

# The Study of the Period of V1162 Orionis Variable Star

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## Abstract

The purpose of this research study the period change of variable star V1162 Orionis. In this work, The observation data was taken from CCD attached to the 0.7 m telescope at Spring book observatory (SBO) in Australia. Four-night data was obtained in B and V filter. We combine eclipse timings from published data and our data. From the O-C variation show parabolic curve. This signal can be explained that period decreasing with  $2.81 \times 10^{-11}$  day/cycle or  $1.66 \times 10^{-6} \text{ y}^{-1}$ . That can be interpreted as an evolutionary effect of pre-main sequence star. B-V = 0.21 mag, mean effective temperature of the star about 7500 K.

### 1. Introduction

V1162 Orionis is variable star type delta-scuti with short period 0.078684 days or 1.88 hours. (RA 05h 32m 1.99s, Dec -07° 17' 30.08"). The pulsating star are caused by expansion and collapsing in outer layer. Light curve of pulsating star change brightness over the time. In this study, we will examine the period change of V1162 Orionis.

### 2. Materials and Method

- 1) Observed V1162 Orionis 0.7 m telescope at Spring book observatory (SBO) in Australia in filter B and V with exposure time 30 second from 11-14 January 2019.
- 2) Data reduction and photometry with software AstrolmageJ.
- 3) Plot Light curve between HJD and flux of star and calculate time of maximum ( $t'_{max}$ ) from the light curve.
- 4) Analysis period change by collection time of maximum from published data (T. Arentoft et al.(2001), Seung-Lee Kim.(2016)) and our data. Calculate period change followed this equation of Hintz et al (1998).  

$$T_{max}(HJD) = 2447110.779 + 0.079E \quad \text{----- (1)}$$
- 5) Fitting polynomial curve compare with sinusoidal curve. Finding the best fit.
- 6) Calculate color index (B-V) by using apparent magnitude B-V.

### 3. Result and Discussion

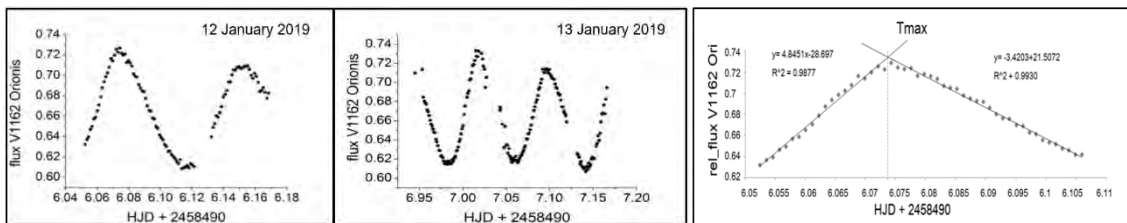


Fig 1: Light curve of V1162 Ori on 12-13 January 2019, Which plot between HJD and rel flux.

Fig 2: The graph shows how to calculate The time of Maximum

From the Fig 1, Four times of maximum were obtained as T12 Jan 2019 (HJD) = 2458496.07, 2458496.15 and T13 Jan 2019 (HJD) = 2458497.02, 2458497.10, respectively.

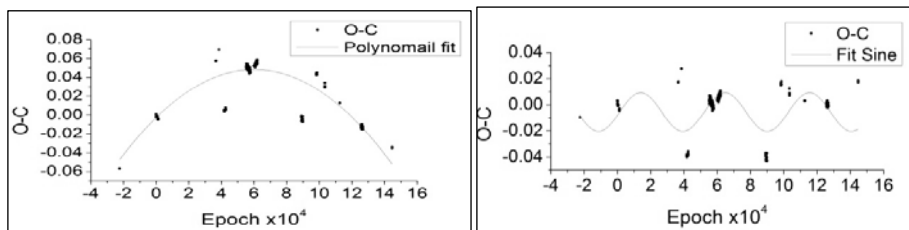


Fig 3: The O-C diagram of V1162 Orionis in Fitting polynomial and sinusoidal curve.

As show in Fig 3. The equation of Polynomial II is  $O-C = (-1.40 \times 10^{-11})e^2 + (1.69 \times 10^{-6})e - (2.65 \times 10^{-3})$  The value of  $dp/de = 2a = 2.81 \times 10^{-11}$  day/cycle can be converted to the period change  $1.66 \times 10^{-6} \text{ y}^{-1}$ .

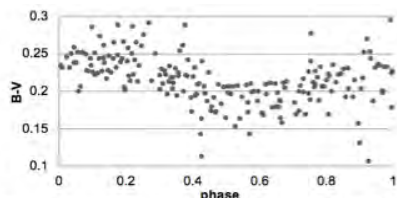


Fig 4 : The color index (B-V) in the range 0.17-0.25 mag.

### 4. Conclusions

V1162 Orionis is  $\delta$  Scuti-type star. The O-C diagram show a combination of a downward parabolic variation with a period decreasing rate of  $2.81 \times 10^{-11}$  day/cycle or  $1.66 \times 10^{-6} \text{ y}^{-1}$ , mean V1162 Orionis was provided in pre-main sequence star according to predicted theoretically from Breger & Pamyatnykh (1998). The color index (B-V) in the range 0.17-0.25 mag. That star have an effective temperature about 7500 K.

### 5. Acknowledgments

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### 6. References

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 Breger, M., & Pamyatnykh, A. A. 1998, Period Changes of  $\delta$  Scuti Stars and Stellar Evolution, A&A 332, 958.  
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