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THE P-L-C RELATION OF GALACTIC FIELD CEPHEIDS AND THE P-L AND P-C RELATIONS OF OPEN CLUSTER AND ASSOCIATION CEPHEIDS

In our paper (Opolski and Ciurla, 1984) we have presented the arguments in favour of large value of the colour term coefficient in the P-L-C relation for galactic field Cepheids. As the continuation of this investigation one of us (T.C.) has worked out a modification of least squares and maximum likelihood methods, which seems to be the most suitable for calculating the P-L-C relation. In this new approach the log P is regarded as an accurate, faultless parameter and $M_{<V>}$ and $<B - V>_o$ as burdened with accidental errors. The details of this method will be published in a separate paper.

Using the data for 52 galactic field Cepheids published by Opolski (1982) (omitting 5 Cepheids which are suspected as overtone pulsators and 7 ones belonging to open clusters and associations), we got by means of this new method the P-L-C relation:

$$M_{<V>} = \underset{\pm 0.81}{5.40}\ <B - V>_o - \underset{\pm 0.84}{5.20}\ \log P - \underset{\pm 0.60}{3.44} \qquad (1)$$

or, considering that

$$<B - V> = <B> - <V> + 0.028$$

we have

$$M_{<V>} = 5.40\ (\ <B> - <V>\ )_o - 5.20\ \log P - 3.29 \qquad (2)$$

Here we have again the large value of the colour term coefficient, which supports our previous results.

In order to test the position of the open cluster and association Cepheids in relation to the plane determined by equation (2) in the three dimensional space: $M_{<V>}$, log P, and $<B> - <V>$ we have used the P-L and the P-C relations obtained for these stars by Fernie and McGonegal (1983):

$$M_{<V>} = -1.61 \pm 0.10 - 2.882 \pm 0.84 \log P \qquad (3)$$

$$(\langle B\rangle - \langle V\rangle)_o = 0.32 \pm 0.04 + 0.418 \pm 0.032 \log P.$$

Geometrically the relations (3) can be treated as equations of a straight line in the same space. It is easy to verify that between the line (3) and the plane (2) there is a small angle amounting to only 9 $\pm$ 3 arcminutes and the line (3) intersects the plane (2) at the point: $M_{<V>} = -3.88$, $\log P = 0.79$ and $(\langle B\rangle - \langle V\rangle)_o = 0.65$, that is close to the mean position of the investigated field Cepheids. Taking into account the accuracy of these data, we may conclude that the line (3) is just placed on the plane (2) or that the open cluster and association Cepheids satisfy also the formula (2), though they do not determine any P-L-C relation, being placed along the line (3).

T. CIURLA and A. OPOLSKI
Wrocław University Observatory
ul. Kopernika 11
51-622 Wrocław, Poland

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