ON THE TWO OOSTERHOFF GROUPS OF GLOBULAR CLUSTERS

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Abstract. The observational evidence leading to the classification, following Oosterhoff, of globular clusters containing RR Lyrae stars into two distinct groups, is summarized and discussed in the light of results of stellar evolution theory and pulsation theory. The dichotomy is caused, at least in part, by a dichotomy in the 'transition period' between the type-*ab* and type-*c* stars which reflects a difference in effective temperature at the transition point. When this difference is accounted for, there remains a smaller average difference between the groups, though no longer a clear dichotomy, that is probably a mass and luminosity effect. If this remaining difference is interpreted as a luminosity effect the average difference in luminosity between the two Oosterhoff groups is at most 0.1 mag. It is suggested that Christy's theoretical relationship between transition period and luminosity cannot be valid, at least not for clusters of different Oosterhoff groups. It is conjectured that the transition-temperature dichotomy may be a reflection of different predominant directions of evolution along the horizontal branch, accompanied by a hysteresis effect in the pulsations.

DISCUSSION

Dickens: A significant objection to the hypothesis of a mass difference to explain the dichotomy is the fact that the stellar models of lower mass are bluer (corresponding to clusters with blue horizontal branches) than those of higher mass (red horizontal branches), in the opposite sense to that required to explain the dichotomy in this way. Although changing the metal content can also strongly affect the horizontal branch models, the fact that it correlates rather poorly with horizontal branch type implies that a variation in the mass is likely to remain as an important parameter in interpreting the colour-magnitude diagrams of clusters. This appears to strengthen the above objection to a mass difference between clusters of different Oosterhoff groups.

J. D. Fernie (ed.), Variable Stars in Globular Clusters and in Related Systems, 196.