	0.065	.0352	.5356	−0.222	.0169
.3351	0.067	.0355	.5361	−0.202	.0170
.3378	0.065	.0362	.5367	−0.198	.0172
.3386	0.076	.0364			
.3393	0.053	.0365	244 1487		
.3400	0.088	.0367	.4415	−0.275	.4850
.3409	0.077	.0369	.4426	−0.290	.4853
.3418	0.074	.0372	.4439	−0.272	.4857
.3647	0.104	.0429	.4468	−0.277	.4863
.3656	0.113	.0431	.4481	−0.313	.4866
.3677	0.113	.0436	.4493	−0.295	.4869
.3685	0.116	.0438	.4506	−0.306	.3873
.3692	0.111	.0440	.4517	−0.350	.4875
.3699	0.117	.0442	.4529	−0.316	.4878
.2708	0.114	.0444	.4558	−0.380	.4886
.3741	0.113	.0452	.4570	−0.398	.4888
.3747	0.117	.0454	.4581	−0.364	.4891
.3756	0.116	.0456	244 1490		
.3763	0.118	.0458	.4294	0.128	.2310

Table 11 — continued

J.D.hel.	Δm	Phase	J.D.hel.	Δm	Phase
.4303	0.113	.2312	.5235	0.114	.2545
.4310	0.107	.2314	.5256	0.122	.2550
.4333	0.136	.2320	.5263	0.130	.2552
.4337	0.142	.2321	.5270	0.086	.2554
.4342	0.111	.2322	.5291	0.102	.2559
.4349	0.070	.2324	.5299	0.129	.2561
.4353	0.083	.2325	.5306	0.124	.2563
.4361	0.105	.2327	.5315	0.145	.2565
.4367	0.078	.2328	.5322	0.097	.2567
.4385	0.103	.2333	.5339	0.108	.2571
.4392	0.121	.2334	.5345	0.107	.2572
.4399	0.121	.2336	.5351	0.102	.2574
.4404	0.117	.2337	.5358	0.095	.2576
.4413	0.106	.2340	.5365	0.128	.2577
.4442	0.076	.2347	.5381	0.118	.2581
.4448	0.105	.2348	.5387	0.135	.2583
.4454	0.130	.2350	.5394	0.108	.2585
.4459	0.122	.2351	.5406	0.108	.2588
.4467	0.112	.2353	.5413	0.102	.2589
.4475	0.105	.2344	.5419	0.109	.2591
.4497	0.117	.2361	.5426	0.117	.2593
.4505	0.118	.2363	.5433	0.134	.2594
.4513	0.107	.2365	.5454	0.125	.2600
.4519	0.120	.2366	.5461	0.134	.2601
.4527	0.136	.2368	.5467	0.123	.2603
.4533	0.144	.2370	.5474	0.123	.2604
.4706	0.108	.2413	.5481	0.112	.2606
.4710	0.153	.2414	.5492	0.127	.2609
.4739	0.132	.2422	.5515	0.134	.2615
.4746	0.133	.2423	.5522	0.129	.2617
.4815	0.137	.2440	.5530	0.135	.2619
.4822	0.131	.2442	.5537	0.090	.2620
.4829	0.131	.2444	.5544	0.143	.2622
.4851	0.146	.2449	.5556	0.122	.2625
.4857	0.107	.2451	.5564	0.118	.2627
.4954	0.095	.2475	.5569	0.108	.2628
.4961	0.116	.2477	.5576	0.115	.2630
.4969	0.106	.2478	.5586	0.127	.2633
.4982	0.141	.2482	.5592	0.118	.2634
.4989	0.140	.2483	.5599	0.122	.2636
.4996	0.144	.2485	.5604	0.116	.2637
.5006	0.093	.2488	.5621	0.110	.2641
.5013	0.129	.2490	.5626	0.136	.2643
.5020	0.109	.2491	.5635	0.133	.2645
.5027	0.108	.2494	.5642	0.138	.2646
.5040	0.157	.2496	.5649	0.104	.2648
.5053	0.136	.2499	.5654	0.103	.2650
.5060	0.102	.2501	.5662	0.142	.2651
.5067	0.100	.2503			
.5074	0.082	.2505	244 1560		
.5090	0.116	.2509	.4094	0.118	.7033
.5102	0.146	.2512			
.5109	0.122	.2513	244 1561		
.5116	0.102	.2515	.3772	0.088	.9450
.5160	0.095	.2526	.3778	0.092	.9451
.5168	0.116	.2528			
.5176	0.138	.2530	244 1572		
.5183	0.135	.2532	.3410	0.095	.6824
.5190	0.115	.2534	.3416	0.120	.6825
.5196	0.121	.2535	.3425	0.150	.6827

Table 11 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3470	0.094	.6839	.4585	0.112	.7117
.3493	0.107	.6846	.4592	0.120	.7119
.3521	0.110	.6851	.4599	0.130	.7121
.3562	0.149	.6862	.4607	0.146	.7123
.3569	0.136	.6864	.4731	0.124	.7155
.3639	0.116	.6881	.4739	0.128	.7156
.3647	0.112	.6883	.4746	0.151	.7157
.3705	0.119	.6897	.4777	0.089	.7165
.3715	0.142	.6900	.4783	0.152	.7167
.3745	0.103	.6907	.4790	0.124	.7168
.3753	0.121	.6909	.4798	0.154	.7170
.3760	0.129	.6911	.4805	0.114	.7172
.3769	0.089	.6913	.4833	0.157	.7179
.3854	0.110	.6935	.4842	0.127	.7181
.3882	0.110	.6942	.4850	0.093	.7183
.3891	0.105	.6944	.4858	0.103	.7185
.3900	0.111	.6946	.4866	0.141	.7187
.3955	0.125	.6960	.4937	0.133	.7205
.3963	0.142	.6962	.4944	0.165	.7207
.3969	0.141	.6963	.4952	0.151	.7209
.3977	0.136	.6965	.4961	0.142	.7211
.4021	0.125	.6977	.5010	0.160	.7223
.4028	0.113	.6978	.5019	0.135	.7225
.4037	0.095	.6980	.5144	0.142	.7257
.4095	0.152	.6995	.5150	0.121	.7258
.4104	0.146	.6997	.5157	0.140	.7260
.4130	0.146	.7004	.5193	0.108	.7269
.4139	0.150	.7006	.5203	0.149	.7271
.4148	0.136	.7008	.5212	0.145	.7274
.4156	0.135	.7010	.5221	0.138	.7276
.4169	0.129	.7013	.5298	0.159	.7295
.4196	0.126	.7020			
.4205	0.142	.7022	244 1579		
.4213	0.123	.7024	.2937	0.108	.4183
.4221	0.131	.7036	.2973	0.086	.4192
.4228	0.128	.7028	.2996	0.118	.4198
.4237	0.119	.7030	.3003	0.113	.4200
.4245	0.112	.7032	.3025	0.104	.4205
.4253	0.139	.7034	.3065	0.070	.4215
.4260	0.145	.7036	.3073	0.116	.4217
.4346	0.139	.7058	.3081	0.088	.4219
.4353	0.098	.7059	.3088	0.129	.4221
.4362	0.149	.7061	.3095	0.103	.4222
.4371	0.149	.7064	.3112	0.100	.4227
.4410	0.139	.7074	.3120	0.102	.4229
.4418	0.107	.7075	.3126	0.092	.4230
.4426	0.131	.7078	.3134	0.091	.4232
.4435	0.130	.7080	.3141	0.140	.4234
.4443	0.114	.7082	.3209	0.110	.4251
.4485	0.097	.7092	.3216	0.104	.4253
.4496	0.105	.7095	.3225	0.101	.4255
.4505	0.110	.7097	.3232	0.117	.4257
.4514	0.109	.7099	.3261	0.106	.4264
.4524	0.098	.7102	.3268	0.125	.4266
.4532	0.114	.7104	.3275	0.142	.4267
.4542	0.124	.7106	.3282	0.120	.4269
.4552	0.110	.7109	.3290	0.115	.4271
.4559	0.131	.7111	.3300	0.097	.4274
.4568	0.107	.7113	.3310	0.095	.4276
.4577	0.137	.7115	.3316	0.096	.4278

