First overtone pulsators among Cepheids

L. Mantegazza[1], E. Poretti[2]

[1] *Università degli Studi, Pavia, Italy*
[2] *Osservatorio Astronomico di Brera, Merate, Italy*

The Fourier decomposition has been successfully applied to several classes of pul sating variables. Antonello and Poretti (1986) and Antonello et al. (1990a) applie it to the Cepheids with $P < 8$ d. The latter authors redefined the $s-$Cepheids a Population I Cepheids that do not follow the Hertzsprung progression, but have progression of their own. The same authors proposed a new denomination (Antonell et al., 1990b): C–a stars to indicate the Classical Cepheids and C–b stars to indicat the redefined $s-$Cepheids.

The new photometric data obtained at La Silla and Merate Observatories (Man tegazza and Poretti, 1992) increase the evidence of a separation of Cepheids into tw well defined subclasses on the basis of the Fourier parameters of their light curves.

In the $\phi_{21} - P$ plane, the $s-$ and Classical Cepheids are characterized by tw sequences well separated for P<5.5 d. In the period range 3 d< P <5.5 d, tw different progressions are also present in the $\phi_{31} - P$ plane while a discriminatin value $R_{21} = 0.20$ can be seen in the $R_{21} - P$ plane. In the $R_{31} - P$ plane th separation is well defined only for $P < 4.5$ d, with a discriminating value $R_{31} = 0.08$

Besides the identification of new first overtone pulsators located on the uppe $s-$Cepheid sequence, we can point out that in the $\phi_{21} - P$ plane the increasing dis persion around 3 d strengthens the hypothesis that a resonance with a higher overton abruptly stops the regular upper progression; consequently the Cepheids located o the lower sequence should also be first overtone pulsators. The common nature of a these stars finds another observational support in the relationships noticeable in th $R_{21} - P$, $\phi_{31} - P$, $R_{31} - P$ planes, now better established on the basis of the ne available light curves.

References:

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