PHOTOELECTRIC ELEMENTS OF THE BINARY SYSTEM AO MONOCEROTIS

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Abstract. A slightly improved period of $1^{d}.884\,761\,9$, has been given for the system AO Mon. Photoelectric elements have been computed in *B* and *V* filters. The orbit is found to be eccentric. Absolute elements have been derived by using the spectroscopic elements given by Struve. The system is found to be a detached one.

1. Introduction

The star AO Mon = BD − 4°1822 was discovered as a binary system by Hoffmeister (1931). Lause (1936) was the first to study it spectroscopically, but the period obtained by him was incorrect. Struve (1945) derived the spectroscopic elements of the system using He I lines and obtained a value of the period which was double of that given by Lause. Gaposchkin (1952) obtained a period for the system from photographic observations. The system was included in our photoelectric observing program during the years 1969–70.

2. The Observations

The star was observed on the 56-cm reflector of the Uttar Pradesh State Observatory employing an unrefrigerated 1P21 photomultiplier, standard *U*, *B* and *V* filters of the Johnson and Morgan photometric system and standard dc-techniques. Details of the variable and the comparison stars are listed in Table I.

TABLE I

Details of the variable and comparison stars

Star	α_{1950}	δ_{1950}	*sp*	m_v
AO Mon = BD − 4°1822	$7^h4^m.21$	−4°16.40	B3 + B5	$9^m.3-9^m.9$
Comp. = BD − 4°1826	$7^h4^m.68$	−4°17.44	A2	$9^m.4$

Since the observations in *U* show a large amount of scatter the observations in *B* and *V* alone have been discussed, a total of 237 observations in *U*, 242 in *B* and 242 in *V* having been secured and included in Tables V(a), V(b) and V(c). The corresponding light curves are given in Figure 1. All the observations have been reduced to the stan-

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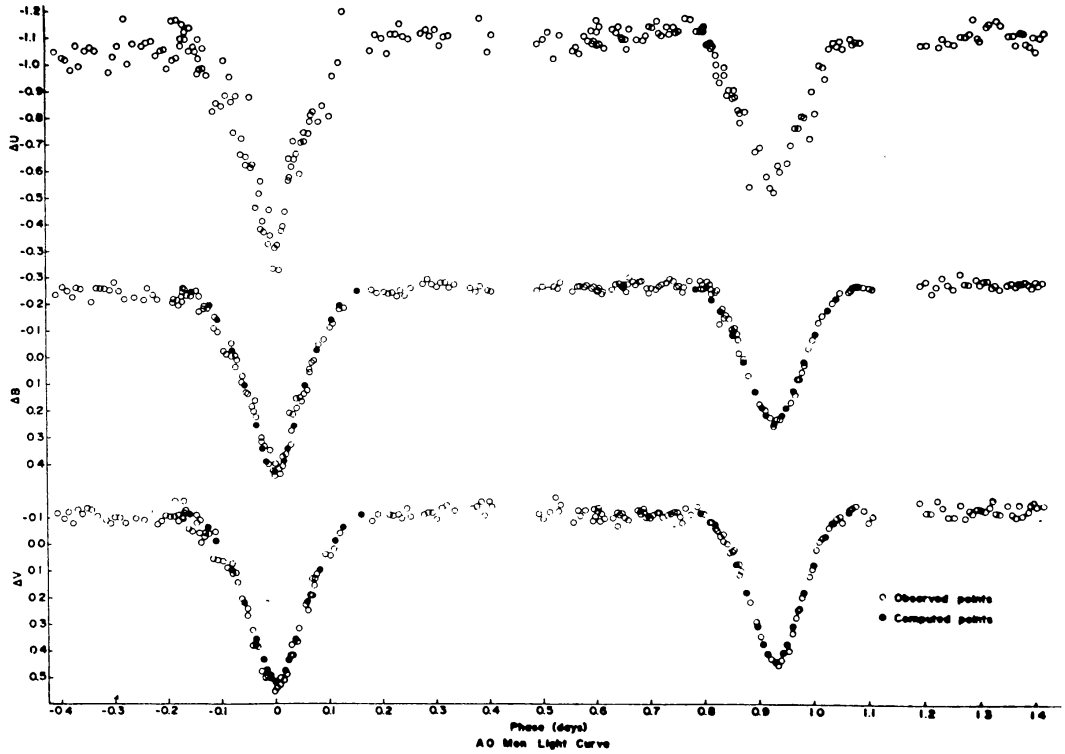

Fig. 1. Light curves of AO Mon.

dard *B*, *V* magnitude system of Johnson and Morgan by observing eleven standard stars (vide Johnson *et al.*, 1966).