Table 11 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
244 1593			.4655	0.112	.9567
.3185	0.095	.9200	.4691	0.113	.9576
.3192	0.115	.9201	.4698	0.107	.9577
.3197	0.115	.9203	.4705	0.120	.9579
.3233	0.103	.9212	.4712	0.122	.9581
.3241	0.103	.9215	.4719	0.095	.9583
.3248	0.072	.9216	.4726	0.100	.9584
.3263	0.123	.9219			
.3276	0.122	.9222	244 1602		
.3291	0.099	.9226	.2809	0.110	.1576
.3319	0.121	.9233	.2836	0.124	.1583
.3325	0.108	.9235	.2842	0.103	.1585
.3330	0.089	.9236	.2848	0.136	.1586
.3493	0.130	.9276	.2886	0.126	.1596
.3533	0.100	.9286	.2893	0.116	.1598
.3540	0.107	.9288	.2899	0.091	.1599
.3549	0.100	.9291	.2906	0.128	.1601
.3557	0.120	.9294	.2913	0.135	.1602
.3946	0.132	.9390	.2946	0.113	.1611
.3973	0.132	.9396	.2953	0.107	.1613
.3981	0.143	.9398	.2966	0.141	.1616
.3988	0.109	.9400	.2973	0.119	.1618
.4087	0.095	.9425	.2979	0.119	.1619
.4094	0.100	.9427	.2986	0.118	.1621
.4103	0.111	.9429	.2993	0.113	.1622
.4110	0.083	.9430	.2999	0.114	.1624
.4285	0.122	.9474	.3116	0.110	.1653
.4294	0.117	.9476	.3124	0.118	.1655
.4328	0.144	.9485	.3134	0.120	.1658
.4335	0.129	.9487	.3171	0.130	.1667
.4342	0.114	.9489	.3177	0.149	.1669
.4351	0.105	.9491	.3185	0.125	.1670
.4367	0.122	.9495	.3192	0.119	.1672
.4373	0.126	.9496	.3199	0.097	.1674
.4380	0.129	.9498	.3208	0.109	.1676
.4388	0.117	.9500	.3256	0.116	.1688
.4407	0.089	.9505	.3263	0.116	.1690
.4446	0.136	.9515	.3270	0.105	.1692
.4453	0.100	.9516	.3277	0.095	.1693
.4460	0.120	.9518	.3284	0.110	.1695
.4466	0.119	.9519	.3290	0.094	.1697
.4472	0.094	.9521	.3297	0.115	.1699
.4478	0.125	.9523	.3304	0.094	.1700
.4505	0.113	.9529	.3311	0.126	.1702
.4512	0.108	.9531	.3318	0.118	.1704
.4518	0.123	.9532	.3471	0.095	.1742
.4525	0.111	.9534	.3497	0.099	.1748
.4531	0.139	.9536	.3503	0.105	.1750
.4538	0.117	.9537	.3511	0.106	.1752
.4544	0.111	.9539	.3519	0.100	.1754
.4551	0.089	.9541	.3527	0.149	.1756
.4558	0.099	.9542	.3552	0.127	.1762
.4565	0.091	.9544	.3559	0.127	.1764
.4609	0.066	.9555	.3565	0.130	.1765
.4618	0.138	.9557			
.4621	0.118	.9558			
.4627	0.089	.9560			
.4634	0.113	.9561			
.4641	0.105	.9563			
.4648	0.128	.9565			

Table 12. Observations in B colour made at Brno Observatory

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
243 8607			.5001	0.073	.4321
.3441	0.107	.3931	.5009	0.062	.4323
.3450	0.126	.3934	.5018	0.069	.4325
.3458	0.122	.3935	.5028	0.078	.4327
.3466	0.102	.3937	.5118	0.117	.4350
.3482	0.118	.3941	.5127	0.119	.4352
.3591	0.101	.3969	.5195	0.116	.4369
.3599	0.122	.3971	.5271	0.120	.4388
.3607	0.133	.3973	.5278	0.117	.4390
.3615	0.134	.3975	.5406	0.124	.4422
.3623	0.137	.3977	.5416	0.115	.4424
.3743	0.120	.4007	.5423	0.118	.4426
.3752	0.114	.4009	.5430	0.111	.4428
.3759	0.144	.4011	.5438	0.098	.4430
.3766	0.097	.4012	.5453	0.116	.4434
.3774	0.114	.4014	.5461	0.127	.4435
.3782	0.119	.4016	.5468	0.111	.4437
.3790	0.122	.4018	.5603	0.125	.4471
.3930	0.107	.4053	.5618	0.127	.4475
.3938	0.118	.4055	.5625	0.124	.4477
.3947	0.115	.4057	.5632	0.105	.4478
.3959	0.112	.4060	.5639	0.111	.4480
.3966	0.108	.4062	.5646	0.114	.4482
.3973	0.111	.4064	.5653	0.123	.4484
.3980	0.112	.4066	.5662	0.110	.4486
.3987	0.118	.4068			
.3996	0.109	.4070	243 8673		
.4005	0.119	.4072	.2538	0.096	.8492
.4013	0.118	.4074	.2545	0.102	.8494
.4021	0.117	.4076	.2555	0.091	.8496
.4180	0.093	.4116	.2564	0.112	.8498
.4188	0.120	.4118	.2651	0.120	.8520
.4195	0.121	.4119	.2659	0.119	.8522
.4205	0.114	.4122	.2668	0.128	.8525
.4213	0.120	.4124	.2676	0.120	.8526
.4221	0.112	.4126	.2685	0.116	.8529
.4229	0.128	.4128	.2696	0.120	.8532
.4237	0.103	.4130	.2782	0.123	.8553
.4410	0.089	.4173	.2789	0.109	.8555
.4424	0.105	.4177	.2800	0.115	.8557
.4432	0.083	.4179	.2809	0.118	.8560
.4440	0.067	.4181	.2816	0.117	.8561
.4449	0.081	.4183	.2823	0.119	.8563
.4457	0.077	.4185	.2832	0.115	.8566
.4466	0.068	.4187	.2845	0.119	.8569
.4475	0.066	.4189	.2925	0.131	.8589
.4484	0.093	.4192	.2932	0.125	.8590
.4492	0.107	.4194	.2943	0.113	.8593
.4512	0.096	.4199	.2950	0.106	.8595
.4677	0.134	.4240	.2958	0.110	.8597
.4685	0.128	.4242	.2966	0.116	.8599
.4693	0.115	.4244	.2973	0.120	.8601
.4702	0.109	.4246	.2980	0.115	.8602
.4709	0.120	.4248	.2989	0.104	.8605
.4716	0.114	.4250	.3001	0.095	.8608
.4788	0.096	.4267	.3073	0.118	.8621
.4797	0.101	.4270	.3080	0.111	.8622
.4805	0.090	.4272	.3089	0.109	.8625
.4987	0.075	.4317	.3145	0.123	.8644
.4993	0.075	.4319	.3152	0.124	.8645

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3161	0.107	.8648	.4617	0.120	.8498
.3170	0.104	.8650	.4772	0.128	.8536
.3182	0.119	.8653	.4777	0.129	.8538
.3286	0.135	.8679	.4784	0.128	.8540
.3295	0.122	.8681	.4790	0.135	.8541
.3304	0.106	.8683	.4797	0.124	.8543
.3314	0.119	.8686	.4885	0.146	.8565
.3322	0.103	.8688	.4895	0.153	.8567
.3426	0.106	.8714	.4897	0.143	.8568
.3433	0.117	.8715	.4902	0.142	.8569
.3445	0.120	.8719	.4908	0.134	.8571
.3457	0.132	.8722	.4915	0.130	.8572
.3568	0.114	.8749	.4922	0.122	.8574
.3575	0.117	.8751	.4973	0.143	.8587
.3584	0.111	.8753	.4980	0.123	.8589
.3591	0.120	.8755	.4986	0.129	.8590
.3610	0.129	.8760	.4993	0.121	.8592
.3619	0.121	.8762	.4999	0.120	.8593
.3633	0.110	.8765	.5006	0.133	.8595
.3758	0.115	.8797	.5013	0.128	.8597
.3770	0.121	.8800			
.3779	0.124	.8802	244 1152		
.3787	0.119	.8804	.3536	0.128	.8215
.3784	0.119	.8806	.3611	0.122	.8234
.3804	0.124	.8808	.3618	0.133	.8235
.3814	0.132	.8811	.3624	0.131	.8237
.3822	0.126	.8813	.3637	0.122	.8240
.3922	0.158	.8838	.3644	0.124	.8242
.3932	0.142	.8840	.3650	0.123	.8244
.3943	0.142	.8843	.3657	0.122	.8245
.3957	0.151	.8846	.3664	0.114	.8247
.3964	0.155	.8848	.3671	0.115	.8249
.3972	0.141	.8850	.3754	0.123	.8269
.3980	0.143	.8852	.3761	0.113	.8271
.3987	0.154	.8854	.3767	0.124	.8273
.3997	0.155	.8856	.3774	0.126	.8274
.4006	0.142	.8859	.3781	0.116	.8276
.4155	0.098	.8896	.3788	0.117	.8278
.4164	0.097	.8898	.3794	0.122	.8279
.4172	0.140	.8900	.3801	0.117	.8281
.4182	0.160	.8902	.3807	0.114	.8283
.4192	0.135	.8905	.3814	0.115	.8284
.4200	0.120	.8907	.3820	0.115	.8286
.4327	0.163	.8939	.3828	0.121	.8288
.4340	0.151	.8942	.3834	0.118	.8289
.4348	0.137	.8944	.3840	0.098	.8291
.4358	0.139	.8946	.3847	0.101	.8293
.4369	0.136	.8949	.3933	0.110	.8314
.4383	0.145	.8953	.2952	0.088	.8319
.4393	0.134	.8955	.3966	0.107	.8322
			.3980	0.097	.8326
244 1141					
.3863	0.123	.0832	244 1217		
.3933	0.111	.0850	.2714	−0.008	.0299
			.2727	0.008	.0303
244 1148			.2734	0.038	.0304
.4578	0.116	.8488	.2762	0.039	.0311
.4595	0.124	.8492	.2774	0.047	.0314
.4604	0.120	.8495	.2780	0.046	.0316
.4611	0.125	.8496	.2787	0.035	.0318

