INTERSTELLAR EXTINCTION IN THE DIRECTION OF THE MEROPE DARK CLOUD IN PLEIADES

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Abstract. The dependence of interstellar extinction on distance in the direction of the dark cloud south of Merope is determined using photoelectric photometry of 93 stars in the Vilnius photometric system. The cloud front edge is detected at 120–130 pc from the Sun and the distance of the Pleiades cluster is found to be 127 pc. Mean extinction $A_v$ in the Merope cloud is of the order of 1.0 mag. There is no evidence of extinction at distances exceeding the Merope cloud distance. Variable extinction method yields $R = A_v/E_{B-V} = 3.6$, while the maximum polarization wavelength method gives the value 3.4. Some Pleiades stars are suspected to be unresolved binaries.

1. Introduction

The area of the Taurus dark clouds is one of the nearest regions of star formation, however, so far it is poorly investigated by methods of photoelectric photometry and MK classification. To fill in the gap few years ago a program was started for study of interstellar extinction in the direction of the Taurus dark clouds using the Vilnius seven-colour photometric system. Two regions of this area, including the Khavtassi (1960) dark clouds 278, 286, and 291 were investigated earlier by Straižys and Meištas (1980) and Meištas and Straižys (1981). In this paper a similar method is used to investigate an area in the direction of the dark cloud south of Merope in the Pleiades. Despite the numerous studies of the cluster members, the photoelectric observations of field stars in the Pleiades area are completely lacking. The ratio of interstellar extinction to colour excess $R$ in the Merope dust cloud is also poorly known. The aim of this work was to determine the distance to the front of the Merope cloud and to investigate its absorbing properties. The coordinates of the investigated area are: $\alpha(1950) = 3^h 41^m - 3^h 47^m$, $\delta(1950) = +23^\circ - +24^\circ$, the area size is $15'5 \times 10'$.

2. Photometric Observations and Their Reduction

The observations of 93 stars down to $V \approx 13$ were obtained with the 1 m reflector on the Maidanak mountain in Uzbekistan during three observational seasons of 1982–1984. $V$-magnitudes and colour indices were reduced outside the atmosphere using Nikonov’s method modified by Zdanavičius (1970, 1975) which takes into account the dependence of extinction coefficients on spectral type, luminosity, and interstellar reddening. Instrumental magnitudes and colour indices were transformed to the standard Vilnius system using relations derived from observations of 30 stars in the Cygnus standard region (Zdanavičius and Černiene, 1985).
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