3. The Light Curve and the Period

The depths of the primary minima in *B* and *V* filters are $0^m.679$ and $0^m.628$ respectively, those of the secondary minima being $0^m.510$ and $0^m.558$. The secondary minimum occurs at phase 0.4933.

TABLE II

Primary minima of AO Mon and the residuals on the basis of the period derived in this study

Primary minimum	$(O-C)$
JD (Hel) 2 440 588.3255	$-0^d.0006$
622.2528	+0.0010

Struve (1945) has given the epoch and the period of this star as Primary minimum = JD 2 426 735.333 + $1^d.884\,745\,4$ *E*. Gaposchkin (1952) gave a period of $1^d.884\,766\,12$ based on photographic observations. A new epoch JD 2 433 330.108 has also since

been given (*vide* Rocznik Astronomiczny, 1970). From the latest epoch and our observations we have recomputed the period, which is given by

$$\text{Primary minimum} = \text{JD } 2\,433\,330.108 + 1^{\mathrm{d}}.884\,761\,9\,E. \pm 0.000\,000\,3$$

The times of observed primary minima and the $(O-C)$ computed from the period derived by us are given in Table II.

4. The Elements

The geometrical elements of the system have been computed from the primary as well as the secondary minimum using Russell and Merrill's (1952) nomographic method. The facts of the secondary minimum being shifted towards the primary minimum and the duration of the primary eclipse being greater than that of the secondary eclipse have been used in the computation of the longitude of periastron 'ω' and the eccen-

TABLE III

Geometrical elements of AO Mon

Element	Primary minimum		Secondary minimum	
	B	*V*	*B*	*V*
x (assumed)	0.6	0.6	0.6	0.6
k	0.93	0.93	0.93	0.93
(k)	0.903	0.903	0.903	0.903
$(1-l_0)$	0.465	0.439	0.375	0.402
L_s	0.412	0.445	0.412	0.447
L_g	0.588	0.555	0.588	0.553
α_0^{oc}	0.910	0.903	0.911	0.900
α_0^{tr}	0.876	0.876	0.876	0.877
p_0	−0.778	−0.777	−0.778	−0.770
θ_e	29°.3	30°.4	27°.8	26°.1
J_g/J_s	1.234	1.079	—	—
i(cir)	85°.8	85°.6	86°.3	86°.3
r_g(cir)	0.256	0.264	0.244	0.230
r_s(cir)	0.238	0.246	0.227	0.214
e	0.05	—	—	—
ω	257°	—	—	—
i(ell)	85°.3	85°.2	86°.6	86°.6
r_g(ell)	0.269	0.277	0.232	0.219
r_s(ell)	0.250	0.258	0.216	0.204
Mean i(ell)	85°.9	—	—	—
Mean r_g(ell)	0.249	—	—	—
Mean r_s(ell)	0.232	—	—	—

The suffixes s and g refer to the smaller and the larger component, respectively.

tricity 'e' of the orbit. The absolute elements have been derived from the radial velocities given by Struve (1945).

To calculate the bolometric magnitudes, the temperatures of the B3 and B5 components have been taken as 18 800 K and 16 400 K, respectively (Harris III, 1963).

The values of the Roche constants were computed and it was found that C_1 and C_2 both are greater than C_0 and that the ratio C_1/C_2 is near unity. Therefore, the system seems to be a detached one. All the elements thus arrived at are listed in Tables III and IV.

TABLE IV

Absolute elements of AO Mon

K_1	185 km s^{-1}
K_2	195 km s^{-1} (Struve, 1945)
A	14.2 $R_\odot$
R_g	3.5 $R_\odot$
R_s	3.3 $R_\odot$
m_g	5.5 $M_\odot$
m_s	5.2 $M_\odot$
M_g (bol)	$-3^m.17$
M_s (bol)	$-2^m.42$
ϱ_g	0.13 $\varrho_\odot$
ϱ_s	0.15 $\varrho_\odot$
C_0	3.99
C_1	5.15
C_2	5.31
C_1/C_2	0.97
W_0	1.52

TABLE V(a)