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.2794	0.044	.0319	.2572	0.129	.2761
.2814	0.041	.0324	.2583	0.128	.2763
.2821	0.050	.0326	.2594	0.138	.2766
.2827	0.068	.0328	.2631	0.131	.2775
.2833	0.071	.0329	.2641	0.142	.2778
.2840	0.067	.0331	.2654	0.130	.2781
.2857	0.067	.0335	.2664	0.132	.2784
.2864	0.064	.0337	.2675	0.120	.2786
.2873	0.068	.0339	.2683	0.122	.2788
.2880	0.062	.0341	.2747	0.138	.2804
.2887	0.061	.0343	.2754	0.132	.2806
.2894	0.075	.0344	.2765	0.117	.2809
.2900	0.069	.0346	.2775	0.136	.2811
.2906	0.075	.0347	.2785	0.137	.2814
.2921	0.080	.0351	.2796	0.119	.2817
.2927	0.076	.0352	.2805	0.127	.2819
.2934	0.087	.0354	.2815	0.138	.2821
.2940	0.080	.0356	.2824	0.130	.2824
.2947	0.083	.0358	.2835	0.119	.2826
.2953	0.085	.0359	.2847	0.122	.2829
.2959	0.086	.0361	.3208	0.140	.2919
.2966	0.089	.0362	.3214	0.121	.2921
.2973	0.085	.0364	.3220	0.120	.2922
.2980	0.089	.0366	.3417	0.103	.2972
.3569	0.115	.0513	.3439	0.113	.2977
.3584	0.113	.0517	.3447	0.145	.2979
.3591	0.124	.0518	.3456	0.128	.2981
.3597	0.113	.0520	.3465	0.119	.2984
.3604	0.119	.0522	.3474	0.142	.2986
.3611	0.123	.0523	.3482	0.129	.2988
.3617	0.120	.0525	.3490	0.120	.2990
.3623	0.122	.0526	.3499	0.135	.2992
.3630	0.124	.0528	.3534	0.130	.3001
.3636	0.122	.0530	.3543	0.120	.3003
.3643	0.124	.0531	.3555	0.135	.3006
.3700	0.139	.0545	.3562	0.124	.3008
.3707	0.124	.0547	.3571	0.125	.3010
.3714	0.117	.0549	.3579	0.129	.3012
.3720	0.123	.0550	.3586	0.131	.3014
.3725	0.126	.0552	.3593	0.124	.3016
.3732	0.132	.0554	.3603	0.124	.3018
.3739	0.121	.0555	.3610	0.134	.3020
.3746	0.120	.0557	.3659	0.123	.3033
.3752	0.116	.0558	.3670	0.127	.3035
.3758	0.111	.0560	.3678	0.117	.3037
.3764	0.112	.0562	.3686	0.124	.3039
.3780	0.128	.0565	.3694	0.132	.3041
.3798	0.117	.0570	.3702	0.136	.3043
.3804	0.133	.0571	.4115	0.123	.3146
.3811	0.123	.0573	.4131	0.130	.3150
.3818	0.120	.0575	.4140	0.129	.3152
.3823	0.121	.0576	.4147	0.134	.3154
.3830	0.113	.0578	.4156	0.120	.3156
			.4163	0.114	.3158
244 1218			.4170	0.127	.3160
.2519	0.138	.2747	.4178	0.116	.3162
.2534	0.129	.2751	.4188	0.129	.3164
.2542	0.125	.2753	.4374	0.122	.3211
.2552	0.134	.2756	.4381	0.127	.3212
.2562	0.123	.2758	.4397	0.127	.3216

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4402	0.110	.3218	.2491	0.122	.7643
.4413	0.134	.3220	.2499	0.125	.7645
.4422	0.121	.3222	.2508	0.130	.7648
.4430	0.134	.3225	.2519	0.123	.7650
.4438	0.125	.3226	.2529	0.128	.7653
.4449	0.132	.3229	.2536	0.136	.7655
.4458	0.117	.3231	.2544	0.128	.7657
.4466	0.109	.3234	.2890	0.124	.7743
.4472	0.118	.3235	.2898	0.129	.7745
.4667	0.127	.3284	.2906	0.132	.7747
.4676	0.126	.3286	.2915	0.139	.7749
.4683	0.131	.3288	.2938	0.141	.7755
.4692	0.132	.3290	.2940	0.147	.7756
.4701	0.128	.3292	.2947	0.145	.7757
.4706	0.125	.3294	.2955	0.126	.7759
.4714	0.113	.3295	.2963	0.131	.7761
.4721	0.116	.3297	.3038	0.127	.7780
.4727	0.118	.3299	.3047	0.127	.7782
.4733	0.123	.3300	.3054	0.141	.7784
.4740	0.118	.3302	.3073	0.137	.7789
.4747	0.114	.3304	.3075	0.133	.7789
.4878	0.109	.3336	.3102	0.134	.7796
.4886	0.120	.3338	.3111	0.121	.7798
.4894	0.113	.3341	.3120	0.122	.7800
.4902	0.111	.3342	.3130	0.134	.7803
.4910	0.128	.3345	.3139	0.133	.7805
.4917	0.134	.3346	.3148	0.144	.7807
.4925	0.134	.3348	.3158	0.142	.7810
.4933	0.132	.3350	.3165	0.138	.7812
.4940	0.124	.3352	.3174	0.140	.7814
244 1219			.3181	0.141	.7816
.4418	0.109	.5718	.3192	0.0134	.7818
.4431	0.121	.5722	.3199	0.131	.7820
.4437	0.111	.5723	.3248	0.121	.7832
.4445	0.124	.5725	.3251	0.111	.7833
.4450	0.108	.5726	.3258	0.125	.7835
.4457	0.097	.5728	.3267	0.131	.7837
.4464	0.099	.5730	.3274	0.135	.7839
			.3292	0.126	.7843
244 1248			.3302	0.126	.7846
.2217	0.130	.7575	.3311	0.149	.7848
.2230	0.148	.7578	.3321	0.133	.7851
.2236	0.135	.7580	.3331	0.136	.7853
.2256	0.143	.7585	.3554	0.126	.7909
.2263	0.126	.7586	.3560	0.123	.7910
.2271	0.144	.7588	.3571	0.128	.7913
.2279	0.128	.7590	.3580	0.139	.7915
.2288	0.128	.7593	.3588	0.115	.7917
.2376	0.125	.7615	.3595	0.121	.7919
.2386	0.130	.7617	.3605	0.126	.7921
.2395	0.130	.7619	.3615	0.135	.7924
.2403	0.125	.7621	.3635	0.137	.7929
.2412	0.129	.7624	.3643	0.123	.7931
.2418	0.140	.7625	.3651	0.116	.7933
.2438	0.138	.7630	.3660	0.132	.7935
.2446	0.127	.7632	.3670	0.132	.7938
.2456	0.131	.7635	.3679	0.143	.7940
.2464	0.129	.7637	.3698	0.141	.7945
.2474	0.127	.7639	.3704	0.155	.7946
.2484	0.132	.7642	.3710	0.142	.7948

