

WASHINGTON CCD PHOTOMETRY OF THE OPEN CLUSTER NGC 1245

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ABSTRACT

We have estimated a metal abundance of $[Fe/H] = -0.04 \pm 0.05$ dex, a reddening of $E(B-V) = 0.28$ mag, an age of 1.1 ± 0.1 Gyr, and a distance of 2.5 ± 0.2 kpc for NGC 1245 using the Washington filter system.

I. INTRODUCTION

It is well known that the mean metallicities of open clusters decrease with increasing galactocentric distance (Friel 1995). The metallicity and Galactocentric distance of NGC 1245 from the previous studies are $[Fe/H] \simeq 0.1$ dex and $R_{GC} \simeq 11$ kpc (Table 1). The metallicity of $[Fe/H] \simeq 0.1$ dex was rather high for the anticenter location of NGC 1245 (Fig. 4). It is not known whether NGC 1245 is abnormally metal-rich compared with other open clusters at the similar distance or the previous estimates of the metallicity of NGC 1245 contain large measuring errors. Therefore accurate determination of metallicity of NGC 1245 is needed. We have estimated the metal abundance, reddening, age, and distance of NGC 1245 using the Washington filter system.

II. OBSERVATION

The images of NGC 1245 were obtained with 0.61 m telescope (equipped with PM512 CCD) at Sobaeksan Observatory which is located in the central area of South Korea, on 19th February 1996.

III. RESULTS

We have determined the metallicity and reddening of NGC 1245 using the same method as used for Tombaugh 2 (Wee et al. 1996) and used 16 red giant stars for estimation of metallicity. A metallicity of $[Fe/H] = -0.04 \pm 0.05$ dex, a reddening value of $E(B-V) = 0.28$ mag, an age of 1.1 ± 0.1 Gyr, and a distance of 2.5 ± 0.2 kpc were obtained (Fig. 2, Fig. 3). These results except the metallicity are almost similar to those of previous researches (Table 1). However, our metallicity estimate is 0.1-0.2 dex smaller than those of previous studies.

The results of this study are illustrated in Fig 4. Fig 4 shows the metallicity of NGC 1245 is consistent with the radial abundance gradient based on other old open clusters.

REFERENCES

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Table 1. Comparison of our study with previous studies

	Method	E(B-V) (mag)	Distance (kpc)	Age (Gyr)	[Fe/H] (dex)
Chincarini 1964	UBV pg		2.3	0.8	metal rich
Hagen 1970	UBV pg	0.28/0.27	2.3		
Janes 1979	$\delta(U-B)$				0.06
Lynga 1987	Lund Catalogue	0.27	2.2	1.1	0.14
Pandey et al. 1989	Integrated parameter			1.1	
Carraro & Patat 1994	BV CCD	0.26	3.0	0.8	0.14
this study	Washington CCD	0.28	2.5 ± 0.2	1.1 ± 0.1	-0.04 ± 0.05

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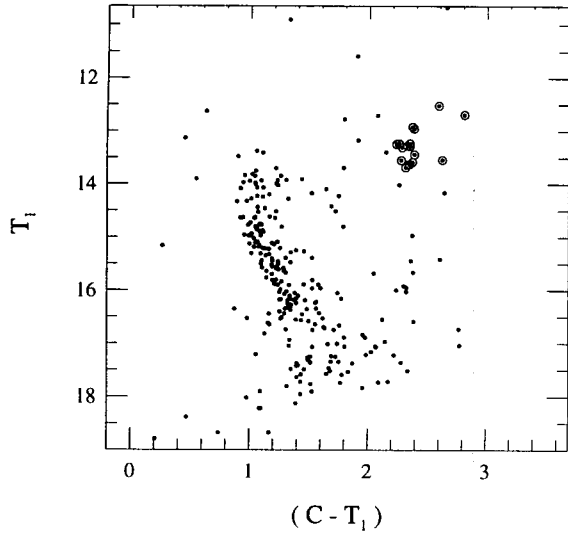


