A NOTE ON THE PERIOD OF THE W UMa STAR YZ PHOENICIS

The only published data on the star YZ Phe are a light curve and
several timings of minima from Sonneberg by Gessner and Meinunger
(1976).   They state that it is a W UMa star and derive an ephemeris
for time of minimum of JD 2436765.622 + $0^d.3052E$; they note that, due
to the small amplitude of variability, the derived period is
uncertain.   This star was put on a programme of observation of W UMa
stars that was commenced at SAAO.   The data that were obtained,
however, cover about half a cycle and cannot therefore be analysed in
detail, but some conclusions may be drawn on the period of the star.

The observations of YZ Phe were made in $UBVRI_c$ with the St
Andrews Photometer on the 1.0-m Elizabeth telescope at SAAO, Suther-
land.   These have been transformed on to the standard system through
observations of E-region stars (Menzies et al, 1980).   Regular obser-
vations were also made of comparison and check stars, as listed in
Table 1, which were constant to within 0.01 mag over the period of the
observations.   The data, which will be published elsewhere, are shown
in Figure 1.   For illustrative purposes, the data have been phased
with a period of 0.2248 d (see below) and the minimum arbitrarily
shifted to phase 0.5.   (There appears to be some scatter around
maximum in U;   the cause of this is   not due to variation in sky
background or transparency and remains unknown).

The minimum covered by the present observations is at HJD
2445621.39683 ± 0.00018, using the method of Kwee and van Woerden
(1956).

The "period" derived from these observations is 0.1124 d;   since
this actually corresponds to only half a cycle, then the true period
of YZ Phe is ~ 0.225 d.   This is close to the observed lower limit of
periods for W UMa stars, making YZ Phe one of the shortest period

objects known in its class.   Whilst the period of YZ Phe is likely to
have changed, a change as large as thirty per cent is unlikely and
indicates that the value of 0.3052 d was in fact incorrect;   more pro-
bable is that 0.3052 d is a 1 day alias of the true period at that
epoch, 0.2338 d.

Table 1

Colour indices of comparison stars for YZ Phe

	V	B-V	U-B	$V-R_c$	$V-I_c$	n	Sp*
HD 10521	8.383	0.360	0.032	0.220	0.442	15	F3V
	.008	.006	.011	.004	.003		
HD 10839	9.070	1.156	1.364	0.658	1.232	3	K2III
	.010	.010	.020	.003	.003		

* From Houk (1978)
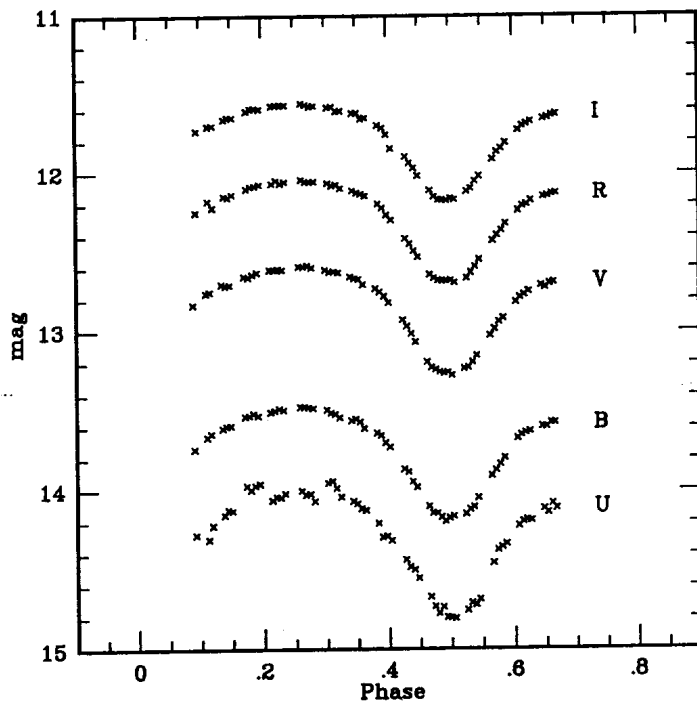
Figure 1.   Light curves of YZ Phe

Table 2

Colour indices of YZ Phe

	V	B-V	U-B	V-R_c	V-I_c
Max	12.597	0.882	–	0.542	1.028
	.010	.005		.010	.013
Min	13.257	0.910	0.613	0.577	1.093
	.015	.015	.027	.008	.017

The colours of the comparison and check stars, when transformed to the Johnson system (Cousins, 1980), are consistent with those of their spectral types (Johnson, 1966; Houk, 1978), implying that the reddening is small or negligible. The colours of YZ Phe are listed in Table 2 (these are the means and s.d. of six measures). These are not consistent with any one spectral type, the (V-R) and (V-I) colours implying a slightly later type (K2-K5) than (B-V) and (U-B) (K0-K2). The (B-V) colour of YZ Phe also appears to be slightly blue for its period (by ~ 0.1-0.2 mag), according to the period-colour relation (Mochnacki, 1985); the short period end of this relation, however, is poorly defined. The colours nevertheless imply that YZ Phe is a W-type W UMa star.

J H SPENCER JONES

S A Astronomical Observatory

P O Box 9

Observatory 7935

South Africa

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