Observed standard differential U magnitudes of AO Mon

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 240.1378	$+0^d.4933$	$-1^m.062$	240.2955	$0^d.6510$	$-1^m.076$
.1474	0.5029	−1.079	.3036	0.6591	−1.037
.1590	0.5145	−1.105	.3092	0.6647	−1.113
.1685	0.5240	−1.109	241.1229	−0.4063	−1.048
.1777	0.5332	−1.094	.1365	−0.3927	−1.023
.2026	0.5581	−1.033	.1449	−0.3844	−1.018
.2104	0.5659	−1.050	.1544	−0.3749	−0.977
.2156	0.5711	−1.026	.1624	−0.3668	−1.070
.2237	0.5793	−1.091	.1703	−0.3590	−0.991
.2334	0.5889	−1.071	.1793	−0.3499	−1.051
.2404	0.5959	−1.110	.1884	−0.3409	−1.062
.2485	0.6040	−1.148	.1985	−0.3307	−1.050
.2540	0.6095	−1.061	.2234	−0.3059	−0.967

Table V(a) (Continued)

JD(Hel)	Phase	Var. – Comp.	JD(Hel)	Phase	Var. – Comp.
2 440 241.2322	−0ᵈ2970	−1ᵐ026	242.3362	0ᵈ8069	−1ᵐ052
.2415	−0.2877	−1.069	.3377	0.8084	−1.054
.2515	−0.2777	−1.168	.3419	0.8126	−1.055
.2602	−0.2690	−0.999	.3438	0.8145	−1.038
.2700	−0.2593	−1.074	.3456	0.8163	−1.046
.2866	−0.2427	−1.065	.3510	0.8217	−1.011
.2949	−0.2344	−1.077	.3528	0.8235	−0.979
.3048	−0.2245	−1.086	.3545	0.8252	−0.939
.3117	−0.2175	−1.029	.3603	0.8310	−0.908
.3192	−0.2101	−1.049	.3662	0.8370	−0.938
.3264	−0.2028	−1.051	.3680	0.8388	−0.967
.3345	−0.1947	−0.980	.3726	0.8434	−0.863
.3427	−0.1865	−1.009	.3754	0.8461	−0.883
.3506	−0.1787	−1.020	.3839	0.8546	−0.853
.3580	−0.1712	−1.064	.3858	0.8565	−0.882
.3662	−0.1631	−1.138	.3880	0.8588	−0.856
.3742	−0.1550	−1.046	.3927	0.8634	−0.808
.3831	−0.1464	−1.061	.3968	0.8675	−0.760
.3916	−0.1377	−1.092	245.1109	−0.1879	−1.161
242.1233	0.5941	−1.062	.1203	−0.1785	−1.164
.1282	0.5989	−1.068	.1314	−0.1674	−1.147
.1334	0.6041	−1.058	588.1862	−0.1400	−0.966
.1339	0.6046	−1.103	.1962	−0.1300	−0.974
.1378	0.6086	−1.125	.2033	−0.1230	−0.967
.1465	0.6173	−1.044	.2147	−0.1125	−0.852
.1614	0.6322	−1.115	.2210	−0.1052	−0.863
.1683	0.6390	−1.103	.2305	−0.0953	−0.852
.1737	0.6444	−1.123	.2377	−0.0885	−0.949
.1794	0.6501	−1.084	.2475	−0.0787	−0.908
.1907	0.6614	−1.075	.2542	−0.0721	−0.752
.2072	0.6779	−1.075	.2647	−0.0615	−0.698
.2186	0.6893	−1.070	.2753	−0.0509	−0.688
.2244	0.6952	−1.086	.3072	−0.0190	−0.427
.2308	0.7015	−1.121	.3175	−0.0087	−0.450
.2354	0.7061	−1.116	.3244	−0.0019	−0.283
.2433	0.7140	−1.142	.3357	0.0095	−0.290
.2478	0.7185	−1.096	.3431	0.0169	−0.416
.2535	0.7242	−1.087	.3551	0.0288	−0.580
.2627	0.7334	−1.121	.3626	0.0364	−0.633
.2683	0.7391	−1.089	.3761	0.0399	−0.693
.2745	0.7452	−1.120	.3838	0.0576	−0.761
.2807	0.7514	−1.097	.3956	0.0694	−0.709
.2852	0.7559	−1.101	.4015	0.0753	−0.807
.2967	0.7675	−1.150	.4123	0.0861	−0.755
.3060	0.7768	−1.149	.4194	0.0932	−0.821
.3169	0.7877	−1.102	.4302	0.1040	−0.763
.3251	0.7959	−1.099	.4368	0.1106	−0.884
.3269	0.7977	−1.112	.4482	0.1220	−0.850
.3287	0.7994	−1.104	.4570	0.1307	−0.895
.3305	0.8013	−1.117	589.1924	0.8662	−0.798