Fig. 1.— Color-magnitude diagram of NGC 1245. The open circles with a dot in the upper-right part are 16 red giant stars that are used for the estimate of metallicity of NGC 1245

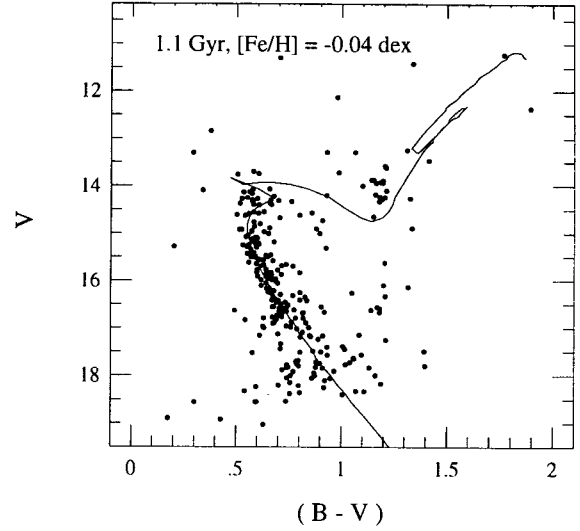


Fig. 3.— Isochrone fits for NGC 1245 in the BV CMD converted from Fig. 1. The solid line represent the ischrone for the age of 1.1 Gyr and $[Fe/H] = -0.04$ dex, shifted according to $E(B-V) = 0.28$ and $(m-M)_0 = 12.00$.

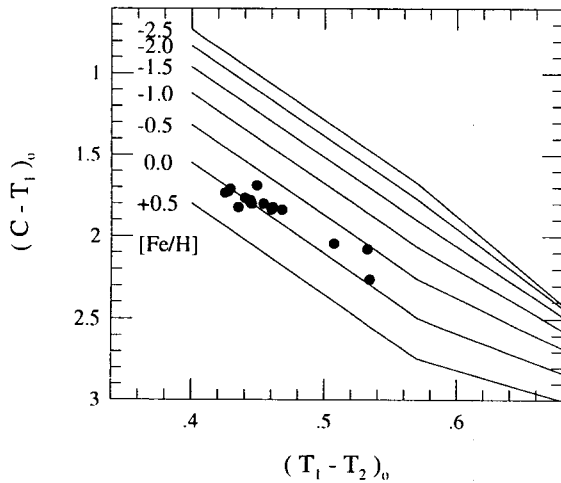


Fig. 2.— Color-color diagram of 16 red giant stars of NGC 1245. This is one of the four CCDs that we used to estimate the metallicity of NGC 1245. The mean metallicity is estimated to be $[Fe/H] = -0.04 \pm 0.05$ dex using these 4 CCDs.

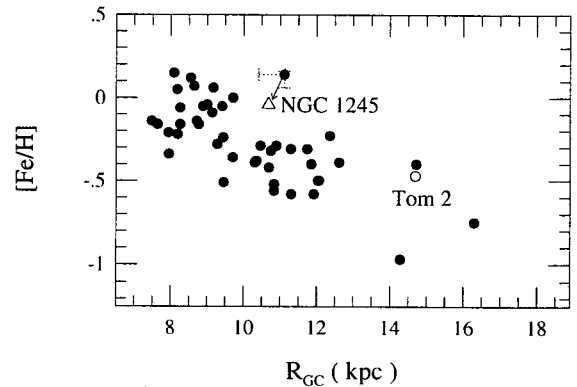


Fig. 4.— Radial abundance gradient for old open clusters. Filled circles correspond to the old open cluster data compiled by Friel(1995). The point of Tombaugh 2(open circle) is updated by Wee et al.(1996) The triangle represents the results of this study. The error bars of NGC 1245 represent the range of previous estimates.