COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 2963

Konkoly Observatory
Budapest
5 December 1986
HU ISSN 0374-0676

ON THE PERIOD VARIATION OF YZ Boo

YZ Boo is one of the few high amplitude δ Scuti stars. The investigation of their period changes may give some information about their evolutionary state. Therefore we carried out new photometry of YZ Boo with the aim of investigating its period variation.

The period changes of YZ Boo was first studied by Szeidl and Mahdy (1981). They suspected that a slight continuous increase of the period had taken place:

$$\text{Max.hel.} = \text{J.D. } 2442146.3543 + 0^d.104091580 \cdot E + 5^d.3\text{x}10^{-13} \cdot E^2$$

Jiang (1986) reexamined all the observations published up till 1984 and made a thorough investigation of the period changes of YZ Boo and found the new ephemeris with a quadratic term:

$$\text{Max.hel.} = \text{J.D. } 2442146.35481 + 0^d.1040915791 \cdot E + 4^d.3\text{x}10^{-13} \cdot E^2$$

Peniche et al. (1985) carried out new accurate photometry of YZ Boo and made a detailed study of the period variation of the star independently of Jiang. Peniche et al. (1985) took the old poorly determined visual observations of Tsessevich (1958) into account, as well, and came to the conclusion that the period was basically constant:

$$\text{Max.hel.} = \text{J.D. } 2442146.35481 + 0^d.1040915680 \cdot E + 1^d.12\text{x}10^{-13} \cdot E^2$$

where the uncertainty in the quadratic coefficient is of the order of the derived value.

In order to study of the period changes of YZ Boo and to determine a more accurate ephemeris we observed the star from 24 June until 12 July 1986 on 13 nights. The observations were carried out by the 74 inch telescope at Kottamia Observatory, Egypt. Standard U, B and V filters with EMI 9558B tube were used.

The observed times of light maxima are given in Table I. In columns 2 and 3 the cycle numbers and the $O-C_{lin}$ values are given calculated according to the linear elements of Jiang (1986):

$$C_{lin} = \text{J.D. } 2442146.35531 + 0^d.1040915678 \cdot E$$

Table I

Observed light maxima of YZ Boo

J.D.hel.	E	$O-C_{lin}$	$O-C_{quad}$
2446606.3697	42847	$+0^d.0030$	$+0^d.0023$
612.3000	42904	+0.0001	-0.0006
612.4040	42905	0.0000	-0.0007
613.3399	42914	-0.0010	-0.0016
614.2773	42923	-0.0004	-0.0010
614.3825	42924	+0.0007	+0.0001
615.3193	42933	+0.0007	+0.0001
617.2972	42952	+0.0009	+0.0002
618.3361	42962	-0.0011	-0.0018
619.2745	42971	+0.0004	-0.0002
620.3170	42981	+0.0020	+0.0014
621.3569	42991	+0.0010	+0.0003
622.2936	43000	+0.0009	+0.0002
623.3338	43010	+0.0002	-0.0005
624.2713	43019	+0.0008	+0.0002
624.3770	43020	+0.0024	+0.0018

The list of light maxima of YZ Boo given in the paper of Peniche et al. (1985) were supplemented with Jiang's (1986) and our observed maxima and then a least-squares solution was carried out. The photoelectric maxima obtained in the last 30 years were only taken into account. As the weights assigned to the times of light maxima may sometimes be a matter of subjective judgement, equal weights were given to each time of light maxima in our calculations. The following new quadratic equation has been obtained:

$$C_{quad} = \text{Max.hel.} = \text{J.D. } 2442146.35479 \underset{\pm 26}{} + 0^d.1040915805 \cdot E \underset{\pm 41}{} + 3^d.43 \times 10^{-13} \cdot E^2 \underset{\pm 1.47}{}$$

This formula has been valid since 1955, when the first photoelectric observations were carried out by Eggen (1955).

Our observations show definite light curve variations. Both the shape and the amplitude of the light curve are subjected to changes from cycle to cycle. An overtone pulsation is probably excited beside the fundamental mode. In a forthcoming paper we will carry out a detailed period analysis of this star.

MOUNIR A. HAMDY
HAMID A. MAHDY
MOHAMMED A. SOLIMAN

Helwan Observatory
Egypt

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