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DETERMINATION OF THE MASS AND THE MODEL OF THE VARIABLES: RT AURIGAE, ETA AQUILAE, X CYGNI, MIRA CETI AND BM CASSIOPEIAE OF POP. I, AND RR LYRAE AND TWO TYPICAL VARIABLES OF POP. II.

The authors, prosecuting a work started with the study of the internal constitution of Eta Aquilae, published in the Combined Colloquium of the Commissions 27 and 42, Bamberg 1965(1), have applied the same computational scheme to study the following stars: RT Aurigae, X Cygni, Mira Ceti, of Population I, and RR Lyrae and two typical variables of Pop. II.

Assuming the radius and the effective temperature derived from the observations, they compute for each of these stars a set of models with different masses, and the characteristic frequency of the adiabatic oscillation for every model; then they choose the model, and therefore the mass, for which the frequency so calculated equals the observed one.

The authors put in evidence that for each of the studied stars the mass so chosen is nearly coincident with the one corresponding to the minimum of the graph $\sigma = \sigma$ (M), which can be made for each star, likewise to that noticed for Eta Aquilae in the previously mentioned paper.

Moreover, the authors applied this method to the star BM Cassiopeiae, the mass of which has been determined in a different way ($\bar{M}$ = 14.3)(2), and they found a very remarkable agreement, as shown in Table 1, where the results for each star are referred.

(1) A. Masani, A. Martini, M. Nelli, E. Albino - Study of the Constitution of Eta Aquilae - Astronomisches Institut der Universität, Erlangen-Nürnberg, Bd. IV, Nr. 40. - IAU Coll. on Var. Stars p. 255.

(2) Thiessen - Zeitschr. für Astr. - 39. 65, 1956.

Table 1

Star	Pop.	R (cm)	T_{eff} (^oK)	σ_{obs} (cm^{-1})	$\bar{M}$	x_1	x_e	$\bar{M}_e$	$\sigma_{calc. ad.}$	λ
RT Aur	I	9.6 (11)	6.0 (3)	1.95(-5)	0.806	.008	.0059	0.707	1.9 (-5)	-1.5 (-5)+3.05(-5)i
Eta Aqu	I	4.0 (12)	5.12(3)	1.03(-5)	5.35	.0084	.0032	1.29	1.06(-5)	-2.14(-6)+9.11(-6)i
X Cyg	I	4.77(12)	5.0 (3)	4.43(-6)	3.	.0046	.0033	1.73	4.16(-6)	-2.93(-6)+3.46(-6)i
Mira	I	2.73(13)	2.3 (3)	2.14(-7)	0.6	.00005	.00003	0.338	2.03(-7)	-7.52(-11)+2.82(-7)i
RR Lyr	II	3.75(11)	8.0 (3)	1.32(-4)	1.75	.0568	.0228	0.776	1.3 (-4)	-7.59(-7)+1.3 (-4)i
-	II	5.5 (11)	8.0 (3)	5.1 (-5)	1.5	.022	.013	0.655	5.47(-5)	-2.08(-5)+4.58(-5)i
-	II	1.92(12)	5.9 (3)	4.88(-6)	2.	.0098	.004	0.664	5.12(-6)	-4.42(-7)+7.57(-6)i
BM Cas	I	1.56(13)	4.41(3)	2.69(-6)	14.3	.0014	.0082	0.35	2.56(-6)	-2.46(-8)+2.59(-6)i

x_1 = value of $x = r/R$ in the point where L (luminosity) starts decreasing

x_e = value of $x = r/R$ in the point where L = 0.

M_e = mass of the nucleus, (in solar units), in $x = x_e$.

λ = damping + $\sigma_{calc.\ non\ adiab.}$ i.

The authors continued the computation for each mass so determined, also for the non adiabatic approximation, as it is shown in Table 1.

The small mass deduced for Mira Ceti is interesting: it must be underlined that, for this star, the fitting with the internal partially degenerate nucleus occurs in a satisfactory way. This fact assumes great importance to understand the evolutive process that brings to the formation of such stars.

The authors give in Table 2, for its peculiar importance, the model they obtained for the variable Mira Ceti.

Table 2

Model of Mira Ceti

$x = r/R$	$y = m(r)/M$	$\log \rho$	$\log P$	$\log \bar{K}$	$\log T$	$L(r)/L(R)$
0.961	1.	-10.296	0.739	-4.732	3.27	1.
0.814	0.907	- 8.0255	3.21	-3.244	3.474	1.
0.675	0.774	- 8.078	3.818	1.69	4.016	1.
0.396	0.602	- 8.016	4.425	1.174	4.369	1.
0.0177	0.562	- 7.447	6.246	-0.124	5.162	1.
0.0000493	0.5615	0.678	16.564	-0.514	7.652	0.999
0.0000333	0.56149	1.322	17.32	-0.536	7.808	0.

$\psi_1 = -6.2$ $\psi_2 = -7.2$ $\psi_c = 25$

0.	0.	6.795	22.446	--	7.808	0.

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DS CYGNI

L' examen de 66 clichés obtenus avec une chambre photographique Dogmar Goerz (O = 113 mm, F = 494 mm) entre juillet 1945 et janvier 1959 montre que l' étoile DS Cygni a varié le plus souvent entre la 13è et la 14è grandeur mais aucun maximum ayant l' importance de celui du mois d' août dernier n' a été décelé.

Trois clichés du télescope Schmidt de 400 mm d' ouverture pris ultérieurement ont donné les magnitudes suivantes:

T. U.		m_p
1962 octobre	21,885	12,75
1966 septembre	23,890	13,2
1966 septembre	23,915	13,2

26 Septembre 1966

CH. BERTAUD

Observatoire de Meudon

Comme suite à la note concernant DS Cyg publiée dans le n° 151 de l' IBVS, j' ai examiné cette étoile sur 20 plaques de ma collection, depuis 1942.

Sur 8 de ces plaques donnant la m_p-limite 13,5, DS Cyg est invisible. Sur 12 autres plaques, la variable est visible: la maximum observé (24 Avril 1963) est m_p 13,2 d'après les étoiles de la S.A. 40 Mt. Wilson dans le champ de laquelle DS Cyg est se trouve également située.

Mais je dois faire remarquer que, selon ce qu' indique M. A. Koeckelenbergh dans sa note, les trois clichés où l' augmentation d' éclat de la variable a été remarquée ont été obtenus sur des plaques Ilford HPS qui sont des plaques panchromatiques. DS Cyg étant une variable irrégulière nettement rouge (spectre N), l' augmentation d' éclat apparente peut trouver sa cause dans la nature des plaques utilisées par l' observateur.

Paris, 9 Octobre 1966

R. WEBER