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THE SECONDARY PERIOD OF AE UMa

The variability of AE UMa = BV 92 was discovered on Bamberg plates some twenty years ago (E.Geyer, R.Kippenhahn and W.Strohmeier, Kleine Veröff. Bamberg No 11, 1955). According to E.K. Kharadze (Abastumani Bull. 10.125, 1949) the star's spectral type is A2, while W. Götz and W.Wenzel (MVS No 571, 1961) classify it as A9.

V.P. Tsesevich (Astr.Circ.No 170,1956) and G.S.Filatov (Astr. Circ. No 215, 1960) observed the star visually, but the type of variability could not be determined with certainty. Recent investigations by Tsesevich (Astr.Circ. No 775, 1973) have, however, shown that the star belongs to the class of dwarf cepheids and has a period of $0^d.086017055$. Tsesevich also called the attention to the light curve variation of the variable.

In order to determine the secondary period of AE UMa more than one thousand photoelectric blue and yellow observations were collected with the 20 in. Cassegrain and 24 in. Newton telescopes of the Konkoly Observatory from January 15, 1974 till April 23, 1974. BD+44°1882 was used as comparison star whose constancy was checked by BD+44°1881.

The time of the 18 maxima observed are listed in the Table. The brightnesses of the maxima in blue (b) and yellow (y) light relative to the comparison star are also given.

First the period of modulation P_m was derived from the heights of the observed blue maxima (see upper part of the Figure) as $P_m = 0^d.29364$. Utilizing the maxima at nearly the same phase of modulation the main period P_o was redetermined: $P_o = 0^d.086017$. This value agrees remarkably well with Tsesevich's period.

The O - C values were calculated by the new elements:

$C_o(\text{mean max.}) = 2442062.5820 + 0^d.086017 \cdot E$ and

$C_m(\text{min.ampl.}) = 2442062.5960 + 0^d.29364 \cdot N$

In the Figure Δb_{max} and $O\text{-}C_o$ are plotted against the phase of modulation $\psi = (O\text{-}C_m)/P_m$.

Table

J.D. max	Δy_{max}	Δb_{max}	O - C	O - C_m	E	N
2442062.5835	+0.90	+0.77	+0.0015	+0.2811	0	- 1
095.5293	.85	.69	+0.0028	+0.0456	+383	+112
.6118	.69	.51	-0.0007	+0.1281	384	112
106.4520	.73	.54	+0.0013	+0.1036	510	149
119.5258:	.83:	.69:	+0.0003:	+0.2573	662	193
121.5017:	.70:	.52:	-0.0019:	+0.1777	685	200
128.2968	.81	.63	-0.0022	+0.2191	764	223
.3872	.91	.76	+0.0022	+0.0158	765	224
.4727	.77	.58	+0.0017	+0.1013	766	224
.5550:	.74:	.57:	-0.0020:	+0.1836	767	224
133.4622	.73	.58	+0.0022	+0.0990	824	241
.5440	.69	.54	-0.0020	+0.1808	825	241
134.4055:	.70:	.53:	-0.0007:	+0.1613	835	244
147.3935:	.79:	.66:	-0.0013:	+0.2292	986	288
148.4295	.73	.60	+0.0025	+0.0906	998	292
.5096	.69	.54	-0.0034	+0.1707	999	292
159.4365	.78	.67	-0.0006	+0.2329	1126	329
161.4145	+0.67	+0.50	-0.0010	+0.1555	1149	336

From P_o and P_m we easily obtain the secondary period P_1 and the period ratio P_1/P_o:

$$P_1 = 0^d.066529 \text{ and } P_1/P_o = 0.773$$

It is worthy of note that exactly the same P_1/P_o ratio was obtained by Julia Balázs and L. Detre (Budapest Mitt. No 40,1956) for RV Ari which has only a slightly longer main period ($0^d.0931$) than AE UMa. It is also interesting that the phase relation between the Δb_{max}-ψ and $(O-C_o)$-ψ curves is nearly the same for both dwarf cepheids.

In the next observational season the investigation of AE UMa will be continued to determine its periods more accurately.

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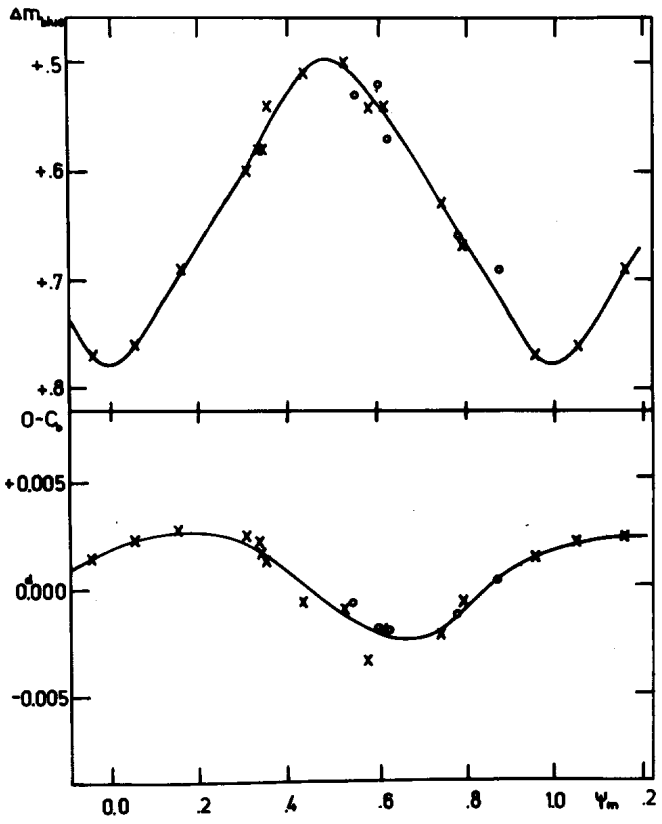
Δm
+.5
+.6
+.7
+.8
O-C
+0.005
0.000
-0.005
0.0
.2
.4
.6
.8
1.0
ψm
.2