

## PERIOD ADJUSTMENT OF TT SCUTI

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## Abstract

The RR Lyrae variable TT Scuti was studied using photographic photometry. The O-C data show a possible downwards curve, which would indicate a decreasing period, but the results are not conclusive. New linear elements are:

$$JD_{(\max)} = 2439384.915 + 0.45293855 E. \quad (1)$$

A limit for the maximum rate of change of the period is  $-0.03 \pm 0.04$  cycles per million years.

\* \* \* \* \*

TT Scuti, which fluctuates from photographic magnitude 13.7 to 15.1 (see Figure 1), was studied using plates from the Maria Mitchell Observatory taken from 1940 to 1985, and the elements published by Oosterhoff (1943):

$$JD_{(\max)} = 2428671.548 + 0.4529390 E. \quad (2)$$

One additional earlier O-C point was obtained from mean light curve data from Oosterhoff (1943). Using least-squares analysis of the O-C data (see Figure 2) the new elements found are:

$$JD_{(\max)} = 2439384.915 + 0.45293855 E. \quad (3) \\ \pm 0.002 \pm 0.00000010$$

The F-test (Pringle 1975) gives a probability of 48% for the coefficient of the parabolic term being non-zero. If the curve is linear then only a period adjustment is necessary. If the period is changing the maximum rate of change is  $-0.03 \pm 0.04$  cycles per million years.

The skew of the light curve indicates that TT Sct is an RR Lyrae star of type ab. Using the period-temperature relationship for pulsating stars given by equation (4) (Stromeier 1972), the effective temperature of the star is found to be  $7100^{\circ}\text{K}$ . This would make it an F1 giant.

$$\log(T_{\text{eff}}) = 3.828 - 0.06 \log P. \quad (4)$$

Using equations (5) and (6) for RR Lyrae stars (Kukarkin 1975; Lang 1980) and approximating  $m_v$  by the mean photographic magnitude we can estimate the distance to TT Sct at 5100 parsecs. This value is not corrected for interstellar extinction.

$$M_v = -2.5 \log P \quad (5)$$

$$m_v - M_v = 5 \log (D) - 5 \quad (6)$$

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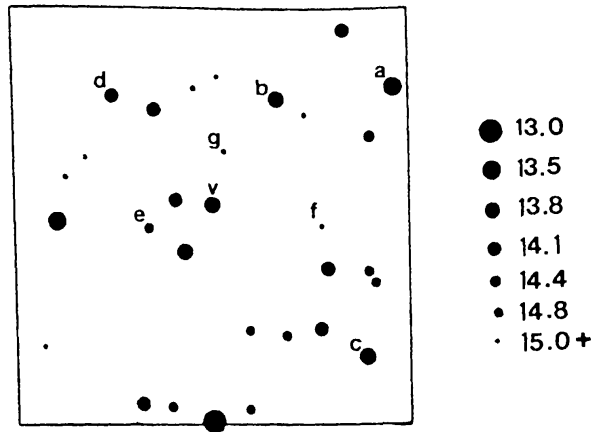


Figure 1. Finder chart for TT Sct. Each side is twelve arc minutes. The 1950 coordinates are: R.A. =  $18^{\text{h}} 52^{\text{m}} 3^{\text{s}}$ , Dec. =  $-12^{\circ} 15' 2''$ .

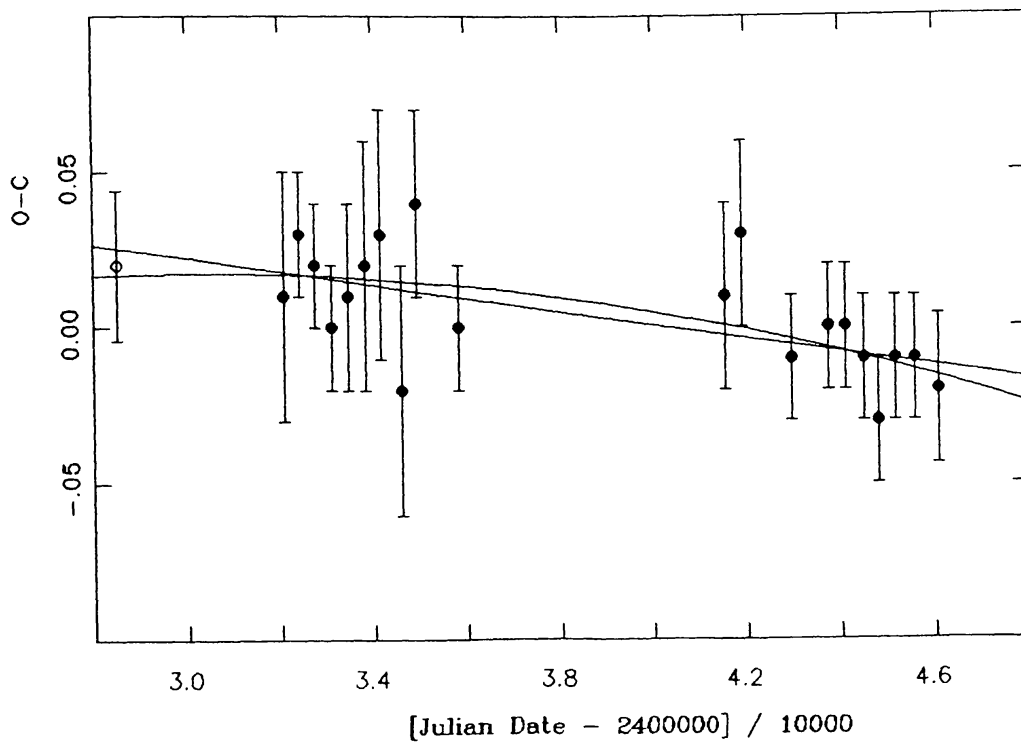


Figure 2. O-C versus Julian Day for TT Sct. O-C is in fractions of the period. The open point is from Oosterhoff (1943); closed points are from Maria Mitchell Observatory.