Table V(a) (Continued)

JD(Hel)	Phase	Var. – Comp.	JD(Hel)	Phase	Var. – Comp.
2 440 589.2032	0ᵈ8770	−0ᵐ801	622.2410	−0ᵈ0110	−0ᵐ322
.2103	0.8841	−0.523	.2454	−0.0066	−0.353
.2217	0.8954	−0.653	.2535	+0.0015	−0.306
.2296	0.9034	−0.669	.2588	0.0067	−0.318
.2414	0.9151	−0.561	.2672	0.0151	−0.374
.2487	0.9225	−0.519	.2739	0.0219	−0.443
.2557	0.9295	−0.500	.2803	0.0283	−0.641
.2625	0.9363	−0.605	.2837	0.0317	−0.573
.2682	0.9419	−0.579	.2897	0.0377	−0.709
.2802	0.9540	−0.609	.2952	0.0432	−0.660
.2881	0.9619	−0.675	.3018	0.0498	−0.586
.2933	0.9671	−0.738	.3058	0.0538	−0.704
.3018	0.9756	−0.736	.3113	0.0593	−0.710
.3068	0.9805	−0.782	.3195	0.0675	−0.736
.3110	0.9848	−0.777	.3247	0.0727	−0.810
.3207	0.9945	−0.699	628.0886	0.1823	−1.042
.3251	0.9989	−0.872	.0987	0.1924	−1.102
.3331	1.0069	−0.791	.1109	0.2046	−1.088
.3383	1.0121	−0.967	.1194	0.2131	−1.032
.3436	1.0173	−0.960	.1274	0.2210	−1.105
.3481	1.0218	−0.921	.1366	0.2303	−1.104
.3547	1.0248	−1.030	.1436	0.2373	−1.144
.3626	1.0364	−1.052	.1522	0.2459	−1.096
.3734	1.0441	−1.037	.1618	0.2555	−1.085
.3747	1.0485	−1.059	.1847	0.2784	−1.105
.3802	1.0540	−1.029	.1930	0.2867	−1.117
.3940	1.0678	−1.065	.2014	0.2951	−1.095
.3988	1.0725	−1.045	.2108	0.3045	−1.120
.4045	1.0783	−1.049	.2188	0.3125	−1.059
.4124	1.0861	−1.049	.2269	0.3205	−1.092
620.1960	−0.1712	−1.093	.2351	0.3287	−1.095
.2053	−0.1620	−1.093	.2915	0.3852	−1.161
.2141	−0.1531	−1.136	.3060	0.3997	−1.034
.2221	−0.1452	−1.045	.3136	0.4073	−1.099
.2288	−0.1384	−1.018	629.1022	1.1959	−1.032
.2382	−0.1290	−1.057	.1126	1.2063	−1.038
.2565	−0.1107	−0.979	.1324	1.2261	−1.030
.2774	−0.0899	−1.011	.1422	1.2358	−1.062
.2882	−0.0790	−0.948	.1517	1.2454	−1.045
.2988	−0.0685	−0.876	.1628	1.2565	−1.036
.3083	−0.0589	−0.718	.1736	1.2673	−1.068
.3163	−0.0509	−0.614	.1819	1.2756	−1.069
.3253	−0.0419	−0.609	.1898	1.2835	−1.078
.3334	−0.0339	−0.458	.1955	1.2892	−1.132
.3418	−0.0255	−0.377	.2042	1.2979	−1.065
622.2100	−0.0420	−0.871	.2106	1.3043	−1.050
.2144	−0.0376	−0.620	.2184	1.3121	−1.105
.2256	−0.0264	−0.510	.2244	1.3181	−1.112
.2277	−0.0243	−0.557	.2382	1.3319	−1.127
.2337	−0.0183	−0.367	.2460	1.3396	−1.110

Table V(a) (Continued)

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 629.2596	1ᵈ3533	−1ᵐ070	629.2990	1ᵈ3927	−1ᵐ030
.2684	1.3621	−1.070	.3050	1.3987	−1.064
.2740	1.3677	−1.038	.3111	1.4047	−1.009
.2806	1.3743	−1.083	.3172	1.4109	−1.062
.2868	1.3805	−1.077	.3241	1.4178	−1.079
.2932	1.3869	−1.040			

TABLE V(b)

