

The Calculation of Distance and Age of the M50 Open Cluster by H-R Diagram.

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Abstract

The purpose of this work is the calculation of distance and age of the M50 open cluster by H-R Diagram. In this work, B and V filter observation was conducted using the 0.6-meter telescope at Cerro Tololo Inter-American Observatory (CTIO). From observation data, created H-R Diagram of M50 open cluster with Standard H-R Diagram. From H-R Diagram, the distance of M50 open cluster is 847 parsec and the age of M50 open cluster is 1,724 Million years.

Introduction

M50 or NGC2323 is open cluster in Monoceros with an apparent magnitude of 5.9, Right Ascension 07h 03.2m and Declination -08° 20'. In this study interested to study about the distance and age of the M50 open cluster by H-R Diagram.

Materials and Method

- Finding Distance and Age of the M50 Open Cluster.
 - Observed M50 Open Cluster in B and V filters.
 - Analyze data with Aperture Photometry Tool (APT) program. in order to compare with reference stars by DS9 program.
 - Calculate apparent from $m_1 - m_2 = -2.5 \log \left(\frac{f_1}{f_2} \right)$ and create H-R Diagram of M50 Open Cluster with standard H-R Diagram.
 - From H-R Diagram, approximate turnoff point of M50 Open Cluster to calculate m-M. Calculate distance by eq.(1) and age by eq.(4).
- Compare H-R Diagrams of M50 Open Cluster with NGC 2323 as shown in Picture 1. And compare data of M50 Open Cluster with Jasonjot Singh Kalirai & Monica Tosi (2004) as shown in Table 1.

Graph 1 show that $m=11.84$ and $M=2.20$ at turnoff point. Apply this value instead in distance modulus equation

$$(1) d = 10^{\left(\frac{m-M+5}{5}\right)}$$

By substituting in the equation, the distance of M50 Open Cluster is 847.23 pc or about 847 pc.

Apply $d=847$ instead in equation

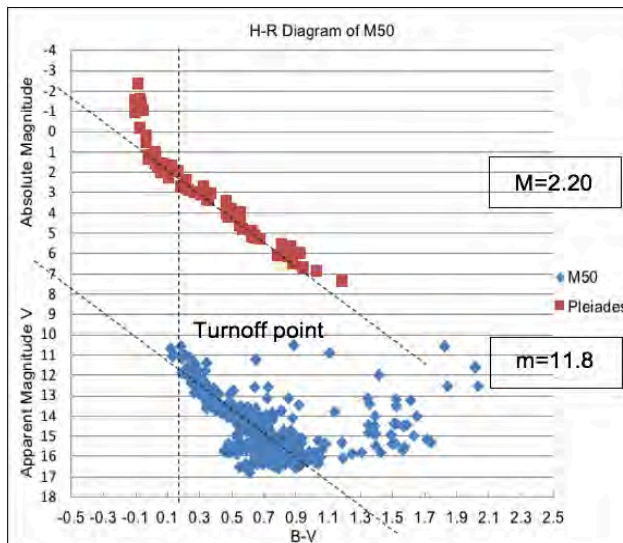
$$(2) m - m_0 = -2.5 \log \left[\left(\frac{L}{L_0} \right) \left(\frac{d_0}{d} \right)^2 \right]$$

$$(3) \log \left(\frac{L}{L_0} \right) = 3.5 \log \left(\frac{M}{M_0} \right)$$

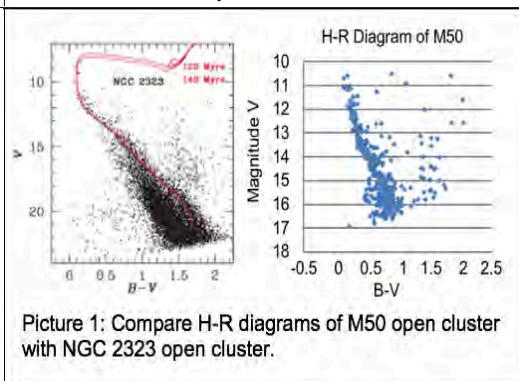
$$(4) t = 10^{10 \left[\frac{M}{M_{sun}} \right] - 2.5}$$

By substituting in the equation, the age of M50 Open Cluster about 1,724 Myr.

Results and Discussion



Graph 1: H-R Diagram of M50 show that the apparent magnitude (m) at turnoff point is 11.8 and Pleiades have absolute magnitude (M) at turnoff point is 2.20.



Picture 1: Compare H-R diagrams of M50 open cluster with NGC 2323 open cluster.

Data	Jasonjot Singh Kalirai & Monica Tosi (2004).	This project
Projects		
B-V	0.22	0.20
V magnitude	8.00	11.73
m-M	10.00	9.53
Distance(pc)	1,000	847
Age(My)	130	1,724

Table 1: Compare data of M50 Open Cluster.

Conclusion

This project found that M50 Open Cluster has a distance about 847 parsecs with error 15% and age about 1,724 million years with error 1,226%. We consider the error of result and found that the limit magnitude of the telescope cause the information of M50 is insufficient and to cause a turnoff point unclear.

Acknowledgment

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Reference

Jasonjot Singh Kalirai & Monica Tosi (2004). Interpreting the colour-magnitude diagrams of open star clusters through numerical simulation