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UBVR PHOTOMETRY OF THE ECLIPSING BINARY DK PERSEI

The eclipsing binary DK Per (=28.1940; $m=12.3-13.3$ pg) was discovered to be a variable by Ahnert et al. (1947). The spectrum of the components was uncertain. In Zakirov's (1990) paper the system was considered to be in the foreground of the open cluster h and χ Per.

DK Per was observed with the 60 cm telescope during 1988 on Mt. Maidanak in South Uzbekistan. As a comparison star, BD+57°555(=HD 14660; $V=9^m805$; $U-B=0^m155$; $B-V=0^m554$; $V-R=0^m167$) was chosen, 67 measurements in U, 80 in B, 83 in each V and R were carried out. According to our estimation the probable error of a single observation of DK Per is 0^m008 in V, for $U-B=0^m012$, for $B-V=0^m010$. The light elements of the system (as given in the GCVS) are as follows:

$$\text{Min I} = \text{JDH}2442492.374 + 0^d898876 \times E$$

Our corrected period is $P=0^d8988796$ for the system. The results of our observations are presented in Figure 1 as light and color curves.

The photometric characteristics are given in Table 1.

	V	U-B	B-V	V-R
Max	11.332	0.265	0.565	0.505
Min I	12.645	0.388	0.788	0.699
Min II	11.489	0.213	0.529	0.477

All light curves of binary were solved by Lavrov's direct method. The results are listed in Table 2.

	U	B	V	R
k	$0.760 \pm .018$	$0.848 \pm .010$	$0.820 \pm .006$	$0.794 \pm .010$
r_1	$0.331 \pm .020$	$0.370 \pm .011$	$0.352 \pm .007$	$0.357 \pm .010$
i	86°9	88°8	87°3	86°0
L_1	$0.858 \pm .037$	$0.861 \pm .017$	$0.884 \pm .011$	$0.852 \pm .014$

Table 3

HJD	V	U-B	B-V	V-R
2447000+				
375.4737	11.429	0.260	0.559	0.500
378.4362	11.308	0.266	0.563	0.481
379.3772	11.311	0.232	0.567	0.495
379.3855	11.327	0.290	0.543	0.495
379.3904	11.329	0.249	0.562	0.503
380.3973	11.401	0.290	0.564	0.464
381.4424	11.575	0.327		0.493
381.4695	11.375	0.281	0.580	0.485
381.4737	11.375	0.252	0.553	0.489
382.4279	11.357	0.236	0.552	0.526
382.4355	11.327	0.283	0.546	0.516
382.4688	11.342	0.242	0.601	0.519
383.3439	11.336	0.263	0.562	0.490
383.3515	11.334	0.233	0.564	0.491
383.4640	11.315	0.264	0.595	0.513
383.4716	11.301	0.249	0.571	0.518
384.4792	11.430	0.284	0.573	0.482
385.4272	11.489	0.213	0.529	0.477
385.4876	11.403	0.236	0.589	0.494
389.3917	11.467	0.269	0.577	0.489
389.4015	11.515	0.230	0.549	0.505
390.3209	11.780	0.261	0.613	0.537
390.3272	11.873	0.292	0.620	0.537
390.3334	11.981	0.248	0.621	0.566
390.3410	12.170	0.255	0.661	0.598
390.3487	12.353	0.363	0.699	0.643
390.3570	12.540	0.354	0.731	0.587
390.3619	12.620	0.307	0.770	0.654
390.3702	12.640	0.387	0.808	0.702
390.3772	12.552	0.370	0.792	0.706
390.3841	12.377	0.383	0.722	0.678
390.3897	12.199	0.333	0.693	0.599
390.3959	12.102	0.342	0.664	0.615
390.4008	11.998	0.240	0.637	0.585
390.4063	11.904	0.314	0.617	0.566
390.4105	11.821	0.274	0.604	0.534
390.4126	11.734	0.254	0.607	0.525
390.4202	11.714	0.240	0.573	0.527
390.4285	11.563	0.246	0.602	0.511
390.4341	11.546	0.246	0.560	0.492
390.4383	11.486	0.274	0.575	0.503
390.4438	11.456	0.272	0.566	0.493

Table 3 (cont.)