Observed standard differential *B* magnitudes of AO Mon

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 240.1351	+0ᵈ4906	−0ᵐ242	241.3043	−0ᵈ2250	−0ᵐ234
.1457	0.5012	−0.261	.3113	−0.2179	−0.216
.1564	0.5119	−0.247	.3423	−0.1870	−0.220
.1669	0.5224	−0.261	.3500	−0.1794	−0.216
.1748	0.5303	−0.252	.3576	−0.1717	−0.229
.1790	0.5345	−0.275	.3737	−0.1555	−0.235
.2020	0.5575	−0.239	242.1218	+0.5925	−0.251
.2116	0.5671	−0.258	.1271	0.5978	−0.247
.2169	0.5714	−0.260	.1324	0.6032	−0.240
.2248	0.5803	−0.256	.1367	0.6074	−0.252
.2301	0.5856	−0.263	.1449	0.6157	−0.238
.2416	0.5971	−0.257	.1603	0.6310	−0.247
.2496	0.6051	−0.245	.1670	0.6378	−0.266
.2556	0.6111	−0.229	.1724	0.6432	−0.269
.2969	0.6524	−0.255	.1787	0.6494	−0.257
.3024	0.6579	−0.237	.1826	0.6534	−0.263
.3080	0.6635	−0.293	.1892	0.6599	−0.267
.3152	0.6707	−0.276	.2057	0.6764	−0.262
241.1224	−0.4069	−0.235	.2126	0.6833	−0.276
.1361	−0.3932	−0.265	.2174	0.6881	−0.275
.1443	−0.3850	−0.251	.2233	0.6940	−0.251
.1538	−0.3754	−0.227	.2295	0.7002	−0.232
.1619	−0.3673	−0.262	.2344	0.7051	−0.250
.1699	−0.3594	−0.259	.2421	0.7128	−0.244
.1878	−0.3414	−0.208	.2467	0.7174	−0.258
.1981	−0.3312	−0.261	.2524	0.7232	−0.265
.2060	−0.3232	−0.261	.2618	0.7325	−0.269
.2147	−0.3145	−0.258	.2672	0.7339	−0.288
.2232	−0.3061	−0.253	.2733	0.7440	−0.279
.2318	−0.2975	−0.286	.2794	0.7502	−0.253
.2410	−0.2883	−0.250	.2840	0.7547	−0.256
.2510	−0.2783	−0.217	.2905	0.7612	−0.235
.2694	−0.2598	−0.224	.2943	0.7650	−0.253
.2858	−0.2434	−0.213	.3037	0.7745	−0.279
.2944	−0.2349	−0.258	.3239	0.7946	−0.277

Table V(b) (Continued)

JD(Hel)	Phase	Var. − Comp.	JD(Hel)	Phase	Var. − Comp.
2 440 242.3257	0ᵈ7964	−0ᵐ248	588.4476	0ᵈ1213	−0ᵐ180
.3277	0.7984	−0.263	.4565	0.1302	−0.183
.3294	0.8001	−0.246	589.1913	0.8648	−0.006
.3350	0.8057	−0.251	.2007	0.8745	0.016
.3369	0.8076	−0.276	.2090	0.8828	0.079
.3407	0.8114	−0.263	.2203	0.8941	0.142
.3424	0.8132	−0.245	.2282	0.9020	0.183
.3444	0.8152	−0.228	.2390	0.9128	0.207
.3517	0.8225	−0.233	.2476	0.9213	0.233
.3535	0.8243	−0.239	.2545	0.9283	0.273
.3576	0.8284	−0.114	.2611	0.9349	0.241
.3652	0.8359	−0.171	.2668	0.9406	0.241
.3667	0.8374	−0.139	.2812	0.9550	0.205
.3713	0.8420	−0.147	.2869	0.9606	0.178
.3769	0.8476	−0.134	.2844	0.9682	0.153
.3824	0.8532	−0.093	.2990	0.9728	0.096
.3846	0.8553	−0.090	.3003	0.9741	0.093
.3868	0.8575	−0.100	.3079	0.9816	0.067
.3914	0.8622	−0.078	.3122	0.9860	0.045
245.1103	−0.1884	−0.205	.3186	0.9923	−0.018
.1198	−0.1790	−0.193	.3263	1.0001	−0.052
.1278	−0.1710	−0.206	.3318	1.0056	−0.083
.1291	−0.1697	−0.260	.3369	1.0107	−0.115
.1308	−0.1680	−0.255	.3449	1.0187	−0.142
588.1853	−0.1409	−0.170	.3493	1.0231	−0.170
.1957	−0.1305	−0.181	.3561	1.0298	−0.171
.2028	−0.1235	−0.182	.3614	1.0352	−0.188
.2142	−0.1120	−0.107	.3692	1.0430	−0.193
.2199	−0.1064	−0.092	.3760	1.0498	−0.227
.2303	−0.0959	−0.021	.3929	1.0666	−0.231
.2373	−0.0889	−0.010	.3976	1.0714	−0.234
.2469	−0.0794	−0.052	.4056	1.0794	−0.249
.2538	−0.0724	−0.003	.4109	1.0847	−0.249
.2642	−0.0620	0.095	.4188	1.0926	−0.245
.2749	−0.0513	0.137	.4299	1.1036	−0.243
.3067	−0.0195	0.338	.4342	1.1080	−0.241
.3170	−0.0092	0.350	620.1951	−0.1721	−0.245
.3239	−0.0023	0.447	.2048	−0.1625	−0.234
.3353	0.0091	0.440	.2135	−0.1537	−0.230
.3426	0.0163	0.371	.2215	−0.1457	−0.250
.3546	0.0284	0.209	.2283	−0.1389	−0.227
.3622	0.0360	0.221	.2377	−0.1296	−0.189
.3745	0.0483	0.155	.2560	−0.1113	−0.151
.3834	0.0572	0.103	.2769	−0.0905	−0.173
.3951	0.0688	0.018	.2877	−0.0795	0.003
.4010	0.0748	0.015	.2983	−0.0690	0.013
.4119	0.0857	−0.027	.3079	−0.0594	0.069
.4190	0.0927	−0.066	.3158	−0.0514	0.134
.4296	0.1034	−0.110	.3248	−0.0424	0.184
.4363	0.1100	−0.125	.3329	−0.0344	0.216