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
3717	0.139	.7950	.2545	−0.249	.0153
.3724	0.142	.7951	.2549	−0.243	.0155
.3731	0.132	.7953	.2713	−0.239	.0195
.3738	0.132	.7955	.2719	−0.167	.0197
.3747	0.127	.7957	.2740	−0.161	.0202
.3755	0.111	.7959	.2748	−0.141	.0204
.3967	0.135	.8012	.2756	−0.146	.0206
.3974	0.133	.8014	.2763	−0.139	.0208
.3979	0.134	.8015	.2772	−0.139	.0210
.3986	0.131	.8017	.2782	−0.124	.0213
.4029	0.130	.8027	.2795	−0.123	.0216
.4037	0.147	.8029	.2831	−0.132	.0225
.4044	0.151	.8031	.2838	−0.099	.0227
.4053	0.121	.8033	.2843	−0.105	.0228
.4061	0.136	.8035	.2850	−0.111	.0230
.4078	0.146	.8040	.2857	−0.104	.0232
.4088	0.130	.8042	.2863	−0.114	.0233
.4096	0.127	.8044	.2871	−0.096	.0235
			.2876	−0.084	.0236
244 1249			.2928	−0.061	.0249
.2164	−0.493	.0058	.2935	−0.058	.0251
.2184	−0.466	.0063	.2942	−0.050	.0253
.2190	−0.461	.0065	.2949	−0.044	.0254
.2195	−0.457	.0066	.2956	−0.057	.0256
.2202	−0.441	.0068	.2963	−0.052	.0258
.2216	−0.458	.0071	.2970	−0.047	.0260
.2222	−0.463	.0073	.2977	−0.039	.0261
.2229	−0.430	.0075	.2985	−0.040	.0263
.2236	−0.436	.0076	.3029	−0.018	.0274
.2243	−0.435	.0078	.3036	−0.022	.0276
.2249	−0.442	.0080	.3045	−0.023	.0278
.2256	−0.449	.0081	.3052	−0.011	.0280
.2270	−0.452	.0085	.3060	−0.007	.0282
.2277	−0.427	.0087	.3069	0.005	.0284
.2282	−0.426	.0088	.3077	0.008	.0286
.2322	−0.406	.0098	.3085	0.003	.0288
.2329	−0.390	.0100	.3095	0.006	.0291
.2336	−0.384	.0101	.3106	0.048	.0294
.2342	−0.387	.0103	.3190	0.021	.0312
.2349	−0.386	.0105	.3203	0.053	.0318
.2356	−0.369	.0106	.3213	0.047	.0320
.2363	−0.361	.0108	.3221	0.064	.0322
.2369	−0.368	.0110	.3285	0.043	.0338
.2376	−0.360	.0111	.3291	0.070	.0340
.2419	−0.357	.0122	.3317	0.072	.0346
.2418	−0.341	.0122	.3324	0.096	.0348
.2431	−0.352	.0125	.3332	0.071	.0350
.2437	−0.317	.0127	.3341	0.101	.0352
.2444	−0.317	.0128	.3351	0.103	.0355
.2452	−0.316	.0130	.3378	0.099	.0362
.2458	−0.312	.0132	.3386	0.111	.0364
.2465	−0.307	.0134	.3393	0.084	.0365
.2470	−0.296	.0135	.3400	0.117	.0367
.2495	−0.281	.0141	.3409	0.113	.0369
.2502	−0.287	.0143	.3418	0.129	.0372
.2511	−0.283	.0145	.3647	0.132	.0429
.2518	−0.268	.0147	.3656	0.124	.0431
.2525	−0.269	.0149	.3677	0.110	.0436
.2532	−0.287	.0150	.3685	0.101	.0438
.2538	−0.270	.0152	.3692	0.103	.0440

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.3699	0.113	.0442	244 1487		
.3708	0.113	.0444	.4415	−0.300	.4850
.3741	0.111	.0452	.4426	−0.281	.4853
.3747	0.125	.0454	.4439	−0.328	.4856
.3756	0.113	.0456	.4468	−0.304	.4863
.3763	0.131	.0458	.4481	−0.338	.4866
.3770	0.108	.0459	.4493	−0.357	.4869
.3810	0.120	.0469	.4506	−0.342	.4873
.3817	0.112	.0471	.4517	−0.367	.4875
.3825	0.114	.0473	.4529	−0.357	.4878
.3834	0.129	.0475	.4558	−0.366	.4886
.3841	0.131	.0478	.4570	−0.417	.4888
.3849	0.130	.0479	.4581	−0.373	.4891
.3857	0.105	.0481			
.4054	0.114	.0530	244 1490		
.4061	0.124	.0532	.4294	0.122	.2310
.4067	0.122	.0534	.4303	0.117	.2312
.4075	0.118	.0536	.4310	0.098	.2314
.4082	0.109	.0537	.4333	0.133	.2320
.4090	0.097	.0539	.4337	0.148	.2321
.4110	0.118	.0544	.4342	0.125	.2322
.4118	0.095	.0546	.4349	·0.123	.2324
.4124	0.094	.0548	.4353	0.123	.2325
.4133	0.110	.0550	.4361	0.136	.2327
.4185	0.115	.0563	.4367	0.132	.2328
.4193	0.130	0.565	.4385	0.141	.2333
.4200	0.087	.0567	.4392	0.126	.2334
.4206	0.086	.0568	.4399	0.100	.2336
			.4404	0.133	.2337
			.4413	0.121	.2340
244 1461			.4442	0.135	.2347
.4987	−0.449	.0077	.4448	0.126	.2348
.5033	−0.401	.0088	.4454	0.123	.2350
.5060	−0.424	.0095	.4459	0.136	.2351
.5067	−0.374	.0097	.4467	0.134	.2353
.5072	−0.395	.0098	.4475	0.124	.2355
.5088	−0.387	.0102	.4497	0.136	.2361
.5095	−0.408	.0104	.4505	0.131	.2363
.5101	−0.392	.0105	.4513	0.110	.2365
.5106	−0.365	.0106	.4519	0.121	.2366
.5113	−0.360	.0108	.4527	0.125	.2368
.5154	−0.335	.0119	.4533	0.127	.2370
.5161	−0.320	.0120	.4706	0.137	.2413
.5168	−0.329	.0122	.4710	0.149	.2414
.5175	−0.319	.0124	.4739	0.164	.2421
.5182	−0.346	.0126	.4746	0.158	.2423
.5189	−0.304	.0127	.4815	0.127	.2440
.5196	−0.326	.0129	.4822	0.118	.2442
.5248	−0.279	.0142	.4829	0.096	.2444
.5258	−0.263	.0145	.4851	0.131	.2449
.5265	−0.254	.0146	.4857	0.142	.2451
.5276	−0.265	.0149	.4954	0.132	.2475
.5283	−0.229	.0151	.4961	0.108	.2477
.5290	−0.254	.0152	.4969	0.126	.2478
.5335	−0.216	.0164	.4982	0.134	.2482
.5342	−0.224	.0165	.4989	0.139	.2483
.5349	−0.211	.0167	.4996	0.135	.2485
.5356	−0.216	.0179	.5006	0.142	.2488
.5362	−0.175	.0170	.5013	0.132	.2490
.5368	−0.216	.0172	.5020	0.127	.2491

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.5027	0.130	.2493	.5642	0.142	.2646
.5040	0.133	.2496	.5649	0.120	.2648
.5053	0.143	.2499	.5654	0.125	.2650
.5060	0.128	.2501	.5662	0.097	.2651
.5067	0.127	.2503			
.5075	0.126	.2505	244 1560		
.5090	0.152	.2509	.4094	0.124	.7033
.5102	0.134	.2512			
.5109	0.142	.2513	244 1561		
.5116	0.099	.2515	.3772	0.123	.9450
.5160	0.129	.2526	.3778	0.117	.9451
.5168	0.135	.2528			
.5176	0.132	.2530	244 1572		
.5183	0.133	.2532	.3410	0.151	.6824
.5190	0.126	.2534	.3416	0.119	.6825
.5196	0.147	.2535	.3425	0.144	.6827
.5235	0.141	.2545	.3470	0.102	.6839
.5256	0.134	.2550	.3493	0.138	.6845
.5263	0.137	.2552	.3521	0.117	.6851
.5270	0.116	.2554	.3562	0.122	.6862
.5291	0.131	.2559	.3569	0.129	.6864
.5299	0.115	.2561	.3629	0.124	.6881
.5306	0.126	.2563	.3647	0.123	.6883
.5315	0.116	.2565	.3705	0.134	.6897
.5322	0.113	.2567	.3715	0.143	.6900
.5339	0.131	.2571	.3745	0.106	.6907
.5345	0.117	.2572	.3753	0.108	.6909
.5351	0.133	.2574	.3760	0.135	.6911
.5358	0.108	.2576	.3769	0.111	.6913
.5365	0.136	.2577	.3854	0.130	.6935
.5381	0.120	.2581	.3882	0.132	.6942
.5387	0.119	.2583	.3891	0.105	.6944
.5394	0.123	.2585	.3900	0.139	.6946
.5106	0.137	.2588	.3955	0.126	.6960
.5413	0.123	.2589	.3963	0.125	.6962
.5419	0.126	.2591	.3969	0.129	.6963
.5426	0.128	.2593	.3977	0.120	.6965
.5433	0.125	.2594	.4021	0.133	.6976
.5454	0.130	.2600	.4028	0.130	.6978
.5461	0.0136	.2601	.4037	0.108	.6980
.5467	0.131	.2603	.4095	0.124	.6995
.5474	.149	.2604	.4104	0.129	.6997
.5481	0.108	.2606	.4130	0.128	.7004
.5492	0.134	.2609	.4139	0.144	.7006
.5515	0.151	.2615	.4148	0.136	.7008
.5522	0.105	.2617	.4156	0.138	.7010
.5530	0.114	.2619	.4169	0.114	.7013
.5537	0.114	.2620	.4196	0.139	.7020
.5544	0.129	.2622	.4205	0.124	.7022
.5556	0.137	.2625	.4213	0.118	.7024
.5564	0.132	.2627	.4221	0.120	.7026
.5569	0.120	.2628	.4228	0.134	.7028
.5576	0.112	.2630	.4237	0.128	.7030
.5586	0.155	.2633	.4245	0.133	.7032
.5592	0.134	.2634	.4253	0.136	.7034
.5599	0.132	.2636	.4260	0.135	.7036
.5604	0.090	.2637	.4346	0.126	.7058
.5621	0.102	.2641	.4353	0.116	.7059
.5626	0.118	.2643	.4362	0.145	.7061
.5635	0.134	.2645	.4371	0.140	.7064

