

# THE THREE COLOUR PHOTOELECTRIC OBSERVATIONS OF THE PULSATING VARIABLE W CVn

J. TREMKO

*Astronomical Institute of the Slovak Academy of Sciences,  
Skalná Pleso, Czechoslovakia*

*Abstract.* The three colour photoelectric observations of the pulsating variable W CVn obtained with 60 cm reflector of the Skalná Pleso Observatory are presented. The variable star was observed during six-year interval. The mean error of the yellow observations is  $\pm 0^m.016$  and the mean error of the blue observations is  $\pm 0^m.025$ . The accuracy of the ultraviolet observations is less than twice lower as the accuracy of the yellow observations.

The pulsating variable star W CVn was observed photoelectrically with the 60 cm f/5.5 reflector of the Astronomical Observatory Skalná Pleso. The photoelectric observations included in this paper were obtained in the period of time from 18th February 1963 until 22th April 1968. The photoelectric photometer was installed in the Newtonian focus of the telescope and the RCA 1 P 21 type electron multiplier tube was used as a detector. The optical system of the photometer is based on the exit pupil system with a Fabry lens and thus the performance of the apparatus is not dependent either on the form of the object under observation, or on its position in the focal diaphragm. The electron multiplier tube was originally fed by a dry battery. Later the high tension stabilizer, type NBZ 411 with a short-time stability of 0.05% was used. The signal at the output of the electron multiplier tube is measured with the recording potentiometer, type EZ 4 with an accuracy of 0.2%. The limiting sensitivity is 100  $\mu$ V for the full deflection of the pen. The stability of the zero point is 1  $\mu$ V. The detailed description of the photoelectric photometer is given in our preceding paper (Tremko, 1975). The

transformation equations from the instrumental to the standard UBV photometric system were also published in the above cited paper. The observations have shown that the instrumental photometric system is very close to the standard UBV system. The observations of the variable started in 1963 originally for the search of the Blažko effect (Tremko, 1974) in the V band and later also the B and V observations were obtained. The mean error of the yellow observations is  $\pm 0^m.016$  and the mean error of the blue observations is  $\pm 0^m.025$ . The accuracy of the ultraviolet observations is less than twice lower as the accuracy of the yellow observations.

We used during photoelectric observations the comparison star BD + 37°2495.

The variable star W CVn is RRab type with stable and smooth light curve excluding the hump on the ascending branch. The period was found not to be constant and the secular shortening from earliest observations was indicated but Blažko effect is not present. The absolute magnitude derived from the period-luminosity relation is  $M_v = +0^m.54$  and the distance of the variable is  $r = 980$  pc. Historical review and other data are published in our preceding paper (Tremko, 1974).

The data observing intervals, numbers of observations and mean errors are summarized in Tables 1—3. The symbols in the last column of the Tables 1—3 denote: 1 — interfering cirrus, 2 — interfering fog, 3 — interfering clouds, 4 — bad transparency. The UBV observations of the variable are listed in Tables 4—6.

Table 1  
Observing intervals and m.e. of one observation  
Yellow observations

	Date		J.D.		<i>n</i>	m.e.	Notes
1963	Feb.	18/19	2438079.3829	-.5620	81	± 0 <sup>m</sup> .015	3
		22/23	2438083.3921	-.5949	84	.017	
		23/24	2438084.3602	-.5471	81	.014	4
		24/25	2438085.3109	-.5686	100	.013	4
	Feb. 28/1	March	2438089.3380	-.3921	16	.018	1
	March	16/17	2438105.3060	-.3784	41	.013	1
	Apr.	2/3	2438122.3783	-.4437	29	.028	
		4/5	2438124.4029	-.4775	32	.021	1
	1964	Jan.	30/31	2438425.4989	-.5086	11	.024
Feb.		21/22	2438447.3710	-.5529	102	.014	4
		22/23	2438448.3690	-.6437	155	.014	4
		24/25	2438450.3723	-.6835	185	.011	4
		March	2/3	2438457.2928	-.5067	175	.014
		9/10	2438464.4112	-.6367	143	.010	2
Apr.		11/12	2438497.4442	-.6064	133	.015	

Table 2  
Observing intervals and m.e. of one observation  
Blue observations

	Date		J.D.		<i>n</i>	m.e.	Notes	
1967	Feb.	26/27	2439548.4212	-.4670	34	± 0 <sup>m</sup> .036	1, 2	
	March	7/8	2439557.3531	-.5353	144	.014		
		26/27	2439576.4203	-.4509	20	.035		
	May	6/7	2439617.3389	-.4108	37	.024		
		10/11	2439621.3248	-.3661	37	.019		
	June	20/21	2439662.3613	-.4745	50	.031		
		23/24	2439665.3832	-.5294	15	.017		
		25/26	2439667.4816	-.5279	34	.039	1	
		26/27	2439668.3729	-.4748	96	.016	4	
	July	29/30	2439671.4359	-.4490	12	.026	1	
		8/9	2439680.3479	-.3654	23	.046		
		10/11	2439682.4372	-.4816	28	.034		
		11/12	2439683.4047	-.4290	16	.013		
		12/13	2439684.3654	-.3723	12	.017		
		14/15	2439686.4200	-.4260	10	.029	1	
		19/20	2439691.3771	-.3950	15	.025	1	
		Nov.	24/25	2439758.6707	-.6870	21	.015	2
	Dec.	28/29	2439853.5956	-.5979	4	.026		
	1968	Jan.	2/3	2439858.4874	-.5016	15	.021	
			8/9	2439864.5105	-.5161	8	.030	1
9/10			2439865.5569	-.6178	37	.027	2	
10/11			2439866.6151	-.6466	24	.027		
March		26/27	2439942.4120	-.4539	48	.016		
Apr.		22/23	2439969.4546	-.4975	29	.029		

Table 3  
Observing intervals and m.e. of one observations Ultraviolet observations

	Date		J.D.		<i>n</i>	m.e.	Notes
1967	March	1/2	2439551.4179	-.4268	11	± 0 <sup>m</sup> .042	
		5/6	2439555.3156	-.3881	42	.037	1
		10/11	2439560.4322	-.4821	28	.035	
		14/15	2439564.6235	-.6512	31	.011	
	Apr.	11/12	2439592.4523	-.5424	12	.022	1
		28/29	2439609.5353	-.5702	17	.034	
	Apr. 30/1 May		2439611.5006	-.5780	47	.035	2
	May	10/11	2439621.3919	-.5608	47	.048	
		12/13	2439623.3344	-.4852	37	.032	1
	June	18/19	2439660.5095	-.5115	4	.035	1
		23/24	2439665.4152	-.4746	17	.036	
		25/26	2439667.4203	-.4492	8	.023	1
		26/27	2439668.4902	-.5196	10	.016	4
		29/30	2439671.4211	-.4243	3	.020	1
	Dec.	1/2	2439826.6363	-.6939	27	.051	1
		12/13	2439837.6143	-.6928	40	.025	3
		26/27	2439851.5090	-.5101	2	.006	3
27/28		2439852.6172	-.7116	44	.031		
28/29		2439853.5192	-.6567	23	.027	1	
1968	Jan.	9/10	2439865.4757	-.7060	73	.047	2
		10/11	2439866.4925	-.6006	49	.043	
		19/20	2439875.6401	-.6471	6	.032	1
1968	Feb.	4/5	2439891.6527	-.6930	25	.046	
		19/20	2439906.5309	-.5853	48	.039	1
	March	7/8	2439923.6217	-.6385	15	.051	
		26/27	2439942.3280	-.4026	31	.042	
		27/28	2439943.4370	-.4562	7	.054	1, 2
		28/29	2439944.3556	-.5068	36	.039	
	Apr.	1/2	2439948.4038	-.4751	21	.053	1
		22/23	2439969.4200	-.4462	13	.041	

Table 4  
Photoelectric observations W CVn Yellow

J.D. <sub>⊙</sub>	V	J.D. <sub>⊙</sub>	V
2438079.3829	10.355	.4384	10.472
.3843	10.369	.4398	10.460
.3870	10.369	.4412	10.487
.3884	10.366	.4426	10.496
.3912	10.369	.4447	10.487
.3926	10.374	.4454	10.494
.3947	10.383	.4474	10.517
.3961	10.376	.4481	10.515
.3981	10.369	.4502	10.532
.3995	10.357	.4609	10.520
.4016	10.411	.4530	10.522
.4030	10.393	.4537	10.535
.4058	10.408	.4558	10.541
.4072	10.414	.4565	10.532
.4093	10.404	.4586	10.572
.4106	10.406	.4600	10.555
.4224	10.453	.4620	10.531
.4238	10.471	.4627	10.560
.4259	10.473	.4759	10.567
.4273	10.477	.4773	10.582
.4322	10.448	.4794	10.598
.4343	10.458	.4808	10.590

Table 4. cont.

