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S 10171 ORI

The Variable S 10171 Ori was discovered in comparing two plates of the field φ_2 Ori. Instrument: Astrograph 400/1600 mm; type: UV Ceti; colour: red.

The following decline was observed:

243 8371.441 ($15^{m}.3$); .485 ($15^{m}.8$); .529 ($17^{m}.2$). Two days earlier and one day later the star was invisible. The brightness on the Palomar blue chart is about 19^{m}, on the red one about 18^{m} (pair 1493).

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THE MASS OF MIRA CETI, DELTA CEPHEI AND ETA AQUILAE

One of the most interesting aspects of the modern methods proposed to assign the mass to variable stars consists in finding the curve $\sigma = \sigma(M)_{Te,R}$ which not only allows to determine the mass but also to give a value for the expression $\left(\frac{1}{\sigma}\frac{d\sigma}{dM}\right)_{Te,R}$

Therefore we present now these curves for the above mentioned stars; we obtained these curves applying the method we exposed in (1), after we operated some changes and some improvements which we shall refer in a following paper.

The curves related to Delta Cep and Eta Aql have been constructed applying the method (1) to masses indicated by points in fig. 1/A and 1/B; they show that if such stars oscillate on the second eigen-value, as proposed by Cristy (2), the masses derived by our method are very close to those this author deduced, in fact we find 1. 8 and 3. 2 $M_{\odot}$. But if the stars oscillate on the first eigen-value the masses we derive are respectively: 3. 5 and 6 $M_{\odot}$.

Our computations do not consent to choose between the two solutions.

Fig. 1/A

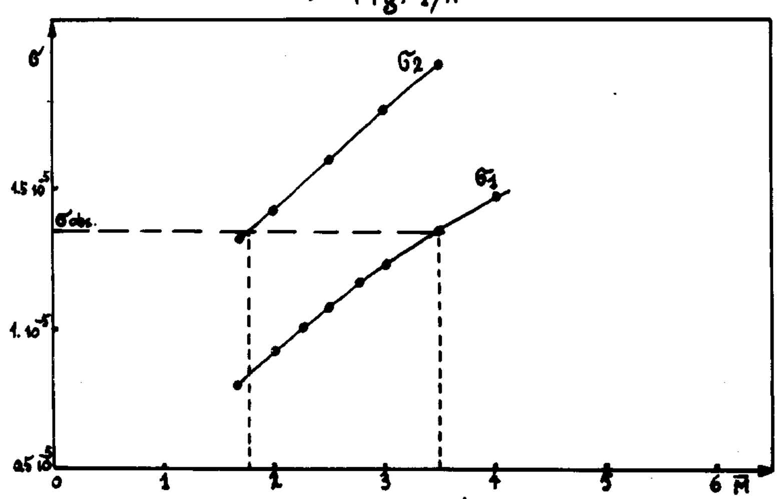
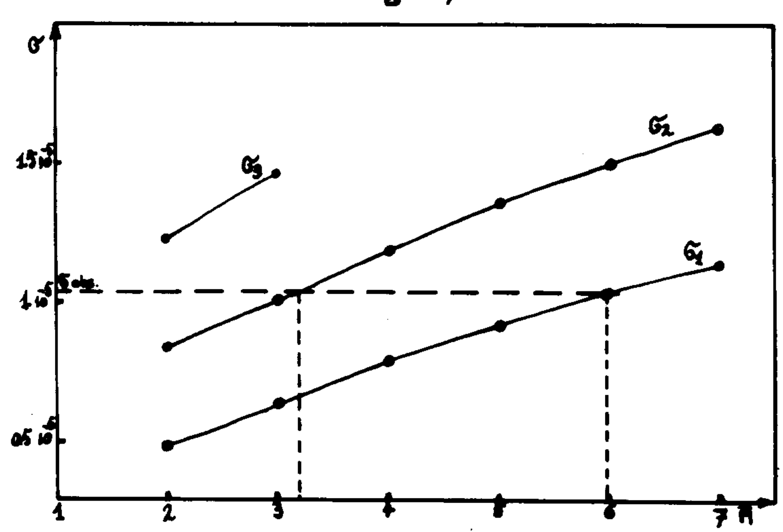
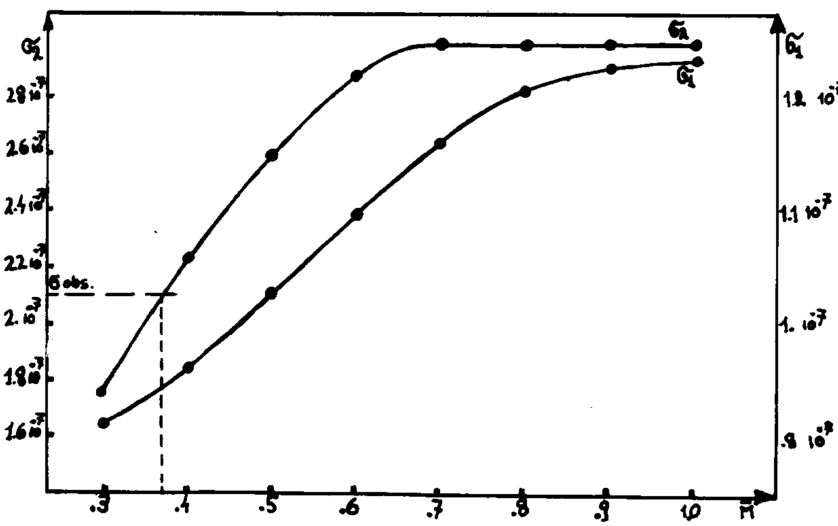


