

UBVRI distances and metallicities for a sample of late-type HIPPARCOS stars

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Abstract. Using UBVRI photometry and proper motions we have developed a procedure to separate dwarfs and subdwarfs from stars of other luminosity classes. Three independent methods to take into account the effect of metallicity in photometric distance determinations have been applied, giving special attention to the use of infrared colours for stars with $(B - V) > 0.8^m$.

The application of these methods to a sample of 426 stars included in the HIPPARCOS Input Catalogue –for which we have obtained photometric data– allow us to analyze systematic differences.

Key words: Photometry – Metallicity – Luminosity Classes

As a previous step in the determination of photometric distances and metallicities of our sample of late-type stars, we have developed an algorithm which, using only UBVRI photometry and proper motions, classifies the stars into luminosity classes. The complete description of the adopted criteria –concerning photometry, kinematics, reddening and metallicity– as well as the methods used can be found in Luri et al. (1991). When applied to our sample, this program has given reliable luminosity classes for the most part of the stars, being the others classified as “peculiar” or unclassified.

Given a luminosity class, we have been able to assign a photometric parallax to the stars. For class III stars, interstellar absorption has been included after analyzing all the possible dereddening solutions. In the case of dwarfs and subdwarfs metallicity has been taken into account; up to three independent determinations have been obtained for each star, applying six different methods –depending on the color range–. A new method, using the R-I infrared index as a metal-free parameter, is proposed. We have detected systematic differences between some of the determinations, Luri (1991), which are due to the different hypothesis made when estimating the effects of metallicity on photometric colors as proposed by several authors. These differences reach, for very metal-poor stars, the 0.6^m level. There are no –nowadays– enough direct data on metal-poor stars to favour one determination or another; we must wait to have more reliable data –e.g. the trigonometric parallaxes coming from the HIPPARCOS mission– to decide which one is the best.

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References

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