J.D. <sub>⊙</sub>	V	J.D. <sub>⊙</sub>	V
.4836	10.607	.5301	10.675
.4849	10.623	.5315	10.683
.4870	10.619	.5336	10.708
.4884	10.627	.5349	10.710
.4905	10.621	.5419	10.743
.4919	10.635	.5447	10.730
.4940	10.612	.5461	10.755
.4954	10.635	.5481	10.742
.4981	10.633	.5495	10.714
.4995	10.625	.5530	10.711
.5016	10.626	.5551	10.715
.5030	10.649	.5558	10.754
.5058	10.621	.5579	10.752
.5079	10.630	.5606	10.747
.5099	10.640	.5620	10.755
.5113	10.672		
.5134	10.674	2438083.3921	10.669
.5211	10.653	.3935	10.697
.5231	10.671	.3956	10.684
.5245	10.691	.3963	10.692
.5266	10.668	.3977	10.669
.5280	10.701	.3990	10.700

Table 4. cont.

J.D. <sub>⊙</sub>	V	J.D. <sub>⊙</sub>	V
.4011	10.681	.5358	10.814.
.4025	10.691	.5379	10.786
.4039	10.694	.5386	10.792
.4046	10.700	.5407	10.780
.4108	10.717	.5414	10.795
.4112	10.701	.5428	10.794
.4129	10.671	.5518	10.803
.4143	10.689	.5532	10.798
.4164	10.675	.5553	10.822
.4172	10.678	.5581	10.798
.4192	10.691	.5622	10.813
.4206	10.698	.5636	10.798
.4226	10.715	.5680	10.813
.4240	10.724	.5699	10.809
.4261	10.737	.5893	10.814
.4275	10.740	.5907	10.837
.4296	10.743	.5935	10.821
.4310	10.743	.5949	10.807
.4331	10.734		
.4345	10.747	2438084.3602	10.376
.4365	10.730	.3616	10.364
.4379	10.730	.3637	10.384
.4400	10.737	.3651	10.371
.4414	10.732	.3672	10.389
.4435	10.734	.3679	10.397
.4449	10.734	.3700	10.389
.4470	10.734	.3714	10.384
.4483	10.734	.3734	10.379
.4504	10.729	.2741	10.309
.4518	10.720	.3755	10.394
.4529	10.761	.3769	10.397
.4553	10.768	.3790	10.397
.4574	10.765	.3804	10.393
.4588	10.765	.3825	10.420
.4609	10.768	.3839	10.428
.4622	10.764	.3859	10.437
.4643	10.770	.3866	10.434
.4025	10.784	.4075	10.486
.5039	10.774	.4089	10.511
.5053	10.772	.4109	10.502
.5060	10.780	.4116	10.508
.5081	10.807	.4137	10.496
.5095	10.816	.4151	10.493
.5108	10.794	.4172	10.519
.5122	10.812	.4186	10.549
.5143	10.822	.4255	10.542
.5157	10.810	.4269	10.561
.5171	10.800	.4290	10.558
.5178	10.792	.4304	10.555
.5192	10.792	.4325	10.564
.5206	10.795	.4339	10.572
.5226	10.797	.4359	10.534
.5233	10.794	.4373	10.548
.5268	10.785	.4401	10.542
.5282	10.812	.4415	10.561
.5296	10.808	.4436	10.562
.5303	10.820	.4450	10.556
.5324	10.792	.4471	10.562
.5331	10.789	.4484	10.570
.5345	10.795	.4505	10.572

Table 4. cont.

J.D. <sub>⊙</sub>	V	J.D. <sub>⊙</sub>	V
.4519	10.586	.3394	10.449
.4540	10.591	.3415	10.427
.4554	10.594	.3422	10.399
.4603	10.605	.3436	10.403
.4616	10.596	.3450	10.403
.4637	10.605	.3471	10.396
.4651	10.598	.3484	10.384
.4700	10.601	.3505	10.370
.4998	10.670	.3519	10.360
.5012	10.643	.3533	10.338
.5026	10.691	.3547	10.327
.5040	10.686	.3568	10.305
.5061	10.699	.3582	10.284
.5068	10.702	.3602	10.281
.5089	10.711	.3609	10.273
.5096	10.698	.3741	10.125
.5116	10.670	.3755	10.119
.5123	10.676	.3769	10.107
.5144	10.705	.3783	10.102
.5151	10.689	.3832	10.111
.5172	10.683	.3846	10.091
.5179	10.721	.3866	10.097
.5200	10.695	.3880	10.083
.5214	10.701	.3901	10.098
.5234	10.698	.3915	10.107
.5241	10.686	.3936	10.110
.5262	10.703	.3950	10.122
.5269	10.706	.3971	10.122
.5290	10.714	.3984	10.139
.5304	10.733	.4995	10.138
.5325	10.721	.4019	10.156
.5339	10.715	.4040	10.120
.5359	10.729	.4054	10.135
.5373	10.732	.4075	10.134
.5394	10.724	.4089	10.146
.5408	10.710	.4109	10.174
.5429	10.721	.4123	10.232
.5436	10.731	.4248	10.199
.5457	10.731	.4262	10.238
.5471	10.719	.4283	10.282
		.4457	10.297
2438085.3109	10.942	.4471	10.257
.3123	10.919	.4929	10.414
.3144	10.891	.4943	10.439
.3151	10.850	.4964	10.435
.3172	10.854	.4977	10.446
.3179	10.847	.4998	10.452
.3200	10.826	.5012	10.460
.3214	10.816	.5033	10.452
.3227	10.770	.5047	10.456
.3241	10.744	.5061	10.472
.3262	10.750	.5075	10.488
.3276	10.716	.5096	10.497
.3297	10.681	.5109	10.490
.3304	10.658	.5130	10.483
.3325	10.647	.5144	10.496
.3332	10.638	.5165	10.510
.3352	10.565	.5179	10.510
.3362	10.526	.5200	10.523
.3380	10.491	.5214	10.527

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.5234	10.508	.3446	10.431
.5248	10.516	.3460	10.439
.5269	10.543	.3481	10.435
.5283	10.530	.3495	10.433
.5304	10.523	.3516	10.428
.5318	10.544	.3530	10.441
.5332	10.535	.3552	10.438
.5352	10.524	.3566	10.448
.5366	10.542	.3587	10.453
.5387	10.540	.3608	10.481
.5401	10.544	.3629	10.475
.5422	10.555	.3643	10.469
.5436	10.568	.3664	10.484
.5457	10.571	.3678	10.499
.5471	10.594	.3699	10.499
.5498	10.576	.3714	10.473
.5519	10.586	.3735	10.504
.5637	10.639	.3749	10.502
.5651	10.629	.3770	10.512
.5672	10.639	.3784	10.507
.5686	10.664	2428122.3783	10.114
		.3818	10.138
2438089.3380	10.416	.3844	10.174
.3416	10.338	.3860	10.189
.3455	10.454	.3885	10.213
.3484	10.471	.3922	10.253
.3622	10.496	.3936	10.221
.3650	10.515	.3958	10.296
.3679	10.496	.4099	10.308
.3706	10.524	.4124	10.272
.3733	10.502	.4141	10.285
.3760	10.523	.4158	10.303
.3787	10.543	.4171	10.295
.3814	10.487	.4195	10.322
.3840	10.530	.4211	10.324
.3867	10.594	.4232	10.321
.3894	10.564	.4245	10.312
.3921	10.566	.4264	10.338
		.4278	10.341
2438105.3060	10.296	.4295	10.309
.3090	10.293	.4308	10.319
.3100	10.293	.4330	10.312
.3115	10.307	.4343	10.321
.3133	10.314	.4364	10.311
.3155	10.329	.4375	10.310
.3168	10.351	.4394	10.338
.3187	10.347	.4405	10.340
.3200	10.350	.4426	10.316
.3230	10.328	.4437	10.358
.3244	10.366		
.3270	10.355	2438124.4029	10.758
.3276	10.365	.4043	10.747
.3305	10.407	.4069	10.833
.3318	10.408	.4083	10.842
.3340	10.413	.4128	10.776
.3354	10.413	.4156	10.781
.3377	10.396	.4176	10.855
.3391	10.394	.4221	10.816
.3411	10.418	.4236	10.837
.3425	10.434	.4260	10.848