Fig. 1/B



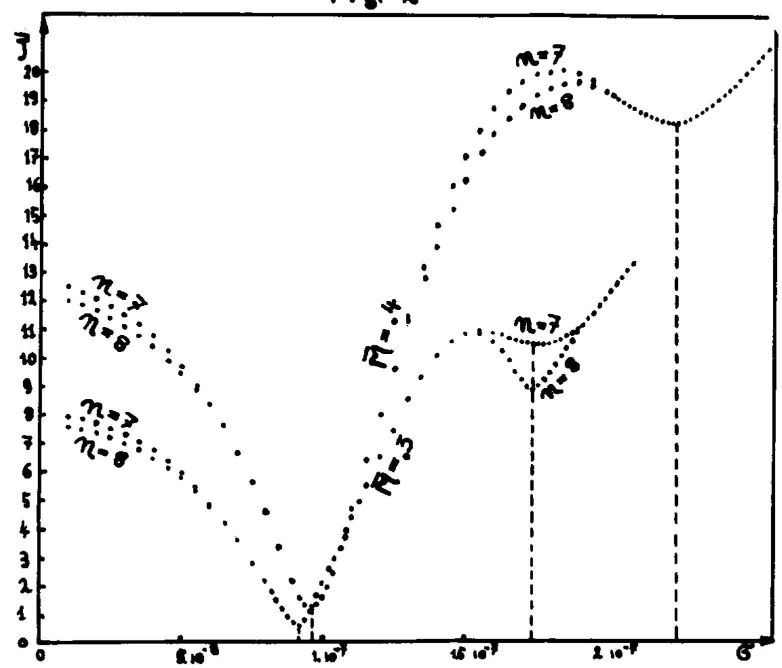
For Mira Ceti we have a different situation. It does not seem possible that Mira Ceti oscillates on the fundamental eigen-value since the mass corresponding to it should be far too high for the possibility of constructing a model; as a matter of fact the models we constructed starting from the surface with masses > 1 exhaust all the mass before arriving to the center. Our results, shown in fig. 1/C, seem to the conclusion that Mira Ceti oscillates on the second eigen-value with a mass $0.4\ M_{\odot}$.

Fig. 1/c



This result obtained in a completely different way is in a good agreement with those by J. D. Fernie (3) and by J. D. Fernie and A. A. Brooken and it strengthens the hypothesis that some M variable stars have very small masses ($\sim 1\ M_{\odot}$) instead of what is generally admitted (that all have $\sim 15\ M_{\odot}$) on the basis of the unjustified application of the mass - luminosity relation to these stars. Mira Ceti, Khi Oph. (3) and analogous variables seem to be for this reason old stars. It is not to be rejected the hypothesis that such stars are the results of an intense process of mass loss (in consequence of strong stellar winds or ejection of shell owing to shock waves propagation) in stars that initially had a mass $< 4\ M_{\odot}$ with evolution that, according to R. Stothers, is not affected by neutrino emission.

Fig. 2



Graph 2, which represents the relation $\bar{J} = \bar{J}(\sigma)$, ($\bar{J} = 10^7 \sqrt{J}$; $J = J(y)$ of (1) (pag. 274) we obtained for Mira Ceti with models which have 0.3 and 0.4 $M_\odot$ and by approximating polynomials of 7th and 8th degrees, shows as an example, how the 1st and 2nd eigen-values are determined according to the method we propose (the curves are different from star to star).

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(1) The position of variable stars in the H-R Diagram. Bamberg, 255 (1965)
(2) Bamberg, 77 (1965)
(3) Ap. J. 130, 611 (1959)
(4) Ap. J. 133, 1088 (1961)
(5) Ap. J. 138, 1085 (1963)