The Measurement of Mass binary stars v0395 And

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Abstract

Binary star v0395 And is a part of the Eclipse binary type W Ursa Majoris, which are wrapped in combination surface around two stars. The objective of this project is to determine the Measurement of Mass binary stars v0395 And. The method of this study is take a photo of the star and analyzing by software programs. The equipment used in the study is a telescope in order to analyze and calculate data with the program of SAO imageDS9, IRIS.

According to the study, it is found that the total mass of the binary stars v0395 And equal 1.185×10^{47}kg. In terms of the mass of the first star equals 6.307×10^{46} kg and the mass of another star equals 5.544×10^{46} kg.

Keywords : Binary star mass of the star

Introduction

Eclipsing binary star is the system of two stars appear closely together in the sky as seen from the Earth; they are almost on the same line of sight. Therefore, author interests in the study of the Measurement of Mass binary stars v0395 And by using the Magnitude of stars in order to observe the bigthness variations. Moreover, the study also uses the kepler's third law for calculating the mass of stars.

Method

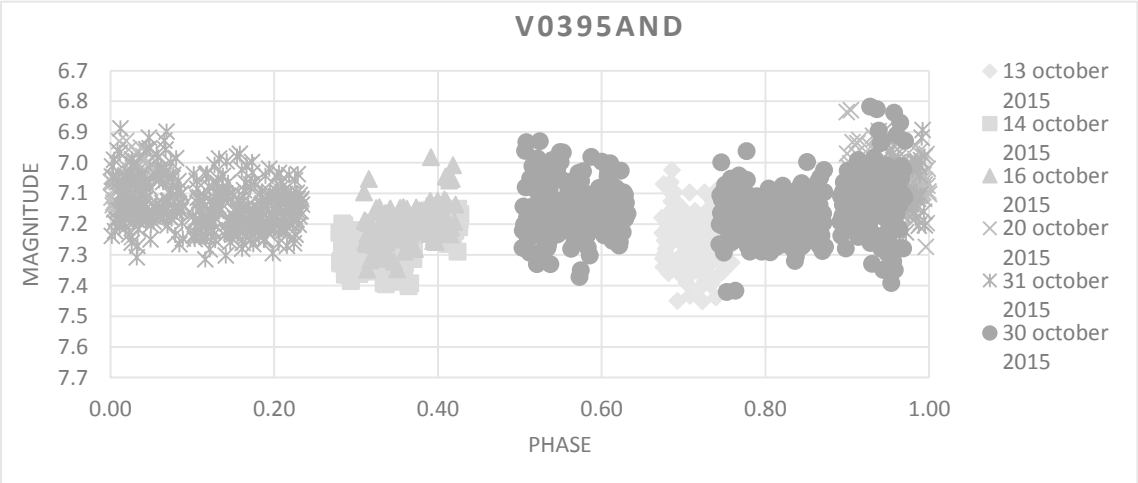
To measure mass of the binary stars v0395 And. is as follows:

1. Take a photo of the binary star v0395 And by using a telescope in the filter V and analyze data by DS9 to define magnitude of the reference star.
2. Taking the data which has been processed to IRIS to analyze the intensity of binary stars and reference star And then calculate the magnitude of binary stars.
3. Creating the light curve and calculating mass of binary star from kepler's third law.

Achievements

The result of the study of measurement of mass binary stars v0395 And. is as follows::

1. The Magnitude of the referenced star that is from DS9 program had a value as follows: Ref= 7.82, and .Check = 11.06
2. Data that is calculated will be creating the light curve as follows:



Due to it is the fact that this stage to make a light curve. There is an error which cannot be analysis. Thus, there will be use the database, which is equal to 0.685 day or 5.916×10^4 seconds. (source:https://www.aavso.org/vsx/index.php?view=detail.top&oid=395)

3. The distance between the binary star (a) is calculated from the Angular separation between components (θ) which is equal 5.642 arcsec or 2.735×10^{-5} radian. (source :http://vizier.u-strasbg.fr/viz-bin/VizieR-S?HIP117111) and the distance from the Earth to the double star (r) is equal to 3433.30 years light or $3.248^{19}\times$ 10 m (source : starry Night program.

4. The calculation of the total mass of the binary star by kepler's third law is as follows.

$$M\text{total} = \frac{4\pi^2 a^3}{T^2 G} \qquad M\text{total} = \frac{4 \times \pi^2 \times (8.883 \times 10^{14} m)^3}{(5.916 \times 10^4\ s)^2 \times (6.674 \times 10^{-11} \frac{Nm^2}{kg^2})}$$

$$M_{total} = 1.185\ \times\ 10^{47} \text{ kilogram}$$

5. Calculation of the mass of each star, according to the database is found that the mass ratio (q) equals 0.879. (source : http://arxiv.org/pdf/astro-ph/0503041.pdf)

$$M1 = \frac{Mtotal}{1+q} \qquad M1 = \frac{1.185 \times 10^{47} kg}{1+0.879}$$

$$M2 = Mtotal - M1$$

$$M2 = (1.185\ \times\ 10^{47}\ kg) - (6.307 \times 10^{46}\ kg)$$

$$M2 = 5.544\times10^{46} \text{ kg}$$

Conclusion and Evaluation

From the finding, it is found that there is an error which cannot be analysis when creating the light curve. So, there will be use the database, which is equal to 0.685 day and mass of the binary star equal to 1.185×10^{47} kg. In terms of the mass of the first star equals 6.307×10^{46} kg and the mass of another star equals 5.544×10^{46} kg by using the kepler's third law.

The references

Matipon Tangmatitam, **Handbook of practical astronomy study**, Academic and Information Astronomy Resource Center, September 2013.

American Association of Variable Star Observers.(2558).**V0395 And**. From : https://www.aavso.org/vsx/index.php?view=detail.top&oid=395 (October 17th,2015)