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.4276	10.845	.4071	10.264
.4308	10.870	.4081	10.297
.4324	10.850	.4093	10.303
.4358	10.848	.4102	10.328
.4374	10.869	.4109	10.312
.4408	10.863	.4124	10.294
.4425	10.853	.4135	10.318
.4462	10.869	.4147	10.326
.4478	10.883	.4157	10.318
.4504	10.883	.4169	10.312
.4519	10.883	.4217	10.370
.4560	10.921	.4231	10.382
.4577	10.929	.4244	10.361
.4611	10.900	.4261	10.356
.4643	10.915	.4273	10.313
.4657	10.900	.4285	10.356
.4684	10.908	.4298	10.377
.4696	10.912	.4312	10.356
.4722	10.912	.4322	10.384
.4734	10.905	.4339	10.375
.4747	10.898	.4352	10.377
.4775	10.948	.4402	10.439
		.4415	10.400
2438425.4989	10.733	.4430	10.447
.4998	10.735	.4444	10.424
.5004	10.756	.4455	10.433
.5010	10.721	.4467	10.431
.5017	10.686	.4476	10.460
.5044	10.756	.4485	10.449
.5050	10.753	.4494	10.442
.5057	10.721	.4503	10.428
.5064	10.730	.4517	10.412
.5073	10.715	.4530	10.414
.5086	10.735	.4574	10.448
		.4585	10.473
2438447.3710	10.186	.4599	10.460
.3722	10.190	.4609	10.467
.3733	10.193	.4620	10.460
.3744	10.197	.4635	10.460
.3755	10.183	.4644	10.473
.3765	10.194	.4657	10.467
.3775	10.217	.4669	10.464
.3786	10.204	.4682	10.508
.3796	10.209	.4694	10.455
.3809	10.196	.4709	10.497
.3821	10.197	.5050	10.590
.3868	10.244	.5061	10.592
.3877	10.257	.5073	10.601
.3891	10.267	.5086	10.585
.3901	10.256	.5101	10.628
.3914	10.251	.5115	10.587
.3929	10.241	.5129	10.596
.3938	10.252	.5143	10.599
.3947	10.244	.5156	10.582
.3958	10.243	.5168	10.622
.3970	10.240	.5179	10.619
.3984	10.262	.5221	10.624
.3992	10.271	.5233	10.634
.4047	10.309	.5245	10.627
.4061	10.312	.5261	10.634

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.5272	10.624	.4265	10.107
.5285	10.658	.4276	10.106
.5302	10.633	.4286	10.099
.5316	10.638	.4300	10.095
.5326	10.661	.4315	10.083
.5343	10.668	.4332	10.074
.5362	10.668	.4345	10.061
.5408	10.724	.4363	10.062
.5424	10.678	.4376	10.051
.5435	10.720	.4390	10.047
.5444	10.715	.4401	10.043
.5461	10.700	.4465	10.112
.5475	10.690	.4477	10.111
.5489	10.694	.4496	10.100
.5503	10.703	.4512	10.119
.5515	10.685	.4522	10.102
.5529	10.734	.4531	10.104
		.4542	10.099
2438448.3690	10.896	.4553	10.091
.3699	10.878	.4567	10.096
.3712	10.869	.4578	10.116
.3723	10.828	.4590	10.127
.3734	10.832	.4604	10.116
.3744	10.840	.4651	10.170
.3753	10.803	.4660	10.164
.3766	10.798	.4675	10.163
.2780	10.787	.4690	10.164
.2791	10.738	.4789	10.200
.3802	10.741	.4803	10.201
.3813	10.710	.4815	10.203
.3823	10.715	.4825	10.211
.3831	10.713	.4837	10.206
.3874	10.624	.4849	10.204
.3882	10.585	.4891	10.235
.3891	10.585	.4901	10.219
.3902	10.561	.4912	10.299
.3913	10.523	.4920	10.255
.3928	10.463	.4932	10.266
.3943	10.436	.4944	10.260
.3955	10.412	.4955	10.248
.3964	10.365	.4969	10.261
.3974	10.397	.4984	10.267
.3985	10.401	.4999	10.270
.3993	10.407	.5014	10.279
.4003	10.365	.5028	10.291
.4013	10.361	.5408	10.441
.4025	10.378	.5417	10.418
.4081	10.340	.5427	10.411
.4100	10.304	.5439	10.413
.4110	10.311	.5448	10.428
.4119	10.308	.5460	10.426
.4130	10.266	.5472	10.414
.4114	10.237	.5485	10.416
.4158	10.243	.5498	10.454
.4170	10.222	.5509	10.428
.4179	10.206	.5519	10.441
.4191	10.182	.5530	10.426
.4201	10.155	.5543	10.424
.4213	10.137	.5577	10.515
.4254	10.129	.5592	10.480

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.5604	10.450	.3774	10.749
.5619	10.475	.3787	10.734
.5635	10.442	.3801	10.736
.5648	10.484	.3815	10.747
.5660	10.479	.3831	10.752
.5670	10.477	.3857	10.723
.5689	10.518	.3867	10.747
.5703	10.484	.3907	10.779
.5713	10.470	.3916	10.751
.5724	10.500	.3927	10.748
.5769	10.520	.3940	10.779
.5778	10.471	.3953	10.787
.5790	10.509	.3967	10.769
.5804	10.516	.3980	10.787
.5814	10.533	.3994	10.756
.5824	10.531	.4006	10.798
.5841	10.524	.4020	10.777
.5849	10.529	.4032	10.767
.5859	10.539	.4044	10.764
.5869	10.541	.4058	10.756
.5882	10.559	.4069	10.792
.5895	10.543	.4119	10.815
.5915	10.594	.4131	10.792
.5988	10.581	.4146	10.779
.6002	10.577	.4156	10.767
.6016	10.550	.4167	10.765
.6029	10.579	.4175	10.787
.6046	10.575	.4184	10.782
.6059	10.588	.4193	10.787
.6069	10.588	.4205	10.767
.6080	10.553	.4216	10.787
.6091	10.568	.4226	10.804
.6102	10.609	.4239	10.789
.6112	10.624	.4250	10.787
.6127	10.602	.4262	10.755
.6176	10.615	.4272	10.740
.6192	10.609	.4283	10.767
.6208	10.625	.4329	10.822
.6220	10.611	.4339	10.808
.6230	10.599	.4354	10.798
.6244	10.623	.4370	10.795
.6255	10.621	.4384	10.820
.6265	10.628	.4425	10.806
.6275	10.619	.4438	10.787
.6289	10.662	.4453	10.786
.6308	10.651	.4465	10.802
.6328	10.673	.4478	10.767
.6384	10.628	.4487	10.769
.6394	10.646	.4498	10.770
.6405	10.648	.4550	10.793
.6415	10.669	.4563	10.783
.6425	10.669	.4574	10.790
.6437	10.687	.4586	10.812
		.4596	10.785
		.4606	10.776
2438450.3723	10.759	.4615	10.771
.3724	10.773	.4625	10.790
.3744	10.754	.4638	10.781
.3753	10.749	.4655	10.781
.3763	10.721	.4668	10.776

Table 4. cont.

J.D. <sub>C</sub>	V	J.D. <sub>C</sub>	V
.4685	10.771	.6133	10.332
.4697	10.778	.6143	10.340
.4708	10.793	.6152	10.311
.4718	10.795	.6163	10.324
.5226	10.867	.6174	10.301
.5239	10.818	.6190	10.267
.5254	10.850	.6210	10.276
.5269	10.852	.6222	10.254
.5284	10.890	.6232	10.243
.5294	10.919	.6242	10.220
.5308	10.901	.6254	10.228
.5323	10.887	.6266	10.182
.5337	10.895	.6280	10.153
.5351	10.865	.6296	10.139
.5364	10.898	.6305	10.138
.5379	10.901	.6469	10.052
.5390	10.885	.6476	10.054
.5440	10.923	.6485	10.029
.5453	10.915	.6493	10.046
.5467	10.912	.6500	10.047
.5481	10.896	.6506	10.052
.5497	10.905	.6514	10.050
.5519	10.911	.6520	10.056
.5531	10.920	.6552	10.090
.5543	10.883	.6559	10.099
.5557	10.883	.6564	10.111
.5568	10.918	.6572	10.100
.5580	10.920	.6579	10.097
.5592	10.919	.6585	10.106
.5608	10.919	.6592	10.103
.5622	10.861	.6598	10.110
.5671	10.919	.6605	10.107
.5684	10.917	.6612	10.127
.5698	10.899	.6619	10.122
.5710	10.891	.6626	10.103
.5722	10.896	.6633	10.122
.5736	10.874	.6640	10.129
.5755	10.885	.6647	10.103
.5768	10.827	.6654	10.110
.5789	10.868	.6661	10.121
.5801	10.840	.6668	10.122
.5816	10.825	.6694	10.143
.5829	10.805	.6701	10.134
.5843	10.794	.6708	10.144
.5854	10.782	.6715	10.139
.5897	10.686	.6722	10.151
.5908	10.688	.6729	10.138
.5922	10.627	.6738	10.150
.5930	10.622	.6757	10.140
.5945	10.561	.6767	10.142
.5956	10.575	.6773	10.155
.5970	10.535	.6780	10.138
.5982	10.491	.6787	10.148
.5995	10.459	.6792	10.139
.6008	10.428	.6800	10.148
.6023	10.419	.6807	10.165
.6039	10.398	.6814	10.151
.6055	10.379	.6820	10.159
.6068	10.341	.6827	10.168
.6080	10.359	.6835	10.171

Table 4. cont.