Table V(b) (Continued)

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 620.3414	−0ᵈ0259	0ᵐ317	628.2265	0ᵈ3201	−0ᵐ278
622.2110	−0.0410	0.203	.2345	0.3282	−0.257
.2153	−0.0367	0.164	.2425	0.3362	−0.269
.2267	−0.0254	0.304	.2748	0.3685	−0.256
.2287	−0.0233	0.349	.2829	0.3766	−0.243
.2347	−0.0174	0.388	.2912	0.3849	−0.264
.2400	−0.0120	0.403	.3056	0.3992	−0.248
.2465	−0.0056	0.428	.3131	0.4067	−0.241
.2524	+0.0003	0.401	629.1005	1.1942	−0.249
.2600	0.0080	0.424	.1113	1.2050	−0.264
.2658	0.0137	0.410	.1212	1.2149	−0.218
.2721	0.0201	0.367	.1312	1.2249	−0.245
.2815	0.0294	0.328	.1411	1.2348	−0.278
.2826	0.0306	0.278	.1503	1.2440	−0.253
.2910	0.0390	0.157	.1615	1.2552	−0.235
.2938	0.0418	0.189	.1726	1.2662	−0.293
.3034	0.0514	0.168	.1806	1.2743	−0.255
.3070	0.0550	0.139	.1886	1.2823	−0.252
.3124	0.0604	0.125	.2031	1.2968	−0.271
.3174	0.0654	0.045	.2092	1.3029	−0.250
.3183	0.0662	0.058	.2172	1.3110	−0.262
.3272	0.0752	−0.030	.2232	1.3169	−0.265
628.0882	0.1819	−0.254	.2310	1.3246	−0.240
.0982	0.1919	−0.239	.2369	1.3306	−0.248
.1106	0.2042	−0.244	.2449	1.3386	−0.233
.1190	0.2126	−0.237	.2585	1.3522	−0.250
.1269	0.2206	−0.239	.2673	1.3610	−0.257
.1362	0.2299	−0.224	.2729	1.3666	−0.243
.1431	0.2368	−0.250	.2794	1.3731	−0.253
.1517	0.2454	−0.228	.2858	1.3795	−0.253
.1613	0.2550	−0.258	.2920	1.3857	−0.260
.1842	0.2779	−0.271	.2981	1.3917	−0.250
.1926	0.2863	−0.293	.3040	1.3977	−0.237
.2010	0.2947	−0.270	.3099	1.4036	−0.259
.2103	0.3040	−0.260	.3161	1.4098	−0.244
.2183	0.3112	−0.277	.3230	1.4167	−0.257

TABLE V(c)