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4410	0.136	.7074	.3120	0.099	.4229
.4418	0.105	.7075	.3126	0.115	.4230
.4426	0.129	.7078	.3134	0.116	.4232
.4435	0.127	.7080	.3141	0.126	.4234
.4443	0.114	.7082	.3209	0.126	.4251
.4485	0.116	.7092	.3216	0.082	4253
.4496	0.097	.7095	.3225	0.113	.4255
.4505	0.133	.7097	.3232	0.123	.4257
.4514	0.102	.7099	.3261	0.132	.4264
.4524	0.106	.7102	.3268	0.095	.4266
.4532	0.138	.7104	.3275	0.118	.4267
.4542	0.117	.7106	.3282	0.139	.4269
.4552	0.109	.7109	.3290	0.132	.4271
.4559	0.116	.7111	.3300	0.122	.4274
.4568	0.087	.7113	.3310	0.105	.4276
.4577	0.137	.7115	.3316	0.132	.4278
.4585	0.100	.7117			
.4592	0.128	.7119	244 1593		
.4599	0.125	.7121	.3185	0.124	.9200
.4607	0.127	.7123	.3192	0.130	.9201
.4731	0.124	.7154	.3197	0.143	.9203
.4739	0.127	.7156	.3233	0.125	.9212
.4746	0.138	.7157	.3241	0.114	.9214
.4777	0.124	.7165	.3248	0.102	.9215
.4783	0.120	.7167	.3263	0.132	.9219
.4790	0.119	.7168	.3276	0.129	.9222
.4798	0.124	.7170	.3291	0.128	.9226
.4805	0.120	.7172	.3319	0.120	.9233
.4833	0.132	.7179	.3325	0.118	.9235
.4842	0.128	.7181	.3330	0.118	.9236
.4850	0.106	.7183	.3493	0.135	.9276
.4858	0.115	.7185	.3533	0.123	.9286
.4866	0.143	.7187	.3540	0.125	.9288
.4937	0.138	.7205	.3549	0.119	.9291
.4944	0.146	.7207	.3557	0.138	.9293
.4952	0.134	.7209	.3946	0.127	.9390
.4961	0.141	.7211	.3973	0.126	.9396
.5010	0.132	.7223	.3981	0.133	.9398
.5019	0.140	.7225	.3988	0.103	.9400
.5144	0.142	.7257	.4087	0.123	.9425
.5150	0.129	.7258	.4094	0.116	.9427
.5157	0.125	.7260	.4103	0.118	.9429
.5193	0.124	.7269	.4110	0.107	.9430
.5203	0.151	.7271	.4285	0.123	.9474
.5212	0.140	.7274	.4294	0.134	.9476
.5221	0.149	.7276	.4328	0.136	.9485
.5298	0.130	.7295	.4335	0.113	.9487
			.4342	0.112	.9489
244 1579			.4351	0.117	.9491
.2937	0.084	.4183	.4367	0.123	.9495
.2973	0.093	.4192	.4373	0.133	.9496
.2996	0.137	.4198	.4380	0.116	.9498
.3003	0.117	.4200	.4388	0.126	.9500
.3025	0.126	.4205	.4407	0.117	.9505
.3065	0.135	.4215	.4446	0.127	.9515
.3073	0.124	.4217	.4453	0.120	.9516
.3081	0.108	.4219	.4460	0.126	.9518
.3088	0.131	.4221	.4466	0.116	.9519
.3095	0.118	.4222	.4472	0.123	.9521
.3112	0.119	.4227	.4478	0.120	.9523

Table 12 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4505	0.114	.9529	.2953	0.133	.1613
.4512	0.125	.9531	.2966	0.150	.1616
.4518	0.131	.9532	.2973	0.133	.1618
.4525	0.136	.9534	.2979	0.129	.1619
.4531	0.119	.9536	.2986	0.136	.1621
.4538	0.113	.9537	.2993	0.124	.1622
.4544	0.123	.9539	.2999	0.136	.1624
.4551	0.133	.9541	.3116	0.126	.1653
.4558	0.124	.9542	.3124	0.133	.1655
.4565	0.110	.9544	.3134	0.119	.1658
.4608	0.107	.9555	.3171	0.108	.1667
.4618	0.132	.9557	.3177	0.111	.1669
.4621	0.102	.9558	.3185	0.129	.1670
.4627	0.121	.9560	.3192	0.133	.1672
.4634	0.128	.9561	.3199	0.123	.1674
.4641	0.111	.9563	.3208	0.120	.1676
.4648	0.114	.9565	.3256	0.125	.1688
.4655	0.111	.9567	.3263	0.118	.1690
.4691	0.125	.9576	.3270	0.131	.1692
.4697	0.130	.9577	.3277	0.131	.1693
.4705	0.125	.9579	.3284	0.124	.1695
.4712	0.128	.9581	.3290	0.101	.1697
.4719	0.130	.9583	.3297	0.136	.1699
.4726	0.124	.9584	.3304	0.126	.1700
			.3311	0.148	.1702
244 1602			.3318	0.149	.1704
.2809	0.118	.1576	.3471	0.122	.1742
.2836	0.123	.1583	.3497	0.121	.1748
.2842	0.105	.1585	.3503	0.107	.1750
.2848	0.138	.1586	.3511	0.110	.1752
.2886	0.117	.1596	.3519	0.132	.1754
.2893	0.130	.1598	.3527	0.137	.1756
.2899	0.110	.1599	.3552	0.152	.1762
.2906	0.136	.1601	.3559	0.128	.1764
.2913	0.130	.1602	.3565	0.144	.1765
.2946	0.119	.1611			

Table 13. Observations in *U* colour made at Brno Observatory

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
244 1487			.4333	−0.054	.2319
.4414	−0.320	.4849	.4338	−0.055	.2320
.4426	−0.393	.4852	.4342	−0.059	.2321
.4439	−0.415	.4855	.4349	−0.054	.2323
.4468	−0.335	.4862	.4353	−0.042	.2324
.4480	−0.346	.4865	.4360	−0.041	.2326
.4493	−0.351	.4868	.4367	−0.033	.2327
.4505	−0.351	.4872	.4385	−0.032	.2332
.4517	−0.362	.4875	.4392	−0.043	.2334
.4529	−0.353	.4878	.4300	−0.053	.2335
.4558	−0.459	.4885	.4403	−0.056	.2336
.4570	−0.470	.4888	.4412	−0.029	.2339
.4581	−0.478	.4891	.4442	−0.048	.2346
			.4448	−0.054	.2348
244 1490			.4454	−0.054	.2349
.4294	−0.048	.2309	.4459	−0.045	.2350
.4303	−0.079	.2311	.4467	−0.056	.2352
.4309	−0.055	.2313	.4475	−0.045	.2354