J.D. <sub>C</sub>	V	J.D. <sub>C</sub>	V
2438457.2928	10.179	.3525	10.300
.2935	10.181	.3536	10.303
.2939	10.175	.3545	10.314
.2947	10.159	.3561	10.323
.2954	10.175	.3571	10.319
.2960	10.137	.3631	10.389
.2967	10.138	.3640	10.369
.2974	10.156	.3649	10.370
.2980	10.169	.3661	10.361
.2987	10.182	.3674	10.386
.2994	10.176	.3685	10.404
.3001	10.169	.3697	10.421
.3007	10.175	.3710	10.390
.3005	10.188	.3721	10.419
.3022	10.181	.3733	10.390
.3040	10.160	.3746	10.401
.3062	10.238	.3756	10.411
.3070	10.216	.3767	10.459
.3077	10.250	.3779	10.380
.3085	10.226	.3790	10.369
.3094	10.246	.3801	10.382
.3102	10.250	.3841	10.448
.3111	10.222	.3847	10.441
.3119	10.255	.3854	10.436
.3129	10.237	.3862	10.458
.3138	10.226	.3870	10.402
.3146	10.237	.3878	10.476
.3155	10.245	.3885	10.441
.3166	10.247	.3893	10.460
.3173	10.241	.3898	10.432
.3184	10.256	.3905	10.423
.3192	10.252	.3912	10.419
.3226	10.263	.3920	10.438
.3237	10.262	.3928	10.402
.3246	10.249	.3936	10.436
.3255	10.246	.3945	10.445
.3264	10.250	.3952	10.487
.3275	10.243	.3959	10.464
.3284	10.259	.4218	10.558
.3295	10.262	.4227	10.552
.3304	10.247	.4236	10.552
.3315	10.233	.4249	10.449
.3325	10.253	.4259	10.580
.3335	10.265	.4270	10.576
.3344	10.252	.4280	10.518
.3351	10.284	.4291	10.552
.3358	10.271	.4301	10.554
.3365	10.270	.4312	10.571
.3404	10.296	.4324	10.565
.3413	10.293	.4337	10.569
.3424	10.301	.4345	10.571
.3433	10.300	.4352	10.581
.3444	10.296	.4384	10.583
.3454	10.291	.4397	10.583
.3463	10.296	.4408	10.607
.3475	10.307	.4416	10.600
.3485	10.309	.4426	10.585
.3495	10.303	.4435	10.596
.3505	10.292	.4444	10.600
.3516	10.310	.4452	10.596

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.4459	10.596	.4165	10.248
.4467	10.577	.4176	10.246
.4475	10.607	.4187	10.209
.4486	10.603	.4202	10.185
.4494	10.612	.4215	10.173
.4503	10.631	.4227	10.151
.4512	10.616	.4239	10.136
.4554	10.633	.4250	10.130
.4561	10.618	.4262	10.098
.4568	10.633	.4323	10.114
.4575	10.629	.4332	10.116
.4582	10.601	.4343	10.103
.4588	10.595	.4354	10.085
.4595	10.612	.4363	10.132
.4603	10.616	.4380	10.081
.4612	10.635	.4392	10.067
.4620	10.672	.4410	10.072
.4631	10.622	.4424	10.068
.4643	10.637	.4435	10.099
.4651	10.642	.4448	10.072
.4661	10.644	.4462	10.063
.4671	10.649	.4474	10.067
.4681	10.646	.4521	10.087
.4694	10.649	.4532	10.102
.4704	10.656	.4543	10.096
.4753	10.658	.4555	10.106
.4765	10.679	.4567	10.113
.4776	10.691	.4581	10.104
.4786	10.686	.4592	10.102
.4795	10.684	.4605	10.137
.4803	10.651	.4614	10.141
.4812	10.660	.4624	10.119
.4821	10.686	.4632	10.122
.4827	10.672	.4642	10.131
.4838	10.675	.4653	10.143
.4840	10.682	.4692	10.143
.4859	10.716	.4704	10.161
.4865	10.703	.4713	10.159
.4875	10.703	.4723	10.161
.4885	10.721	.4733	10.165
.4893	10.708	.4745	10.172
.4902	10.700	.4757	10.174
.4939	10.713	.4768	10.169
.4950	10.724	.4779	10.179
.4963	10.715	.4791	10.182
.4977	10.673	.4803	10.188
.4987	10.710	.4815	10.182
.4997	10.713	.4830	10.203
.5006	10.689	.4845	10.202
.5018	10.685	.4854	10.214
.5026	10.704	.4863	10.212
.5038	10.692	.4873	10.226
.5049	10.710	.5054	10.295
.5055	10.696	.5070	10.314
.5067	10.708	.5082	10.306
		.5094	10.324
2438464.4112	10.300	.5105	10.328
.4124	10.290	.5117	10.329
.4136	10.264	.5132	10.335
.4151	10.266	.5145	10.332

Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.5161	10.347	.6095	10.549
.5173	10.344	.6113	10.550
.5185	10.321	.6123	10.558
.5196	10.335	.6198	10.579
.5206	10.361	.6211	10.569
.5220	10.353	.6224	10.596
.5269	10.357	.6237	10.584
.5284	10.373	.6248	10.611
.5295	10.376	.6258	10.626
.5310	10.381	.6272	10.628
.5321	10.396	.6282	10.622
.5332	10.389	.6292	10.640
.5346	10.402	.6307	10.663
.5360	10.411	.6322	10.667
.5373	10.420	.6331	10.630
.5385	10.415	.6342	10.645
.5395	10.409	.6350	10.642
.5407	10.411	.6358	10.642
.5419	10.409	.6367	10.637
.5430	10.418		
.5440	10.423	2428497.4442	10.916
.5502	10.447	.4449	10.955
.5515	10.440	.4456	10.955
.5528	10.451	.4464	10.942
.5543	10.442	.4471	10.909
.5558	10.453	.4478	10.909
.5575	10.464	.4485	10.909
.5589	10.456	.4493	10.942
.5601	10.462	.4498	10.926
.5612	10.470	.4506	10.944
.5621	10.458	.4544	10.908
.5635	10.458	.4554	10.945
.5651	10.449	.4561	10.933
.5663	10.453	.4568	10.942
.5720	10.477	.4575	10.948
.5736	10.491	.4581	10.979
.5747	10.518	.4588	10.945
.5758	10.523	.4595	10.926
.5769	10.518	.4602	10.948
.5783	10.525	.4608	10.926
.5793	10.521	.4616	10.942
.5808	10.537	.4623	10.917
.5821	10.529	.4657	10.934
.5839	10.535	.4665	10.918
.5851	10.527	.4671	10.909
.5862	10.541	.4679	10.903
.5876	10.549	.4686	10.888
.5881	10.541	.4693	10.888
.5946	10.553	.4700	10.909
.5957	10.549	.4706	10.894
.5969	10.558	.4713	10.903
.5980	10.564	.4720	10.881
.5996	10.570	.4728	10.888
.6007	10.570	.4734	10.888
.6016	10.568	.4741	10.903
.6030	10.547	.4777	10.863
.6040	10.531	.4783	10.886
.6053	10.585	.4790	10.883
.6071	10.564	.4797	10.845
.6083	10.538	.4809	10.828



Table 4. cont.

J.D. <sub>☉</sub>	V	J.D. <sub>☉</sub>	V
.4816	10.831	.5490	10.068
.4824	10.820	.5499	10.065
.4833	10.823	.5508	10.076
.4843	10.803	.5517	10.090
.4850	10.765	.5526	10.075
.4856	10.776	.5538	10.079
.4889	10.728	.5548	10.068
.4899	10.703	.5558	10.072
.4907	10.707	.5570	10.094
.4917	10.677	.5578	10.123
.4925	10.651	.5587	10.107
.4934	10.649	.5595	10.097
.4942	10.600	.5606	10.094
.4950	10.578	.5646	10.122
.4958	10.555	.5656	10.125
.4967	10.524	.5665	10.118
.4976	10.518	.5676	10.099
.4985	10.475	.5686	10.122
.5019	10.418	.5696	10.122
.5025	10.401	.5765	10.120
.5033	10.397	.5774	10.112
.5040	10.401	.5785	10.120
.5047	10.395	.5793	10.140
.5054	10.401	.5801	10.147
.5061	10.385	.5811	10.166
.5068	10.389	.5823	10.160
.5075	10.395	.5832	10.176
.5083	10.381	.5841	10.188
.5092	10.372	.5851	10.193
.5101	10.372	.5861	10.195
.5112	10.377	.5871	10.208
.5288	10.171	.5880	10.230
.5295	10.157	.5892	10.248
.5305	10.140	.5946	10.240
.5350	10.106	.5956	10.240
.5357	10.084	.5967	10.229
.5368	10.057	.5977	10.262
.5378	10.078	.5987	10.262
.5386	10.078	.5997	10.277
.5396	10.080	.6005	10.291
.5404	10.084	.6012	10.300
.5411	10.078	.6026	10.319
.5419	10.103	.6035	10.302
.5428	10.078	.6046	10.302
.5439	10.091	.6059	10.296
.5447	10.084	.6064	10.309
.5481	10.065		

Table 5  
Photoelectric observations W CVn  
Blue

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
2439548.4212	11.207	.4282	11.278
.4219	11.209	.4291	11.252
.4233	11.186	.4343	11.269
.4244	11.221	.4351	11.302
.4253	11.287	.4366	11.289
.4262	11.273	.4374	11.242

Table 5. cont.