Observed standard differential V magnitudes of AO Mon

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 240.1369	0ᵈ4924	−0ᵐ110	240.1783	0ᵈ5339	−0ᵐ142
.1464	0.5019	−0.087	.2032	0.5587	−0.075
.1578	0.5133	−0.119	.2110	0.5665	−0.123
.1679	0.5234	−0.170	.2164	0.5719	−0.102
.1753	0.5308	−0.117	.2242	0.5797	−0.123

Table V(c) (Continued)

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 240.2410	0ᵈ5965	−0ᵐ125	242.2303	0ᵈ7011	−0ᵐ092
.2491	0.6046	−0.130	.2348	0.7056	−0.103
.2548	0.6103	−0.108	.2428	0.7135	−0.113
.2963	0.6418	−0.059	.2473	0.7180	−0.113
.3030	0.6585	−0.108	.2530	0.7237	−0.092
.3086	0.6641	−0.112	.2622	0.7329	−0.103
.3160	0.6715	−0.096	.2678	0.7385	−0.107
241.1223	−0.4070	−0.120	.2740	0.7448	−0.116
.1356	−0.3936	−0.097	.2801	0.7508	−0.113
.1436	−0.3857	−0.121	.2846	0.7553	−0.096
.1533	−0.3760	−0.084	.2913	0.7620	−0.074
.1614	−0.3678	−0.132	.2962	0.7669	−0.131
.1694	−0.3599	−0.116	.3045	0.7752	−0.106
.1782	−0.3511	−0.137	.3176	0.7884	−0.135
.1872	−0.3421	−0.134	.3245	0.7952	−0.109
.1975	−0.3318	−0.108	.3264	0.7971	−0.111
.2141	−0.3152	−0.091	.3281	0.7989	−0.104
.2224	−0.3069	−0.078	.3298	0.8006	−0.106
.2312	−0.2980	−0.102	.3412	0.8119	−0.075
.2406	−0.2887	−0.100	.3430	0.8138	−0.076
.2503	−0.2789	−0.079	.3449	0.8157	−0.073
.2688	−0.2604	−0.098	.3504	0.8211	−0.054
.2853	−0.2439	−0.089	.3523	0.8230	−0.058
.2940	−0.2353	−0.123	.3540	0.8247	−0.046
.3109	−0.2184	−0.073	.3593	0.8300	−0.022
.3182	−0.2111	−0.080	.3655	0.8363	−0.004
.3253	−0.2040	−0.107	.3674	0.8381	−0.028
.3336	−0.1957	−0.101	.3719	0.8426	0.004
.3419	−0.1874	−0.163	.3762	0.8470	0.038
.3495	−0.1797	−0.108	.3832	0.8539	0.034
.3571	−0.1712	−0.161	.3853	0.8560	0.030
.3651	−0.1642	−0.066	.3922	0.8629	0.080
.3733	−0.1560	−0.047	.3973	0.8680	0.106
.3818	−0.1475	−0.079	245.1098	−0.1890	−0.102
.3904	−0.1388	−0.003	.1192	−0.1795	−0.085
242.1227	0.5934	−0.081	.1272	−0.1716	−0.095
.1276	0.5984	−0.096	.1285	−0.1703	−0.118
.1329	0.6037	−0.119	.1302	−0.1676	−0.125
.1372	0.6079	−0.079	588.1844	−0.1418	−0.039
.1458	0.6165	−0.088	.1952	−0.1310	−0.024
.1609	0.6316	−0.091	.2195	−0.1067	0.062
.1677	0.6384	−0.113	.2298	−0.0964	0.066
.1730	0.6438	−0.105	.2369	−0.0893	0.092
.1791	0.6498	−0.111	.2464	−0.0798	0.074
.1832	0.6539	−0.091	.2533	−0.0729	0.113
.1899	0.6606	−0.083	.2638	−0.0624	0.204
.2064	0.6772	−0.121	.2746	−0.0516	0.248
.2119	0.6826	−0.115	.3061	−0.0201	0.504
.2180	0.6887	−0.128	.3165	−0.0097	0.449
.2237	0.6945	−0.093	.3234	−0.0028	0.556

Table V(c) (Continued)