Table 13 — continued

J.D.$_{hel.}$	Δm	Phase	J.D.$_{hel.}$	Δm	Phase
.4497	−0.071	.2359	.5426	−0.062	.2592
.4504	−0.074	.2362	.5433	−0.059	.2594
.4513	−0.049	.2364	.5454	−0.003	.2599
.4519	−0.058	.2365	.5461	−0.044	.2601
.4527	−0.056	.2367	.5467	−0.074	.2602
.4533	−0.050	.2369	.5474	−0.037	.2604
.4705	−0.038	.2412	.5480	−0.034	.2606
.4710	−0.036	.2413	.5492	−0.066	.2608
.4739	−0.055	.2420	.5515	−0.036	.2614
.4746	−0.028	.2422	.5522	−0.056	.2616
.4815	−0.057	.2439	.5530	−0.051	.2618
.4822	−0.057	.2441	.5537	−0.041	.2620
.4829	−0.050	.2443	.5544	−0.053	.2621
.4851	−0.039	.2448	.5556	−0.046	.2624
.4857	−0.059	.2450	.5564	−0.049	.2626
.4954	−0.030	.2474	.5569	−0.054	.2628
.4961	−0.045	.2476	.5576	−0.049	.2629
.4968	−0.035	.2478	.5586	−0.049	.2632
.4982	−0.055	.2481	.5592	−0.041	.2633
.4989	−0.049	.2483	.5599	−0.065	.2635
.4996	−0.049	.2484	.5604	−0.059	.2636
.5006	−0.050	.2487	.5620	−0.054	.2640
.5013	−0.057	.2489	.5626	−0.068	.2642
.5020	−0.051	.2490	.5634	−0.047	.2644
.5027	−0.061	.2492	.5641	−0.034	.2645
.5040	−0.054	.2495	.5648	−0.040	.2647
.5053	−0.020	.2499	.5654	−0.052	.2649
.5060	−0.049	.2500	.5662	−0.066	.2651
.5067	−0.043	.2502			
.5074	−0.028	.2504	244 1560		
.5089	−0.044	.2508	.4094	−0.040	.7033
.5102	−0.055	.2511			
.5109	−0.049	.2513	244 1561		
.5116	−0.054	.2514	.3772	−0.037	.9449
.5160	−0.050	.2525	.3778	−0.036	.9450
.5168	−0.057	.2527			
.5176	−0.051	.2529	244 1572		
.5183	−0.051	.2531	.3410	−0.035	.6823
.5190	−0.063	.2533	.3416	−0.059	.6825
.5196	−0.064	.2534	.3425	−0.061	.6827
.5236	−0.040	.2544	.3470	−0.077	.6838
.5256	−0.048	.2549	.3493	−0.058	.6844
.5263	−0.047	.2551	.3520	−0.045	.6845
.5270	−0.041	.2553	.3562	−0.025	.6861
.5291	−0.064	.2558	.3569	−0.050	.6863
.5298	−0.056	.2560	.3638	−0.040	.6880
.5306	−0.049	.2562	.3647	−0.093	.6882
.5315	−0.065	.2564	.3705	−0.060	.6897
.5322	−0.069	.2566	.3715	−0.049	.6899
.5339	−0.052	.2570	.3745	−0.072	.6907
.5345	−0.064	.2472	.3753	−0.081	.6909
.5350	−0.056	.2573	.3760	−0.060	.6910
.5358	−0.062	.2575	.3769	−0.058	.6913
.5365	−0.055	.2577	.3854	−0.048	.6934
.5381	−0.016	.2580	.3882	−0.022	.6941
.5387	−0.029	.2582	.3891	−0.032	.6943
.5394	−0.033	.2584	.3900	−0.068	.6945
.5406	−0.004	.2587	.3954	−0.045	.6959
.5412	−0.041	.2588	.3963	−0.053	.6961
.5419	−0.055	.2590	.3969	−0.047	.6963

Table 13 — continued

$J.D._{hel.}$	Δm	Phase	$J.D._{hel.}$	Δm	Phase
.3977	−0.079	.6965	.4961	−0.038	.7210
.4021	−0.045	.6975	.5010	−0.072	.7222
.4028	−0.030	.6977	.5019	−0.067	.7225
.4036	−0.028	.6979	.5144	−0.047	.7256
.4095	−0.088	.6994	.5150	−0.026	.7257
.4104	−0.064	.6996	.5157	−0.032	.7259
.4130	−0.040	.7003	.5193	−0.065	.7268
.4138	−0.046	.7005	.5202	−0.050	.7270
.4148	−0.040	.7007	.5212	−0.054	.7273
.4156	−0.048	.7009	.5220	−0.047	.7275
.4169	−0.072	.7012	.5298	−0.075	.7295
.4196	−0.051	.7019			
.4204	−0.058	.7021	244 1579		
.4213	−0.044	.7023	.2937	−0.013	.4182
.4220	−0.048	.7025	.2973	−0.092	.4191
.4228	−0.060	.7027	.2996	−0.032	.4197
.4237	−0.057	.7029	.3003	−0.057	.4199
.4245	−0.056	.7031	.3025	−0.053	.4204
.4252	−0.054	.7033	.3065	−0.016	.4214
.4260	−0.042	.7035	.3073	−0.029	.4216
.4346	−0.057	.7057	.3081	−0.047	.4218
.4353	−0.047	.7058	.3088	−0.088	.4220
.4362	−0.049	.7061	.3095	−0.010	.4222
.4371	−0.054	.7063	.3112	−0.057	.4226
.4410	−0.015	.7073	.3120	−0.064	.4288
.4418	−0.066	.7075	.3126	−0.055	.4229
.4426	−0.046	.7077	.3133	−0.061	.4231
.4435	−0.037	.7079	.3140	−0.052	.4233
.4443	−0.053	.7081	.3209	−0.048	.4250
.4485	−0.049	.7091	.3216	−0.067	.4252
.4496	−0.090	.7094	.3225	−0.064	.4254
.4505	−0.046	.7096	.3231	−0.074	.4256
.4514	−0.057	.7099	.3261	−0.032	.4263
.4524	−0.055	.7101	.3268	−0.072	.4265
.4532	−0.025	.7103	.3275	−0.074	.4267
.4542	−0.058	.7106	.3282	−0.037	.4268
.4552	−0.071	.7108	.3290	−0.080	.4270
.4558	−0.055	.7110	.3299	−0.056	.4273
.4568	−0.032	.7112	.3310	−0.070	.4275
.4577	−0.024	.7114	.3316	−0.054	.4277
.4585	−0.038	.7116			
.4592	−0.017	.7118	244 1593		
.4599	−0.027	.7120	.3185	−0.028	.9199
.4607	−0.027	.7122	.3191	−0.053	.9200
.4731	−0.042	.7153	.3197	−0.024	.9202
.4739	−0.025	.7155	.3233	−0.007	.9211
.4746	−0.059	.7157	.3241	−0.053	.9213
.4777	−0.042	.7164	.3248	−0.045	.9214
.4783	−0.066	.7166	.3263	−0.058	.9218
.4790	−0.053	.7167	.3276	−0.046	.9221
.4798	−0.046	.7169	.3291	−0.055	.9225
.4805	−0.076	.7171	.3319	−0.067	.9232
.4833	−0.089	.7178	.3325	−0.062	.9234
.4842	−0.044	.7180	.3330	−0.054	.9235
.4850	−0.045	.7182	.3493	−0.051	.9276
.4858	−0.043	.7184	.3522	−0.046	.9285
.4866	−0.036	.7186	.3540	−0.048	.9287
.4937	−0.062	.7204	.3549	−0.046	.9240
.4944	−0.060	.7206	.3558	−0.041	.9292
.4952	−0.058	.7208	.3946	−0.045	.9389

Table 13 — continued

$J.D._{hel.}$	Δm	Phase	$J.D._{hel.}$	Δm	Phase
.3973	−0.051	.9395	244 1602		
.3981	−0.044	.9398	.2808	−0.058	.1576
.3988	−0.043	.9399	.2835	−0.026	.1682
.4086	−0.061	.9424	.2842	−0.055	.1584
.4094	−0.066	.9426	.2848	−0.046	.1585
.4102	−0.067	.9428	.2886	−0.064	.1595
.4110	−0.058	.9430	.2893	−0.024	.1597
.4285	−0.067	.9473	.2899	−0.035	.1598
.4294	−0.063	.9475	.2906	−0.002	.1600
.4328	−0.035	.9484	.2913	−0.041	.1602
.4335	−0.047	.9486	.2946	−0.027	.1610
.4342	−0.063	.9488	.2953	−0.012	.1612
.4350	−0.040	.9490	.2966	−0.010	.1615
.4367	−0.052	.9494	.2973	−0.025	.1617
.4373	−0.067	.9495	.2979	−0.008	.1618
.4380	−0.071	.9497	.2986	−0.006	.1620
.4388	−0.047	.9499	.2992	−0.002	.1621
.4406	−0.028	.9504	.2999	−0.004	.1623
.4446	−0.053	.9514	.3116	−0.055	.1652
.4453	−0.057	.9515	.3124	−0.063	.1654
.4450	−0.040	.9517	.3133	−0.070	.1657
.4466	−0.054	.9519	.3171	−0.033	.1666
.4471	−0.057	.9520	.3177	−0.037	.1668
.4478	−0.056	.9522	.3185	−0.040	.1670
.4506	−0.044	.9529	.3192	−0.062	.1671
.4511	−0.036	.9530	.3199	−0.065	.1673
.4518	−0.043	.9532	.3208	−0.052	.1675
.4525	−0.049	.9533	.3256	−0.053	.1687
.4531	−0.057	.9535	.3263	−0.028	.1689
.4538	−0.029	.9537	.3270	−0.047	.1691
.4544	−0.053	.9538	.3276	−0.052	.1692
.4551	−0.044	.9540	.3284	−0.042	.1694
.4558	−0.076	.9542	.3290	−0.036	.1696
.4565	−0.074	.9543	.3297	−0.044	.1698
.4608	−0.045	.9554	.3304	−0.034	.1699
.4618	−0.067	.9556	.3311	−0.025	.1701
.4620	−0.072	.9557	.3318	−0.037	.1703
.4627	−0.051	.9559	.3471	−0.062	.1741
.4634	−0.070	.9561	.3497	−0.012	.1748
.4641	−0.055	.9562	.3503	−0.000	.1749
.4648	−0.054	.9564	.3511	−0.073	.1751
.4654	−0.050	.9566	.3519	−0.066	.1753
.4691	−0.050	.9575	.3527	−0.035	.1755
.4698	−0.068	.9577	.3552	−0.003	.1761
.4705	−0.045	.9578	.3558	−0.008	.1763
.4712	−0.056	.9580	.3565	−0.070	.1765
.4719	−0.053	.9582			
.4726	−0.050	.9584			

7. Conclusions

As mentioned above we suspected first MY Cyg to be an Algol-type system with the metallic-line spectrum, but when admitting the newly proved four-day period for it the situation whole conception changed. From the new point of view the system consists of two equal bodies whose sizes lie deep below Roche limit and the mass exchange between them is absent, at least at present. The photometric observations support such a conclusion to a great extent. The components seem to be moderately evolved main sequence stars of the spectral type F2 IV—V.