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
.4383	11.267	.4038	11.276
.4393	11.286	.4047	11.299
.4429	11.260	.4054	11.268
.4458	11.283	.4062	11.322
.4466	11.306	.4071	11.327
.4481	11.247	.4079	11.261
.4490	11.232	.4117	11.144
.4498	11.266	.4125	11.132
.4506	11.228	.4131	11.123
.4515	11.231	.4139	11.147
.4548	11.311	.4149	11.147
.4557	11.224	.4158	11.099
.4567	11.315	.4172	11.057
.4573	11.309	.4180	11.061
.4579	11.300	.4187	10.973
.4586	11.274	.4195	10.991
.4604	11.252	.4202	10.949
.4611	11.286	.4209	10.947
.4616	11.238	.4217	10.980
.4645	11.272	.4225	10.893
.4655	11.237	.4233	10.935
.4670	11.291	.4240	10.908
		.4277	10.772
2439557.3531	11.322	.4288	10.749
.3538	11.306	.4297	10.708
.3550	11.282	.4305	10.719
.3557	11.330	.4326	10.605
.3579	11.349	.4336	10.600
.3586	11.374	.4346	10.606
.3597	11.329	.4353	10.587
.3604	11.315	.4360	10.580
.3611	11.369	.4367	10.580
.3686	11.383	.4374	10.582
.3696	11.313	.4381	10.572
.3704	11.365	.4388	10.578
.3711	11.342	.4395	10.383
.3723	11.327	.4434	10.574
.3731	11.322	.4443	10.561
.3739	11.324	.4450	10.555
.3746	11.366	.4458	10.513
.3761	11.387	.4465	10.504
.3779	11.342	.4471	10.490
.3874	11.360	.4478	10.484
.3883	11.319	.4513	10.405
.3894	11.322	.4520	10.407
.3907	11.343	.4527	10.394
.3917	11.346	.4534	10.391
.3926	11.372	.4541	10.388
.3937	11.325	.4550	10.376
.3946	11.354	.4555	10.370
.3951	11.352	.4563	10.372
.3958	11.380	.4570	10.373
.3965	11.329	.4575	10.371
.3972	11.322	.4582	10.366
.3995	11.342	.4590	10.339
.4002	11.330	.4681	10.260
.4008	11.339	.4689	10.260
.4015	11.336	.4695	10.266
.4021	11.333	.4701	10.259
.4031	11.315	.4708	10.259

Table 5. cont.

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
.4715	10.287	.4419	11.054
.4722	10.300	.4429	11.087
.4729	10.286	.4444	11.047
.4736	10.281	.4474	11.107
.4743	10.288	.4482	11.117
.4750	10.285	.4489	11.064
.4757	10.311	.4495	11.061
.4766	10.296	.4509	11.075
.4777	10.302		
.4785	10.316	2439617.3389	11.191
.4812	10.316	.3400	11.176
.4819	10.315	.3409	11.173
.4827	10.342	.3426	11.176
.4833	10.316	.3433	11.170
.4840	10.328	.3442	11.192
.4847	10.340	.3452	11.166
.4854	10.328	.3462	11.162
.4861	10.323	.3471	11.181
.4868	10.327	.3486	11.173
.4875	10.323	.3506	11.195
.5103	10.459	.3544	11.228
.5110	10.434	.3555	11.228
.5124	10.443	.3566	11.243
.5131	10.464	.3687	11.187
.5137	10.480	.3724	11.187
.5145	10.484	.3734	11.261
.5151	10.488	.3863	11.234
.5158	10.502	.3873	11.246
.5165	10.486	.3885	11.256
.5172	10.486	.3896	11.247
.5179	10.506	.3908	11.210
.5186	10.488	.3918	11.201
.5213	10.523	.3922	11.237
.5221	10.521	.3934	11.219
.5228	10.518	.3946	11.199
.5236	10.516	.3958	11.273
.5241	10.533	.3972	11.200
.5248	10.525	.3985	11.229
.5255	10.528	.4028	11.234
.5262	10.530	.4047	11.239
.5269	10.518	.4063	11.246
.5276	10.530	.4072	11.251
.5284	10.538	.4081	11.253
.5291	10.545	.4090	11.251
.5298	10.562	.4099	11.252
.5346	10.549	.4108	11.248
.5353	10.552		
		2439621.3248	11.194
2439576.4203	10.992	.3258	11.222
.4211	11.000	.3267	11.235
.4225	10.984	.3275	11.257
.4246	10.974	.3283	11.235
.4267	11.034	.3297	11.208
.4308	11.016	.3306	11.222
.4322	11.027	.3315	11.226
.4385	11.050	.3325	11.248
.4391	11.078	.3333	11.271
.4398	11.045	.3341	11.277
.4405	11.055	.3378	11.238
.4412	11.044	.3386	11.256

Table 5. cont.

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
.3415	11.260	.4184	10.754
.3425	11.267	.4192	10.797
.3434	11.228	.4566	10.870
.3442	11.264	.4575	10.874
.3450	11.280	.4600	10.846
.3459	11.287	.4607	10.870
.3469	11.252	.4613	10.839
.3511	11.300	.4688	10.865
.3522	11.278	.4700	10.871
.3531	11.304	.4708	10.861
.3540	11.289	.4715	10.948
.3548	11.295	.4722	10.953
.3556	11.319	.4728	10.904
.3563	11.297	.4739	10.861
.3570	11.294	.4745	10.908
.3577	11.331		
.3584	11.297	2439665.3832	11.219
.3615	11.294	.3843	11.240
.3630	11.316	.3856	11.202
.3636	11.360	.3865	11.203
.3642	11.336	.3872	11.206
.3648	11.310	.3880	11.203
.3655	11.332	.3887	11.236
.3661	11.339	.3895	11.231
		.3901	11.210
		.5218	11.398
2439662.3613	10.514	.5240	11.389
.3619	10.537	.5255	11.391
.3626	10.550	.5266	11.394
.3641	10.579	.5284	11.395
.3683	10.596	.5294	11.261
.3692	10.568		
.3748	10.579	2439667.4816	11.075
.3762	10.604	.4824	11.066
.3770	10.612	.4832	11.061
.3794	10.607	.4873	11.104
.3801	10.576	.4881	11.078
.3807	10.607	.4888	11.125
.3814	10.580	.4935	11.081
.3821	10.601	.4944	11.118
.3829	10.607	.4953	11.063
.3835	10.623	.4961	11.063
.3843	10.592	.4969	11.106
.3852	10.624	.4977	11.082
.3859	10.666	.4984	11.101
.3891	10.683	.5005	11.087
.3899	10.670	.5013	11.086
.3925	10.684	.5058	11.156
.3933	10.703	.5066	11.171
.3965	10.703	.5074	11.140
.3972	10.688	.5082	11.148
.3995	10.701	.5090	11.137
.4068	10.735	.5097	11.142
.4079	10.717	.5103	11.130
.4087	10.737	.5110	11.153
.4097	10.756	.5125	11.160
.4105	10.755	.5191	11.170
.4112	10.736	.5198	11.102
.4119	10.744	.5212	11.102
.4127	10.733	.5219	11.161
.4176	10.790	.5226	11.148

Table 5. cont.

J.D. <sub>☉</sub>	<i>B</i>	J.D. <sub>☉</sub>	<i>B</i>
.5255	11.175	.4283	10.535
.5261	11.202	.4298	10.562
.5269	11.149	.4305	10.554
.5274	11.191	.4312	10.551
.5279	11.103	.4344	10.560
		.4351	10.573
2439668.3729	10.293	.4383	10.570
.3737	10.275	.4401	10.619
.3745	10.292	.4409	10.615
.3752	10.277	.4425	10.620
.3761	10.300	.4456	10.601
.3771	10.299	.4463	10.608
.3780	10.296	.4470	10.605
.3791	10.304	.4477	10.597
.3798	10.306	.4484	10.598
.3806	10.317	.4491	10.581
.3841	10.302	.4507	10.600
.3849	10.332	.4513	10.589
.3858	10.303	.4520	10.617
.3865	10.313	.4526	10.600
.3873	10.315	.4533	10.636
.3881	10.308	.4539	10.625
.3888	10.323	.4545	10.622
.3896	10.297	.4616	10.684
.3904	10.331	.4623	10.673
.3911	10.316	.4629	10.695
.3947	10.351	.4635	10.690
.3954	10.356	.4641	10.680
.3962	10.384	.4652	10.668
.3969	10.386	.4658	10.704
.3976	10.386	.4665	10.665
.3982	10.384	.4670	10.683
.3991	10.384	.4676	10.692
.4001	10.384	.4701	10.732
.4009	10.410	.4706	10.714
.4043	10.417	.4712	10.746
.4049	10.422	.4717	10.735
.4067	10.417	.4722	10.726
.4074	10.417	.4727	10.717
.4081	10.436	.4734	10.737
.4087	10.448	.4740	10.756
.4095	10.431	.4748	10.771
.4102	10.427		
.4110	10.455	2439671.4359	11.260
.4140	10.474	.4374	11.222
.4147	10.476	.4378	11.225
.4162	10.474	.4395	11.271
.4171	10.446	.4402	11.249
.4178	10.454	.4409	11.270
.4185	10.486	.4416	11.179
.4192	10.486	.4460	11.191
.4198	10.466	.4466	11.213
.4207	10.497	.4477	11.205
.4236	10.528	.4484	11.286
.4241	10.542	.4490	11.286
.4247	10.527		
.4253	10.516	2439680.3479	11.154
.4259	10.522	.3484	11.145
.4267	10.546	.3490	10.064
.4273	10.531	.3494	11.061

Table 5. cont.

