

THE ABSOLUTE MAGNITUDES OF RR LYRAE STARS

A. Manduca and R. A. Bell
University of Maryland

ABSTRACT

A theoretical counterpart to the Barnes-Evans relation between stellar surface brightness and V-R color has been calculated from model atmospheres for parameters appropriate to RR Lyrae stars. Such a relation can be used to derive stellar angular diameters from V,R photometry and, when applied to variable stars and combined with a radial velocity curve, to derive radii, distances, and absolute magnitudes by the method of Barnes et al. (1977, MNRAS, 178, 661). This was done for RR Lyr and X Ari using the photometry of Moffett and Barnes (1980, private communication) and radial velocities from the literature. The resulting absolute magnitudes are $\langle M_V \rangle = \pm 0.59 + 0.25$ for X Ari and $\langle M_V \rangle = 0.61 + 0.35$ for RR Lyr. The method is shown to be a very accurate way of determining radii, distances, and absolute magnitudes for RR Lyrae stars which compares very favorably to the variations of the Baade-Wesselink technique currently in use.

DISCUSSION

MANDUCA: The color relations depend on gravity in spite of earlier statements. This is deceptive because the changes in the parameter S_V we use are ten times larger than the Barnes and Evans F_V . The effect is enough to cause a problem in RR Lyrae stars.

BARNES: The empirical surface gravity-color index relation has error bars nearly an order of magnitude bigger than the gravity differences. This is what we meant when we said that there is no gravity effect in the observations. They aren't good enough.