Thanks to well determined photometric as well as spectroscopic solution the geometrical properties of the system are satisfactorily known. There remain, however, important astrophysical problems that might be advantageously solved in this binary. The most interesting feature is the metallicism well expressed in both components, its connection with the rotational velocity of the stars and with other astrophysical parameters; it would be good to have also the precise quantitative analysis of the stellar atmospheres of the stars. Perhaps it might also be interesting to compare the effective temperatures derived in this paper with those obtained on the basis of spectroscopic data. All these problems call for further spectroscopic investigations especially for those with high dispersion spectrographs.

Some our results were published as the short communication recently (Tremko et al., 1976). The results of Williamon (1975) which were published at the same time agree well with our computations.

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FOTOELEKTRICKÁ FOTOMETRIA TESNEJ DVOJHVIEZDY MY Cyg

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Fotografické pozorovania ukázali, že ide o sústavu, kde sekundárna zložka vypĺňuje Rocheovu medzu. Také sústavy sú vhodné na štúdium modelov s prenosom hmoty medzi zložkami. Preto sa stala MY Cyg stredom pozornosti výskumu zákrytových dvojhviezd.

Ďalším stimulom nášho výskumu bola skutočnosť, že MY Cyg sa klasifikuje ako hviezda s čiarami kovov. Tesné dvojhviezdy s čiarami kovov nám môžu poskytnúť viac informácií na štúdium problému výskytu kovov v atmosférach hviezd, pretože umožňujú priame určenie hmoty, priemerov a gravitačného zrýchlenia na povrchu hviezd. Popper (1971) skúmal štyri tesné dvojhviezdy s čiarami kovov v spektre, medzi nimi i sústavu MY Cyg. Jeho závery o MY Cyg sa zakladajú iba na málo presných fotografických pozorovaniach a vo svojom článku vyjadruje potrebu presnej fotometrie.

MY Cyg je ťažkým problémom pre fotometriu, pretože jej perióda sa približne rovná celistvému násobku dní. Svetelné krivky z fotografických pozorovaní publikoval Wachmann (1948) a Gapoškin (1953). Obe série pozorovaní ukazujú malý pokles jasnosti vo fáze, kde sa očakávalo sekundárne minimum. Proti reálnosti tohto efektu argumentoval Popper (1971) a naše pozorovania ho tiež nepotvrdili. Po roku 1953 existujú iba sporadické pozorovania tejto sústavy.

V období od roku 1964 do roku 1974 sa na Astronomickom Observatóriu na Skalnatom Plese a Observatóriu Univerzity v Brne získalo viac ako 6600 fotoelektrických pozorovaní. Fotoelektrický fotometer Astronomického Observatória na Skalnatom Plese bol inštalovaný na 60 cm zrkadlovom ďalekohľade. Údaje o fotoelektrickom fotometri a jeho vlastnostiach boli uverejnené nedávno (Tremko, 1975; Horák et al., 1976). Pozorovanie na Observatóriu Univerzity v Brne sa získali fotoelektrickým fotometrom inštalovaným tak isto na 60 cm ďalekohľade. Pozorovacie hviezdy boli síce odlišné, ale hviezda, ktorá sa používala na Astronomickom Observatóriu na Skalnatom Plese ako porovnávacia, na Observatóriu Univerzity v Brne sa používala ako hviezda kontrolná. Preto sa transformácia oboch sérií pozorovaní na jeden systém obišla bez komplikácií a analýza materiálu ukázala, že nie sú systematické rozdiely medzi oboma radmi pozorovaní. Pretože perióda svetelných zmien je takmer komenzurabilná s celistvým násobkom dní, iba niektoré roky sú vhodné na určenie epochy minima. Počas niekoľkých rokov pozorovaní sme iba dvakrát získali časti svetelnej krivky v epoche minima. Hviezdu sme pozorovali i mimo fázy minima, a tak sme pomocou strednej svetelnej krivky odvodili normálne epochy minima, čo nám umožnilo detailnejšiu analýzu periódy. Nami odvodená perióda je dvakrát dlhšia ako je uvedená v Suppl. to the General Catalogue of Variable Stars (Kukarkin et al., 1974). Naše výsledky ukazujú, že perióda je konštantná v medziach pozorovacích chýb.

V súvislosti s odvodením nových elementov treba upozorniť na rozlíšenie primárneho a sekundárneho minima. Obe minimá sa v hĺbke líšia iba o $0^m.01$, pretože obe hviezdy sú takmer rovnaké a je ťažké rozlíšiť ich spektroskopickou alebo fotometrickou metódou. Preto sa určenie „primárneho" a „sekundárneho" minima robilo axiomaticky. Za „primárne" považujeme hlbšie minimum, čím si definujeme i primárnu zložku dvojhviezdy. Preto sa naša začiatočná epocha minima líši od začiatočnej epochy, ktorú uvádzajú Kukarkin et al. (1974) a Popper (1971) o pol periódy, to značí, že pri porovnávaní nášho riešenia s predchádzajúcimi treba vzájomne zameniť primárnu a sekundárnu zložku.

Z individuálnych pozorovaní podľa fázy sa zostavili normálne body v 200 ekvidistantných fázových intervaloch. Každý normálny bod pozostáva z 10 až 50 individuálnych pozorovaní. Tým je svetelná krivka dobre definovaná pre výpočet elementov. Stredná chyba normálneho bodu leží v medziach $\pm 0^m.001$ až $\pm 0^m.010$. Svetelná krivka je neúplná v časti zostupnej vetvy primárneho minima. Tento efekt by mohol do istej miery ovplyvniť naše výpočty elementov, ale nemá vplyv na ďalšie závery o priebehu svetelnej krivky. Priebeh svetelnej krivky mimo minima vylučuje existenciu akéhokoľvek poklesu jasnosti, ktorý by nasvedčoval realite „sekundárneho" minima indikovaného predchádzajúcimi autormi (Wachmann, 1948; Gapoškin, 1953 v Supplement to the General Catalogue of Variable Stars 1974). Jasnosť sústavy mimo minima je konštantná a signalizuje, že pri MY Cyg nie je ani efekt odrazu, ani efekt eliptickosti zložiek. Fourierova analýza časti svetelnej krivky mimo zatmenia potvrdila tento záver, pretože hodnoty koeficientov sú rovné nule v medziach pozorovacích chýb.

Keďže svetelná krivka MY Cyg nevykazuje ani efekt odrazu, ani efekt eliptickosti zložiek, netreba pri spracovaní pozorovaní aplikovať klasickú rektifikáciu. Objavila sa však komplikácia spojená s excentricitou dráhy. Pretože teória fotometrických zákrytov pre eliptické dráhy nie je dostatočne rozpracovaná, takáto možnosť sa neaplikovala v štandardnom programe výpočtov pri riešení svetelnej krivky. Na druhej strane excentricita dráhy je malá, takže sa skutočná dráha iba málo líši od kruhovej. Pri výpočtoch sa použila minimalizačná metóda Horáka (1966) a model sústavy guľa—guľa. Ako predbežné základné elementy sme použili elementy, ktoré publikoval Popper (1971). Iteračný proces sa vykonával pri konštantných teoretických koeficientoch okrajového ztemnenia u_1 a u_2 a menili sa iba geometrické elementy a L_1. Po ukončení iteračného procesu sa podmienka konštantnosti u_1 a u_2 zrušila a riešenie pokračovalo pre všetkých 6 premenných parametrov. Značné komplikácie na začiatku vznikli preto, že sa nenašlo vyhovujúce riešenie. Príčina spočívala v tom, že hodnota základnej periódy bola chybná. Až sa použila dvojnásobná hodnota periódy, komplikácie zmizli. Komplikácie mali pozitívny dôsledok v tom, že sa podarilo odhaliť skutočnú podstatu systému, ktorý, ako sa ukázalo, pozostáva z dvoch takmer rovnakých hviezd. Riešenie je rovnaké vo *V* a v *B* obore, odchýlka pri *U* riešení sa dá vysvetliť menšou presnosťou pozorovaní v *U* obore. Nové fotometrické riešenie predložené nami, vzhľadom na zhodu s teoretickými hodnotami koeficientov okrajového ztemnenia i vzhľadom na dobré spektroskopické riešenie, radí zákrytovú sústavu MY Cyg medzi sústavy s veľmi dobre určenými absolútnymi rozmermi. Svietivosti zložiek sú v súlade s priemermi a s efektívnymi teplotami zložiek. Odvodená efektívna teplota odpovedá spektrálnemu typu F2, t. j. spektrálnemu typu odvodenému z čiar kovov, čo je v súlade i s našimi *UBV* fotoelektrickými pozorovaniami.