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 588.3349	+0ᵈ0086	0ᵐ503	620.2210	−0ᵈ1463	−0ᵐ110
.3419	0.0157	0.471	.2278	−0.1395	−0.089
.3541	0.0279	0.382	.2372	−0.1301	−0.038
.3618	0.0356	0.352	.2556	−0.1117	−0.046
.3740	0.0478	0.301	.2757	−0.0915	0.060
.3831	0.0568	0.229	.2872	−0.0800	0.121
.3946	0.0684	0.130	.2977	−0.0695	0.148
.4004	0.0741	0.131	.3072	−0.0600	0.212
.4115	0.0752	0.116	.3154	−0.0518	0.270
.4185	0.0923	0.039	.3242	−0.0430	0.322
.4291	0.1029	0.045	.3324	−0.0349	0.387
.4358	0.1095	0.020	.3409	−0.0264	0.480
.4471	0.1209	−0.043	622.2105	−0.0415	0.381
.4559	0.1297	−0.069	.2149	−0.0371	0.380
589.1918	0.8656	0.119	.2261	−0.0259	0.425
.2021	0.8759	0.186	.2282	−0.0238	0.441
.2096	0.8834	0.222	.2342	−0.0179	0.500
.2211	0.8949	0.295	.2405	−0.0115	0.505
.2290	0.9027	0.350	.2458	−0.0062	0.528
.2409	0.9144	0.411	.2530	0.0010	0.543
.2482	0.9220	0.436	.2595	0.0075	0.530
.2550	0.9288	0.454	.2665	0.0145	0.514
.2619	0.9356	0.458	.2728	0.0208	0.491
.2676	0.9414	0.439	.2809	0.0289	0.421
.2807	0.9545	0.406	.2833	0.0312	0.421
.2875	0.9613	0.337	.2904	0.0384	0.370
.2938	0.9676	0.278	.2946	0.0426	0.317
.2995	0.9733	0.251	.3026	0.0505	0.298
.3014	0.9752	0.248	.3118	0.0598	0.254
.3072	0.9810	0.206	.3167	0.0646	0.193
.3115	0.9853	0.187	.3188	0.0668	0.194
.3192	0.9929	0.127	.3253	0.0733	0.160
.3257	0.9995	0.097	628.0876	0.1813	−0.086
.3325	1.0063	0.032	.0978	0.1914	−0.110
.3376	1.0113	−0.004	.1101	0.2038	−0.098
.3442	1.0180	−0.016	.1185	0.2122	−0.107
.3487	1.0225	−0.021	.1265	0.2201	−0.101
.3554	1.0291	−0.053	.1357	0.2294	−0.108
.3621	1.0359	−0.070	.1426	0.2363	−0.093
.3698	1.0436	−0.090	.1513	0.2450	−0.132
.3754	1.0491	−0.096	.1609	0.2546	−0.100
.3809	1.0547	−0.072	.1838	0.2774	−0.108
.3934	1.0672	−0.122	.1919	0.2856	−0.116
.3981	1.0719	−0.129	.2005	0.2942	−0.115
.4049	1.0787	−0.136	.2098	0.3035	−0.090
.4183	1.0921	−0.117	.2178	0.3115	−0.133
.4292	1.1030	−0.073	.2259	0.3196	−0.142
620.1945	−0.1727	−0.109	.2421	0.3358	−0.122
.2043	−0.1629	−0.119	.2737	0.3674	−0.129
.2130	−0.1542	−0.112	.2824	0.3761	−0.136

Table V(c) (Continued)

JD(Hel)	Phase	Var.−Comp.	JD(Hel)	Phase	Var.−Comp.
2 440 628.2907	0ᵈ3844	−0ᵐ157	629.2098	1ᵈ3035	−0ᵐ120
.2978	0.3915	−0.101	.2178	1.3115	−0.114
.3053	0.3989	−0.156	.2237	1.3195	−0.129
.3126	0.4062	−0.135	.2316	1.3254	−0.155
629.1010	1.1947	−0.145	.2375	1.3312	−0.107
.1119	1.2055	−0.109	.2455	1.3391	−0.104
.1217	1.2153	−0.108	.2591	1.3528	−0.136
.1317	1.2254	−0.154	.2678	1.3615	−0.103
.1415	1.2352	−0.128	.2735	1.3672	−0.090
.1510	1.2447	−0.093	.2799	1.3736	−0.138
.1622	1.2558	−0.093	.2863	1.3799	−0.097
.1731	1.2668	−0.137	.2926	1.3863	−0.113
.1812	1.2749	−0.087	.2986	1.3922	−0.137
.1892	1.2829	−0.116	.3045	1.3982	−0.149
.1951	1.2887	−0.105	.3105	1.4042	−0.131
.2037	1.2974	−0.124	.3235	1.4172	−0.136

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