J.D. <sub>☉</sub>	<i>B</i>	J.D. <sub>☉</sub>	<i>B</i>
.3512	11.172	.4144	10.822
.3522	11.185	.4150	10.799
.3527	11.134	.4199	10.836
.3530	11.199	.4213	10.816
.3541	11.118	.4290	10.847
.3545	11.134		
.3549	11.114	2439684.3654	10.322
.3571	11.138	.3663	10.284
.3578	11.173	.2670	10.294
.3583	11.133	.3676	10.267
.3594	11.174	.3683	10.273
.3599	11.119	.3688	10.277
.3606	11.231	.3693	10.267
.3612	11.217	.3699	10.256
.3622	11.229	.3704	10.276
.3627	11.132	.3710	10.275
.3633	11.232	.3716	10.294
.3642	11.165	.3723	10.271
.3654	11.199		
		2439686.4200	11.142
2439682.4372	11.165	.4207	11.110
.4371	11.170	.4214	11.136
.4384	11.145	.4220	11.098
.4390	11.165	.4227	11.099
.4403	11.140	.4233	11.125
.4409	11.128	.4240	11.136
.4417	11.140	.4247	11.109
.4430	11.123	.4253	11.178
.4437	11.149	.4260	11.171
.4444	11.128		
.4618	11.138	2439691.3771	11.184
.4625	11.181	.3778	11.162
.4631	11.209	.3786	11.187
.4656	11.169	.3815	11.126
.4683	11.154	.3823	11.110
.4691	11.147	.3836	11.173
.4698	11.212	.3842	11.174
.4705	11.213	.3850	11.242
.4721	11.235	.3857	11.243
.4735	11.228	.3864	11.220
.4743	11.228	.3873	11.143
.4751	11.154	.3915	11.242
.4778	11.231	.3936	11.195
.4786	11.231	.3942	11.224
.4797	11.220	.3950	11.165
.4804	11.278		
.4810	11.288	2439758.6707	10.789
.4816	11.175	.6711	10.784
		.6715	10.791
		.6719	10.799
2439683.4047	10.834	.6730	10.799
.4055	10.798	.6734	10.797
.4062	10.801	.6738	10.816
.4067	10.809	.6747	10.809
.4072	10.804	.6753	10.801
.4079	10.791	.6758	10.804
.4083	10.786	.6764	10.823
.4093	10.809	.6775	10.828
.4099	10.823	.6781	10.838
.4108	10.823	.6811	10.834
.4137	10.846	.6831	10.836

Table 5. cont.

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
.6835	10.837	.6050	11.117
.6840	10.836	.6056	11.124
.6846	10.833	.6064	11.131
.6859	10.834	.6072	11.068
.6864	10.843	.6108	11.094
.6870	10.843	.6115	11.156
		.6122	11.114
2439853.5956	11.154	.6129	11.139
.5964	11.217	.6140	11.102
.5971	11.220	.6152	11.186
.5979	11.247	.6159	11.099
		.6166	11.175
2439858.4874	11.172	.6173	11.130
.4882	11.196	.6178	11.166
.4889	11.176		
.4896	11.184	2439866.6151	10.943
.4905	11.164	.6161	10.940
.4914	11.198	.6178	10.941
.4922	11.201	.6194	10.943
.4929	11.252	.6201	10.926
.4945	11.188	.6208	10.947
.4953	11.220	.6217	10.948
.4980	11.175	.6226	10.940
.4987	11.244	.6265	10.928
.5002	11.241	.6281	10.920
.5009	11.208	.6295	10.905
.5016	11.199	.6324	10.919
		.6332	10.933
2439864.5105	11.173	.6345	10.951
.5114	11.112	.6381	10.994
.5124	11.107	.6390	10.976
.5130	11.134	.6400	10.959
.5143	11.163	.6409	10.972
.5148	11.124	.6417	10.951
.5154	11.115	.6427	10.928
.5161	11.138	.6437	10.993
		.6446	10.962
2439865.5569	11.065	.6456	10.969
.5576	11.063	.6466	10.954
.5587	11.082		
.5594	11.057	2439942.4120	11.186
.5601	11.049	.4130	11.193
.5608	11.038	.4136	11.164
.5613	11.091	.4148	11.168
.5620	11.051	.4198	11.108
.5646	11.102	.4204	11.119
.5651	11.075	.4209	11.110
.5658	11.066	.4215	11.107
.5664	11.084	.4221	11.113
.5670	11.081	.4226	11.096
.5677	11.070	.4232	11.096
.5682	11.044	.4237	11.092
.5694	11.114	.4269	11.071
.5700	11.110	.4275	11.073
.5705	11.099	.4281	11.079
.6011	11.134	.4287	11.076
.6018	11.135	.4292	11.081
.6026	11.089	.4296	11.076
.6037	11.154	.4303	11.084
.6045	11.114	.4309	11.069

Table 5. cont.

J.D. <sub>☉</sub>	B	J.D. <sub>☉</sub>	B
.4315	11.066	.4636	11.147
.4321	11.074	.4647	11.141
.4326	11.098	.4667	11.236
.4323	11.083	.4689	11.172
.4369	11.145	.4697	11.164
.4374	11.103	.4705	11.152
.4380	11.080	.4716	11.166
.4386	11.085	.4725	11.134
.4391	11.079	.4736	11.141
.4398	11.083	.4780	11.176
.4404	11.087	.4789	11.161
.4410	11.109	.4799	11.140
.4415	11.095	.4808	11.148
.4422	11.102	.4817	11.169
.4451	11.093	.4825	11.179
.4457	11.106	.4835	11.140
.4463	11.136	.4843	11.136
.4468	11.112	.4860	11.197
.4486	11.177	.4869	11.168
.4494	11.112	.4901	11.184
.4500	11.117	.4914	11.180
.4505	11.107	.4924	11.191
.4511	11.130	.4932	11.190
.4517	11.090	.4943	11.191
.4523	11.106	.4952	11.181
.4528	11.107	.4966	11.178
.4535	11.138	.4975	11.181
.4539	11.129		
2439969.4546	11.226		
.4580	11.168		

Table 6  
Photoelectric observations W CVn  
Ultraviolet

J.D. <sub>☉</sub>	U	J.D. <sub>☉</sub>	U
2439551.4179	10.396	.3280	10.691
.4186	10.413	.3289	10.604
.4195	10.412	.3312	10.622
.4204	10.416	.3319	10.680
.4213	10.512	.3334	10.635
.4222	10.516	.3391	10.629
.4231	10.439	.3459	10.787
.4239	10.539	.3477	10.743
.4248	10.552	.3390	10.801
.4258	10.529	.3497	10.725
.4268	10.557	.3504	10.799
		.3535	10.810
2439555.3156	10.562	.3549	10.779
.3167	10.648	.3563	10.789
.3174	10.604	.3573	10.742
.3196	10.572	.3593	10.794
.3203	10.580	.3600	10.716
.3210	10.667	.3607	10.763
.3219	10.648	.3615	10.743
.3230	10.685	.3664	10.849
.3238	10.680	.3671	10.865
.3273	10.606	.3678	10.822

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
.3686	10.838	.6437	10.416
.3693	10.874	.6444	10.372
.3712	10.819	.6451	10.395
.3729	10.765	.6458	10.399
.3737	10.806	.6467	10.417
.3776	10.844	.6475	10.391
.3793	10.834	.6482	10.334
.3828	10.842	.6490	10.379
.3838	10.928	.6497	10.367
.3881	10.821	.6505	10.408
		.6512	10.426
2439560.4322	11.136		
.4339	11.197	2439592.4523	11.271
.4347	11.096	.4532	11.244
.4354	11.185	.4541	11.216
.4361	11.174	.4775	11.291
.4382	11.174	.4794	11.276
.4411	11.164	.4864	11.293
.4418	11.118	.4898	11.338
.4426	11.211	.4950	11.338
.4436	11.211	.4959	11.325
.4443	11.189	.4966	11.325
.4451	11.178	.5002	11.340
.4458	11.191	.5424	11.279
.4467	11.146		
.4493	11.255	2439609.5353	11.161
.4526	11.228	.5364	11.162
.4566	11.239	.5379	11.170
.4575	11.211	.5387	11.098
.4592	11.276	.5395	11.102
.4601	11.211	.5401	11.117
.4610	11.188	.5408	11.109
.4652	11.262	.5415	11.182
.4670	11.216	.5423	11.148
.4714	11.229	.5429	11.117
.4785	11.319	.5470	11.218
.4792	11.264	.5479	11.235
.4799	11.304	.5488	11.229
.4831	11.272	.5496	11.235
		.5683	11.261
2439564.6235	10.507	.5694	11.267
.6242	10.513	.5702	11.261
.6249	10.484		
.6258	10.465	2439711.5006	10.588
.6267	10.469	.5015	10.617
.6274	10.469	.5024	10.589
.6281	10.481	.5031	10.678
.6288	10.476	.5038	10.653
.6296	10.441	.5045	10.563
.6305	10.442	.5052	10.578
.6312	10.444	.5059	10.587
.6348	10.382	.5065	10.608
.6355	10.366	.5074	10.523
.6362	10.349	.5083	10.578
.6372	10.388	.5110	10.565
.6379	10.402	.5117	10.511
.6386	10.375	.5137	10.530
.6393	10.370	.5145	10.541
.6400	10.359	.5152	10.533
.6409	10.366	.5334	10.350

