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PHOTOELECTRIC PHOTOMETRY OF THE ECLIPSING BINARY DM Del

The variability of DM Delphini = BD $+13^{\circ}4478$ = 137.1935 was discovered by C. Hoffmeister (1). H. Schneller (2) observed DM Del in 1958-59 photoelectrically, deriving the physical parameters of this system. These observations were recorded in the instrumental system and in only one colour. Although H. Schneller mentioned further observations in more colours, no publication of these measurements has come to the writer's attention.

When I started observing DM Del visually in 1968, I was not aware of H. Schneller's work. My estimates led me to the formulation of entirely different elements of variability (3). Several observers have questioned these new elements, and of course, Schneller's work proves their objections to be correct.

In order to check on the current behaviour of DM Del, I decided to observe it photoelectrically during the summer of 1979. The single channel RGUBV-photometer of Basel University, attached to the 1 meter reflector of Gornergrat Station, Switzerland (operated by "Stiftung Hochalpine Forschungsstation Jungfraujoch und Gornergrat") was employed during ten nights, most of them of good photometric quality. Since the principal purpose of this photometer lies in the definition of the RGU-system with bright standard stars, it is not well suited to high-precision photometry of variable stars. The internal accuracy of the 63 observations each in the V- and B-band is therefore only in the order of $0^{m}.02$ in both V and B-V.

BD $+13^{\circ}4479$ ($V=9.18\pm0.02$, $B-V=0.45\pm0.02$) was used as comparison star while BD $+14^{\circ}4379$ served as check star. Since the variable lies only 3' north of the comparison star, the use of standard first order extinction coefficients was sufficient. Standard

reduction procedures were employed and the transformation of the instrumental system into the BV-system was checked throughout the observing run.

Table I lists all photometric values.

Table I

JD hel 2400000+	V	B-V	JD hel 2400000+	V	B-V
44062.4384	8.62	0.21	44073.4232	8.63	0.19
.4829	8.68	0.16	.4587	8.67	0.19
.5127	8.71	0.15	.4767	8.68	0.20
.5349	8.75	0.22	44076.3654	8.62	0.19
44063.3648	8.71	0.19	.3862	8.65	0.19
.3766	8.76	0.22	.4147	8.71	0.19
.4065	8.78	0.21	.4425	8.82	0.17
.4336	8.80	0.17	.5001	9.09	0.21
.4579	8.79	0.16	.5307	9.10	0.20
.4836	8.76	0.21	.5571	9.04	0.21
.5058	8.74	0.19	.5723	8.97	0.19
.5266	8.71	0.19	44077.3660	9.10	0.23
.5468	8.68	0.19	.3854	9.09	0.19
44069.4269	8.73	0.19	.4139	8.98	0.18
.4443	8.70	0.20	.4396	8.84	0.16
.4720	8.66	0.19	.4549	8.76	0.18
.4964	8.64	0.19	.4764	8.70	0.17
.5130	8.61	0.19	.4910	8.67	0.20
.5415	8.59	0.19	.5042	8.63	0.17
.5602	8.57	0.19	.5313	8.61	0.17
44070.3991	8.58	0.19	.5556	8.58	0.18
.4200	8.60	0.17	.5847	8.57	0.19
.4491	8.62	0.16	44078.4562	8.60	0.17
.4901	8.68	0.18	.4756	8.56	0.19
.5288	8.79	0.19	.5027	8.65	0.19
.5540	8.94	0.18	.5360	8.70	0.19
.5845	9.09	0.21	.5784	8.76	0.18
44072.4171	8.68	0.20	44079.4110	8.75	0.18
.4470	8.63	0.16	.4694	8.82	0.19
.4900	8.58	0.18	.5103	8.74	0.19
.5275	8.60	0.17	.5826	8.69	0.19
.5525	8.60	0.20			

The GCVS 1969 elements Min.JD Hel=2430663.067+0.8446725·E were used to compute phases. The lightcurve is covered quite well by the observations as can be seen in Fig.1, which compares very well with Schneller's photometry. The totality of the primary minimum as well as the slight asymmetry of the secondary minimum are confirmed. A Fourier-analysis of the V-observations yields the following light curve parameters:

type : EB

$V_{min\ I} = 9.11$ $V_{min\ II} = 8.80$

$V_{max\ I} = V_{max\ II} = 8.58$

$A_I = 0.53 \qquad A_{II} = 0.22$

Min II - Min I = $0^p.50$.

The B-V colour curve shows only a slight difference in temperature between the two components, and possibly indicated reddening during both minima could be attributed to the reflection effect present in this close system.

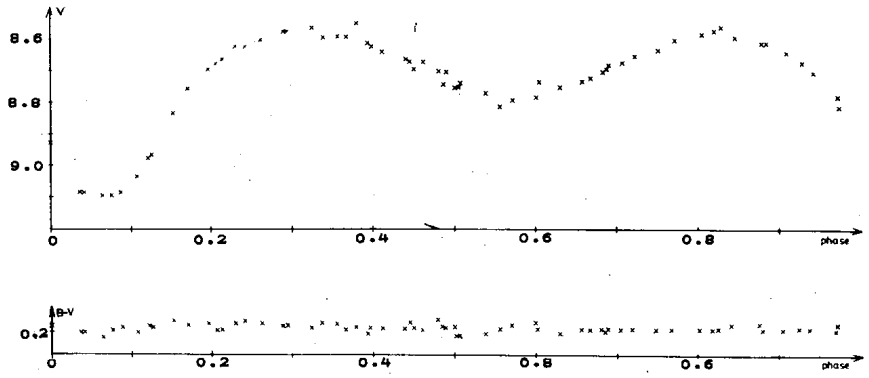

Figure 1. Light- and colour curve of DM Del, reduced with the elements in the GCVS 1969.

Compared to the elements mentioned above, my observations give an O-C value of $+0^d.055$. An improvement of these elements from the current observations alone is not possible.

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References:

(1) Hoffmeister, C.: 1935, Astron. Nachrichten, 255, p.401

(2) Schneller, H.: 1960, Astron. Nachrichten, 285, p.265

(3) Diethelm, R.: 1976, BBSAG Bulletin, 27, p.5