Sústava MY Cyg pozostáva z dvoch hviezd hlavnej postupnosti spektrálneho typu F2 IV—V. Keďže je dobre známe fotometrické i spektroskopické riešenie, možno uzatvárať, že vlastnosti sústavy sú dobre známe. Zostávajú ešte otvorené astrofyzikálne problémy tejto sústavy. Predovšetkým ide o problém kovov v atmosférach oboch zložiek, ich súvis s rýchlosťou rotácie a ostatnými vlastnosťami sústavy. Na riešenie týchto problémov treba okrem detailného fotometrického výskumu robiť spektroskopický výskum vysokodisperznými spektrografmi na presnú kvantitatívnu analýzu.

ФОТОЭЛЕКТРИЧЕСКАЯ ФОТОМЕТРИЯ ТЕСНОЙ ДВОЙНОЙ ЗВЕЗДЫ MY Cyg

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Резюме

Фотографические наблюдения свидетельствовали о том, что MY Cyg является системой, где вторичный компонент заполняет предел Роша. Такие системы подходят для изучения моделей с переносом материи между компонентами. По этой причине MY Cyg стала центром внимания исследователей затменно-переменных звезд.

Следующей причиной, стимулирующей наши исследования, был факт, что MY Cyg относится к звездам с линиями металлов в спектре. Тесные двойные звезды с линиями металлов могут предоставить нам больше информации для изучения проблемы встречаемости металлов в атмосферах звезд, поскольку они позволяют прямо определять массу, диаметр и гравитационное ускорение на поверхности звезд. Поппер (1971) изучал четыре тесные двойные звезды с линиями металлов в спектре, среди них и систему MY Cyg. Его выводы в отношении MY Cyg основаны лишь на недостаточно точных фотографических наблюдениях, и по своей статье он высказался за необходимость точной фотометрии.

MY Cyg представляет трудную проблему для фотометрии, поскольку ее период приблизительно равен целому кратному дней. Кривые блеска по фотографическим наблюдениям публиковали Вахманн (1948) и Гапошкин (1953). Обе серии наблюдений показывают незначительное падение блеска в фазе, когда ожидался вторичный минимум. Против реальности этого эффекта выдвигал аргументы Поппер (1971); наши наблюдения также не подтвердили его. После 1953 г. существуют лишь спорадические наблюдения этой системы.

В период с 1964 по 1974 гг. в Астрономической обсерватории на Скалнатом Плесе и в обсерватории университета им. Я. Э. Пуркине в Брно были получены многочисленные

фотоэлектрические наблюдения. Фотоэлектрический фотометр Астрономической обсерватории на Скалнатом Плесе был установлен на 60-см реалекторе. Данные о фотоэлектрическом фотометре и его свойствах были опубликованы ранее (Тремко, 1975; Горак и кол., 1976). Наблюдения в обсерватории университета в Брно проводились при помощи фотоэлектрического фотометра, также установленного на 60-см рефлекторе. Хотя звезды сравнения и были разными, но звезда, используемая в Астрономической обсерватории на Скалнатом Плесе в качестве звезды сравнения, в обсерватории университета в Брно служила в качестве контрольной. По этой причине приведение обеих серии наблюдений к одной системе прошло без осложнений и анализ материала показал, что между обоими рядами наблюдений нет систематических отличий. Поскольку период изменений блеска почти пропорционален целому кратному дней, то лишь некоторые годы оказываются подходящими для определения эпохи минимума. В течение нескольких лет наблюдений мы получили только дважды фазу кривой блеска в эпохе минимума. Наблюдения звезды мы проводили и вне фазы минимума, так что при помощи средней кривой блеска были выведены нормальные эпохи минимума, что позволило нам более детально проанализировать период. Выведенный нами период вдвое длиннее приведенного в Suppl. to the General Catalogue of Variable Stars (Кукаркин и кол., 1974). Наши результаты показывают, что период не меняется в пределах ошибок наблюдений.

В связи с выводом новых элементов необходимо обратить внимание на различение первичного и вторичного минимума. Оба минимума отличаются по глубине лишь на $0\overset{m}{.}01$, поскольку обе звезды почти одинаковы и их трудно отличить при помощи спектроскопического или фотометрического метода. Поэтому определение «первичного» и «вторичного» минимума проводилось аксиоматически. В качестве «первичного» был принят более глубокий минимум, что определяет и первичный компонент двойной звезды. По этой причине наша начальная эпоха минимума отличается от начальной эпохи, которую приводит Кукаркин и кол. (1974) и Поппер (1971), на полпериода, что означает, что при сравнении нашего решения с предыдущими необходимо переставить местами первичный компонент.

На основе отдельных наблюдений по фазам были составлены средние точки в 200 эквидистантных фазовых интервалах. Каждая средняя точка включала 10—50 отдельных наблюдений. Таким образом кривая блеска хорошо определена для расчета элементов. Средняя квадратическая ошибка средней точки лежит в пределах $\pm 0\overset{m}{.}001$—$\pm 0\overset{m}{.}010$. Кривая изменения блеска не полна на участке восходящей ветви первичного минимума. Этот эффект мог бы в определенной мере повлиять на наши расчеты элементов, однако он не оказывает влияния на последующие выводы о ходе кривой блеска. Характеристика кривой блеска вне минимума исключает существование какого-либо снижения блеска, котойый свидетельствовал бы о реальности «вторичного» минимума, определенного предшествующими авторами (Вахманн, 1948; Гапошкин, 1953, Supplement to the General Catalogue of Variable Stars, 1974). Блеск системы вне минимума не меняется и свидетельствует о том, что у MY Лебедя нет ни эффекта отражения, ни эффекта эллиптичности компонентов. Анализ Фурье участка кривой блеска вне фазы затмения потверждает этот вывод, поскольку значения коэффициентов равны нулю в пределах ошибок наблюдений.

Поскольку кривая блеска MY Лебедя не показывает ни эффекта отражения, ни эффекта эллиптичности компонентов, то нет необходимости для обработки наблюдений использовать классическую ректификацию. Однако встретилась компликация, связанная с эксцентритетом орбиты. Поскольку теория фотометрических покрытий для эллиптических орбит разработана недостаточно, то эта возможность не была предусмотрена в стандартной программе расчетов при решении кривой блеска. С другой стороны, эксцентритет орбиты является незначительным, так что действительная орбита лишь немного отличается от круговой. При расчетах был применен метод минимализации Горака (1966) и модель системы шар—шар. В качестве предварительных исходных элементов нами были использованы элементы, опубликованные Поппером (1971). Процесс итерации производился при константных теоретических коэффициентах потемнения к краю u_1 и u_2 и изменялись только геометрические элементы и L_1. После окончания процесса итерации условие константности u_1 и u_2 было аннулировано и решение было продолжено для всех шести параметров. Значительные компликации в начале возникли в результате того, что не было найдено подходящего решения. Причина состояла в том, что значение исходного периода было ошибочным. После применения двухкратного значения периода осложнения исчезли. Положительные последствия этих компликаций состояли в том, что удалось раскрыть действительную сущность системы, которая, как оказалось, состоит из двух почти одинаковых звезд. Решение одинакого в области *V* и *B*, погрешность, для решения в области *U* можно объяснить меньшей точностью наблюдений в этой области. Новое фотометрическое решение, предложенное нами, учитывая совпадение с теоретическими коэффициентами потемнения к краю и хорошое спектроскопическое решение, относит затменно-переменную систему MY Лебедя к системам с весьма хорошо определенными абсолютными размерами. Показатели цвета компонентов находятся в соответствии с диаметрами и эффективными их температурами. Эффективная температура отвечает спектральному типу F2, т. е. спектральному типу, выведенному по линиям металлов, что находится в согласии и с нашими *UBV* фотоэлектрическими наблюдениями.

Система MY Лебедя состоит из двух звезд главной последовательности спектрального типа F2 IV—V. Поскольку хорошо известно фотометрическое и спектроскопическое решение, то можно констатировать, что свойства системы хорошо известны. Остаются открытыми еще астрофизические проблемы этой системы. Прежде всего это касается проблемы металлов в атмосферах обоих компонентов, их связи со скоростью вращения и остальными свойствами системы. Для решения этих проблем необходимо, наряду с тщательным фотометрическим исследованием, произвести и спектроскопическое исследование при помощи высокодисперсных спектрографов с целью проведения точного количественного анализа.