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
.5342	10.346	.5054	10.506
.5365	10.352	.5081	10.543
.5372	10.366	.5089	10.543
.5379	10.337	.5125	10.593
.5386	10.322	.5151	10.570
.5391	10.323	.5196	10.593
.5426	10.390	.5210	10.565
.5433	10.306	.5341	10.624
.5444	10.364	.5349	10.707
.5452	10.413	.5526	10.780
.5461	10.334	.5533	10.798
.5468	10.345	.5541	10.760
.5476	10.314	.5547	10.722
.5481	10.374	.5554	10.697
.5488	10.402	.5561	10.673
.5496	10.356	.5600	10.708
.5503	10.466	.5608	10.714
.5628	10.438		
.5635	10.449	2439623.3344	11.085
.5653	10.520	.3361	11.148
.5661	10.484	.3370	11.148
.5668	10.470	.3376	11.148
.5689	10.501	.3406	11.100
.5696	10.541	.3457	11.150
.5743	10.584	.3464	11.172
.5750	10.518	.4225	11.301
.5757	10.555	.4234	11.275
.5764	10.504	.4243	11.320
.5771	10.575	.4258	11.324
.5780	10.620	.4267	11.226
2439621.3919	11.443	.4274	11.324
.3947	11.449	.4290	11.182
.3956	11.383	.4381	11.304
.3966	11.446	.4389	11.199
.3986	11.442	.4405	11.199
.3996	11.398	.4412	11.215
.4048	11.253	.4421	11.207
.4059	11.264	.4430	11.226
.4070	11.225	.4480	11.291
.4110	11.104	.4499	11.266
.4120	11.142	.4524	11.291
.4142	11.113	.4540	11.263
.4184	11.011	.4577	11.215
.4194	10.915	.4587	11.190
.4203	10.968	.4664	11.311
.4265	10.868	.4674	11.287
.4274	10.902	.4680	11.199
.4284	10.838	.4687	11.219
.4449	10.586	.4694	11.309
.4459	10.585	.4702	11.252
.4504	10.569	.4813	11.308
.4514	10.530	.4828	11.259
.4567	10.491	.4836	11.262
.4584	10.464	.4843	11.230
.4774	10.385	.4852	11.260
.4789	10.338		
.4797	10.427	2439660.5095	11.415
.4815	10.389	.5102	11.407
.4891	10.446	.5108	11.365
.4975	10.507	.5115	11.335

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
2439665.4152	11.232	.6754	10.884
.4159	11.272	.6766	10.808
.4173	11.214	.6775	10.806
.4183	11.244	.6900	10.527
.4201	11.170	.6909	10.585
.4215	11.162	.6914	10.618
.4244	11.263	.6920	10.674
.4253	11.273	.6927	10.637
.4261	11.263	.6939	10.538
.4300	11.265		
.4421	11.294	2439837.6143	11.362
.4441	11.340	.6151	11.369
.4554	11.232	.6185	11.389
.4566	11.264	.6193	11.345
.4592	11.257	.6282	11.330
.4702	11.297	.6309	11.389
.4746	11.306	.6329	11.425
		.6327	11.439
2439667.4203	11.083	.6334	11.336
.4239	11.019	.6343	11.401
.4299	11.097	.6359	11.382
.4397	11.039	.6372	11.418
.4404	11.066	.6381	11.406
.4419	11.059	.6390	11.394
.4466	11.050	.6466	11.412
.4492	11.032	.6478	11.426
		.6486	11.356
2439668.4902	10.810	.6494	11.382
.4927	10.843	.6500	11.439
.4936	10.876	.6514	11.426
.4950	10.868	.6523	11.402
.4959	10.864	.6530	11.422
.5085	10.866	.6537	11.436
.5112	10.874	.6547	11.392
.5121	10.885	.6609	11.394
.5158	10.896	.6787	11.396
.5196	10.908	.6797	11.381
		.6806	11.456
2439671.4211	11.283	.6824	11.449
.4235	11.236	.6857	11.389
.4243	11.272	.6864	11.431
		.6871	11.398
2439826.6363	11.400	.6878	11.454
.6381	11.403	.6885	11.418
.6387	11.461	.6892	11.454
.6419	11.476	.6900	11.380
.6427	11.396	.6907	11.411
.6442	11.473	.6914	11.413
.6516	11.350	.6921	11.398
.6525	11.354	.6928	11.401
.6559	11.346		
.6579	11.446	2439851.5090	10.707
.6587	11.354	.5101	10.717
.6683	11.018		
.6693	10.923	2439852.6172	10.681
.6708	11.028	.6189	10.609
.6717	11.009	.6198	10.650
.6725	11.059	.6206	10.686
.6735	11.004	.6215	10.668
.6745	10.852	.6224	10.626

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
.6233	10.623	.6533	11.389
.6242	10.679	.6567	11.413
.6250	10.587		
.6297	10.575	2439865.4757	10.988
.6307	10.522	.4765	10.899
.6318	10.597	.4775	10.954
.6353	10.562	.4805	10.973
.6361	10.500	.4987	11.053
.6633	10.383	.4995	11.067
.6664	10.335	.5022	10.975
.6673	10.423	.5037	10.969
.6689	10.382	.5044	10.948
.6707	10.449	.5095	10.995
.6724	11.441	.5102	10.984
.6764	10.475	.5109	11.016
.6772	10.439	.5124	11.039
.6789	10.512	.5159	11.077
.6813	10.483	.5168	11.087
.6831	10.449	.5177	11.087
.6840	10.468	.5216	11.104
.6848	10.488	.5223	11.103
.6862	10.488	.5232	11.099
.6867	10.548	.5240	11.087
.6898	10.540	.5247	11.103
.6906	10.555	.5255	11.140
.6912	10.521	.5282	11.125
.6917	10.491	.5292	11.143
.6924	10.575	.5386	11.067
.6943	10.567	.5394	11.150
.6949	10.599	.5402	11.109
.7000	10.590	.5411	11.052
.7007	10.627	.5420	11.106
.7014	10.589	.5430	11.153
.7025	10.551	.5437	11.152
.7096	10.612	.5450	11.081
.7102	10.664	.5496	11.071
.7111	10.630	.5503	11.160
.7116	10.596	.6255	11.318
		.6262	11.220
2439853.5192	11.340	.6269	11.276
.5198	11.340	.6278	11.182
.5221	11.334	.6288	11.289
.5827	11.317	.6298	11.270
.5842	11.285	.6310	11.234
.5859	11.346	.6326	11.251
.5875	11.392	.6342	11.244
.5883	11.346	.6350	11.343
.5891	11.311	.6360	11.273
.6038	11.389	.6534	11.330
.6044	11.325	.6553	11.285
.6052	11.276	.6563	11.325
.6115	11.335	.6608	11.349
.6129	11.279	.6624	11.329
.6183	11.292	.6631	11.267
.6191	11.312	.6640	11.201
.6315	11.429	.6780	11.361
.6401	11.362	.6796	11.243
.6408	11.348	.6814	11.383
.6510	11.358	.6874	11.301
.6517	11.354	.6883	11.208

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
.6894	11.304	.5956	11.006
.6902	11.252	.5965	10.976
.6910	11.217	.5974	11.038
.6919	11.252	.5980	10.924
.6931	11.201	.5987	10.949
.6939	11.199	.6006	10.933
.6948	11.185		
.6993	11.267	2439875.6401	11.243
.7001	11.292	.6418	11.299
.7010	11.322	.6439	11.237
.7019	11.333	.6452	11.318
.7029	11.283	.6461	11.262
.7037	11.307	.6471	11.311
.7044	11.214		
.7053	11.289	2439891.6527	11.301
.7060	11.297	.6532	11.260
		.6539	11.325
2439866.4925	10.593	.6545	11.391
.4936	10.606	.6552	11.234
.4943	10.583	.6559	11.262
.4952	10.597	.6697	11.387
.4960	10.624	.6704	11.309
.4976	10.645	.6717	11.303
.5046	11.686	.6748	11.327
.5082	10.672	.6754	11.316
.5087	10.567	.6763	11.247
.5093	10.639	.6774	10.316
.5210	10.606	.6780	11.291
.5217	10.722	.6787	11.358
.5225	11.731	.6794	11.320
.5232	10.746	.6808	10.241
.5240	10.618	.6835	11.312
.5262	10.691	.6861	11.331
.5270	10.710	.6867	11.349
.5279	10.620	.6875	11.409
.5313	10.689	.6885	11.413
.5354	10.694	.6905	11.378
.5383	10.802	.6911	11.395
.5413	10.762	.6930	11.356
.5455	10.781		
.5466	10.764	2439906.5309	11.382
.5724	10.865	.5321	11.302
.5730	10.911	.5327	11.298
.5737	10.815	.5333	11.266
.5766	10.880	.5339	11.325
.5774	10.886	.5345	11.333
.5780	10.963	.5350	11.385
.5787	10.901	.5356	11.296
.5794	10.903	.5362	11.326
.5801	10.884	.5368	11.280
.5806	10.963	.5374	11.289
.5840	10.999	.5380	11.328
.5849	11.000	.5440	11.357
.5857	11.009	.5446	11.271
.5870	11.003	.5452	11.392
.5876	11.009	.5458	11.391
.5882	10.986	.5464	11.335
.5888	10.942	.5470	11.334
.5898	10.997	.5475	11.366
.5948	10.909	.5481	11.322

Table 6. cont.