HJD	V	U-B	B-V	V-R
2447000+				
390.4480	11.428	0.238	0.577	0.500
390.4522	11.396	0.261	0.565	0.522
390.4577	11.401	0.266	0.541	0.481
390.4618	11.380	0.220	0.560	0.520
390.4674	11.367	0.268	0.566	0.482
390.4716	11.377	0.265	0.543	0.467
390.4758	11.372	0.270	0.547	0.524
390.4799	11.370	0.249	0.560	0.512
390.4862	11.365	0.215	0.532	0.519
390.4897	11.375	0.200	0.560	0.497
391.4160	11.319	0.259	0.572	0.484
391.4223	11.324	0.222	0.568	0.468
395.3924	11.366	0.222	0.571	0.501
395.4000	11.351	0.215	0.579	0.516
396.3994	11.346	0.287	0.561	0.510
396.4063	11.341	0.273	0.552	0.514
442.3646	11.350	0.237	0.566	0.505
442.3702	11.343	0.229	0.564	0.458
444.1771	11.353		0.557	0.518
444.1847	11.381		0.554	0.512
444.1917	11.359		0.563	0.508
444.1979	11.388		0.552	0.518
444.2021	11.373		0.563	0.506
444.2049	11.389		0.556	0.508
444.2084	11.392		0.550	0.495
444.2119	11.401		0.562	0.501
445.2688	11.481		0.558	0.507
445.2716	11.452			0.506
447.2042	11.337		0.549	0.528
447.2688	11.325		0.551	0.503
447.4264	11.526			0.548
452.4827	11.340	0.237	0.559	0.459
454.3097	11.356	0.269	0.567	0.483
454.3139	11.331	0.263	0.570	0.493
454.3799	11.325	0.284	0.569	0.502
454.5084	11.336	0.228	0.564	0.510
454.5132	11.341	0.211	0.580	0.518
459.3820	11.319	0.293	0.566	0.481
460.2625	11.336		0.541	0.488
460.3389	11.361		0.536	0.487
460.3438	11.364		0.547	0.499

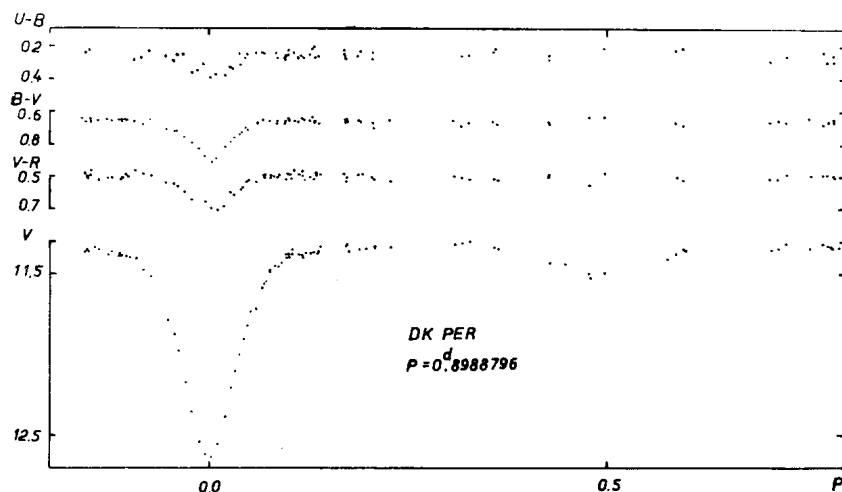


Figure 1. Light and color curves of DK Per

The mass ratio $q=0.68$ was obtained from formulae by Kopal (1959). The best combination of M_v , R and \mathcal{M} corresponds to B9V+A8IV. Sizes of the Roche lobe for components $r_{1crit}=0.389$ and $r_{2crit}=0.324$ were obtained from the mass ratio q . These sizes exceed the relative polar radii of the components.

Accordingly, DK Per is classified as a detached system, containing a subgiant.

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