J.D. <sub>☉</sub>	<i>U</i>	J.D. <sub>☉</sub>	<i>U</i>
.5487	11.273	.3742	11.178
.5493	11.333	.3884	11.226
.5499	11.207	.3894	11.235
.5505	11.207	.3903	11.248
.5563	11.317	.3913	11.210
.5576	11.243	.3922	11.206
.5588	11.279	.3931	11.200
.5591	11.278	.3940	11.241
.5599	11.329	.3950	11.192
.5605	11.218	.3959	11.190
.5611	11.227	.3969	11.187
.5617	11.245	.3987	11.287
.5623	11.296	.3997	11.287
.5629	11.219	.4007	11.217
.5672	11.276	.4016	11.289
.5684	11.256	.4026	11.291
.5696	11.301		
.5702	11.320	2439943.4370	11.299
.5708	11.269	.4380	10.293
.5714	11.253	.4389	11.311
.5720	11.269	.4399	11.204
.5787	11.318	.4491	11.319
.5793	11.380	.4543	11.185
.5799	11.255	.4562	11.252
.5805	11.265		
.5811	11.375	2439944.3556	10.842
.5847	11.343	.3618	10.890
.5853	11.378	.3627	10.827
		.3646	10.852
2439923.6217	11.173	.3656	10.907
.6223	11.252	.3675	10.871
.6230	11.271	.3686	10.880
.6235	11.213	.3695	10.892
.6241	11.198	.3746	10.867
.6247	11.176	.3755	10.922
.6259	11.219	.3765	10.873
.6265	11.311	.3775	10.892
.6317	11.352	.3784	10.859
.6329	11.321	.3794	10.955
.6334	11.283	.3803	10.880
.6341	11.297	.3822	10.983
.6367	11.391	.3890	10.941
.6379	11.347	.3919	11.023
.6385	11.252	.3929	11.016
		.3938	10.979
2439942.3280	11.192	.3947	10.973
.3289	11.246	.4075	10.957
.3496	11.185	.4096	10.952
.3515	11.198	.4105	11.016
.3529	11.182	.4152	10.967
.3548	11.206	.4166	10.974
.3558	11.273	.4334	11.165
.3668	11.283	.4344	11.168
.3677	11.213	.4364	11.138
.3687	11.201	.4379	11.104
.3696	11.164	.4522	11.191
.3705	11.319	.4543	11.213
.3715	11.179	.4744	11.289
.3724	11.264	.4754	11.273
.3734	11.176	.4890	11.222

Table 6. cont.

J.D. <sub>⊙</sub>	<i>U</i>	J.D. <sub>⊙</sub>	<i>U</i>
.5068	11.312	.4622	11.290
		.4632	11.274
2439948.4039	11.256	.4739	11.229
.4068	11.274	.4751	11.280
.4091	11.242		
.4178	11.282	2439969.4200	11.358
.4204	11.259	.4242	11.229
.4217	11.271	.4255	11.251
.4241	11.345	.4268	11.234
.4254	11.242	.4281	11.282
.4268	11.320	.4294	11.225
.4281	11.357	.4307	11.252
.4364	11.215	.4320	11.256
.4377	11.223	.4334	11.307
.4392	11.230	.4347	11.337
.4407	11.279	.4435	11.244
.4439	11.229	.4449	11.180
.4466	11.229	.4462	11.225
.4480	11.190		

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## TROJFAREBNÉ FOTOELEKTRICKÉ POZOROVANIA PULZUJÚCEJ PREMENNEJ HVIĚZDY W CVn

J. TREMKO

*Astronomický ústav Slovenskej akadémie vied,  
Skalnaté Pleso, Československo*

Súhrn

Pulzujúca premenná hviezda W CVn sa pozorovala 60 cm  $f/5.5$  zrkadlovým ďalekohľadom Astronomického observatória na Skalnatom Plese. Fotoelektrický fotometer bol inštalovaný v Newtonovom ohnisku ďalekohľadu. Ako detektor svetla sa použil násobič elektrónov typu RCA 1 P 21. Optická sústava fotoelektrického fotometra je zostavená na princípe výstupnej pupily, takže hodnoty pozorovaných údajov nezávisia ani od tvaru objektu, ani od jeho polohy v ohniskovej clone. Ako zdroj napätia pre násobič elektrónov sa používa stabilizátor napätia NBZ 411, ktorý zabezpečuje krátkodobú stabilitu napätia na 0,05 %. Signál na výstupe násobiča elektrónov sa meria elektronickým líniovým zapisovačom typu EZ 4 s presnosťou 0,2 %. Limitná citlivosť prístroja je 100  $\mu\text{V}$  pri plnej výchyлке a stabilita nulovej polohy je 1  $\mu\text{V}$ . Podrobný opis fotoelektrického fotometra je v našej predchádzajúcej publi-

kácii (Tremko, 1975), kde sú aj transformačné rovnice pre prechod z inštrumentálneho na medzinárodný UBV systém. Ukázalo sa, že inštrumentálny fotometrický systém je veľmi blízky medzinárodnému UBV systému. Pozorovania premennej hviezdy sa začali roku 1963 najmä kvôli štúdiu zmien periódy a Blažkovho efektu. V neskorších rokoch sa získali pozorovania i v obore B a U. Stredná chyba jedného pozorovania v obore V je  $\pm 0^{\circ}.016$ ; stredná chyba jedného pozorovania v obore B je  $\pm 0^{\circ}.025$ . Presnosť pozorovaní v oblasti U je takmer dvakrát nižšia ako presnosť pozorovaní v obore V.

Údaje o intervaloch pozorovaní, počte pozorovaní a stredných chybách sú v tab. 1—3. Fotoelektrické pozorovanie premennej, transformované na systém UBV, uvádzajú tab. 4—6.

## ТРЕХЦВЕТНЫЕ ФОТОЭЛЕКТРИЧЕСКИЕ НАБЛЮДЕНИЯ ПУЛЬСИРУЮЩЕЙ ПЕРЕМЕННОЙ ЗВЕЗДЫ W CVn

Й. ТРЕМКО

*Астрономический институт Словацкой академии наук,  
Скалнате Плесо, Чехословакия*

Резюме

Наблюдения пульсирующей переменной звезды W CVn велись при помощи 60-см рефлектора  $f/5.5$  Астрономической обсерватории на Скалнате Плесо. Фотоэлектрический фотометр был установлен в фокусе Ньютона телескопа. В качестве приемника света использовался электронный умножитель типа RCA 1 P 21. Оптическая система фотоэлектрического фотометра составлена на принципе выходного зрачка, так что величины данных наблюдений не зависят ни от формы объекта ни от его положения в фокусной диафрагме. В качестве напряжения для электронного умножителя используется стабилизатор напряжения NBZ 411, обеспечивающий кратковременную стабилизацию напряжения с точностью 0,05 %. Сигнал на выходе электронного умножителя измеряется при помощи электронного линейного регистрирующего прибора типа EZ 4 с точностью 0,2 %. Предельная чувствительность прибора составляет 100 мкВ при полном отклонении,

а стабильность нулевого положения 1 мкВ. Подробное описание фотоэлектрического фотометра опубликовано ранее (Тремко, 1975). Уравнения преобразования для перехода от инструментальной к международной UBV системе также опубликованы в упомянутой работе. Оказалось, что инструментальная фотометрическая система очень близка к международной UBV системе. Наблюдения переменной звезды начаты были в 1963 г. в основном с целью изучения изменений периода и эффекта Блажко. В последующие годы были получены наблюдения и в В и в U области. Средняя ошибка одного наблюдения в V области составляет  $\pm 0^{\circ}.016$ ; а в В области  $\pm 0^{\circ}.025$ . Точность наблюдений в U области почти в два раза ниже чем в V области.

Данные об интервалах наблюдений, числе наблюдений и средних ошибках приводятся в таблицах 1—3. Фотоэлектрические наблюдения переменной, преобразованные в UBV систему, даются в таблицах 4—6.