Photometric Studies of New Southern SU UMa-type dwarf novae, FL Triangulum Australe and CTCV J0549-4921

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Abstract

We report time-resolved optical CCD photometry on newly discovered SU UMa-type dwarf novae, FL TrA and CTCV J0549-4921. During the 2006 August outburst, we detected superhumps with a period of 0.59897(11) days for FL TrA, clarifying the SU UMa nature of the system. On the first night of our observations on FL TrA, the object showed no superhumps. This implies that it takes a few days for full development of superhumps. The superhump period variation diagram of FL TrA was similar to that observed in some WZ Sge stars and short period SU UMa-type stars. This indicates that the system is closely related to WZ Sge stars and SU UMa stars having short orbital periods. For CTCV J0549-4921, the candidates of the mean superhump period are 0.083249(10) days and 0.084257(8) days, respectively. Due to a lack of the observations, we cannot determine the true superhump period, but the latter period is favorable. Using the ASAS-3 archive, it turned out that the system shows only four outbursts over the past 6 years. The outburst amplitude of CTCV J0549-4921 was relatively small, with about 4.5 mag. One possibility is that mass evaporation may play a role during quiescence.

Key words: accretion: accretion discs — stars: cataclysmic — stars: dwarf novae — stars: individual (FL Triangulum Australe, CTCV J0549-4921) — stars: novae, cataclysmic variables — stars: oscillations

1. Introduction

Dwarf novae are a subclass of cataclysmic variables that consist of a white dwarf (primary) and a late-type star (secondary). The secondary star fills its Roche lobe, transferring the matter into the primary via inner Lagrangian point (L1). Then the accretion disc is formed around the white dwarf. The accretion disc shows various modulations both in outburst and quiescence (for a review, see Warner 1995; Hellier 2001; Lasota 2001; Connon Smith 2007).

SU UMa-type stars are a subclass of dwarf novae (Osaki 1989; Osaki 1996; Patterson et al. 2005; Osaki (2005)). The systems basically exhibit two types of eruptions: normal outburst which lasts a few days and superoutburst which lasts about two weeks. During the superoutburst, modulations having an amplitude of ~0.2 mag called superhumps, are always observed. The period of the superhumps are a few percent longer than that of the orbital period of the system, which is attributed to prograde precession of tidally deformed accretion disc (Whitehurst 1988). Short and long-term variations of SU UMa stars are well reproduced by the thermal-tidal instability model developed by Osaki (1989). Recent arising problems concerning SU UMa stars are reviewed in Nogami (2007).

Recently, the advent of the Internet has significantly improved our understanding in SU UMa stars (Patterson et al. 2000; Patterson et al. 2002; Ishioka et al. 2002; Patterson et al. 2003; Kato et al. 2004), especially in the Northern hemisphere. As for Southern SU UMa stars, it is true that a lot of studies have been performed for them including e.g., VW Hyi (Vogt 1974; Haefner et al. 1979), Z Cha (Wood et al. 1986; Wade, Horne 1988), and OY Car (Wood et al. 1989; Horne et al. 1994). However, there are many poorly studied SU UMa stars compared to the Northern SU UMa stars. This trend has been changing over the past few years because of the advent of the All Sky Automated Survey (ASAS, Pojmanski 2002).

Valuable observations of SU UMa stars have been carried out thanks to prompt detection of outburst by the ASAS-3 (Templeton et al. 2006; Imada, Monard 2006; Imada et al. 2006a).

In this paper, we report photometric observations of two Southern dwarf novae, FL TrA and CTCV J0549-4921 during outbursts, during which we detected superhumps for the first time for these objects.
Table 1. Observation log of FL TrA during the 2005 August superoutburst.

| 2005 Date | Start<sup>a</sup> | End<sup>a</sup> | N<sup>b</sup> |
|-----------|--------------------|----------------|------------|
| Jul. 27   | 579.2491           | 579.3572       | 225        |
| Jul. 28   | 580.2378           | 580.5585       | 451        |
| Jul. 29   | 581.2032           | 581.5047       | 426        |
| Jul. 30   | 582.3141           | 582.5241       | 297        |
| Jul. 31   | 583.2259           | 583.4713       | 347        |
| Aug. 1    | 584.1918           | 584.4763       | 360        |
| Aug. 2    | 585.2243           | 585.3945       | 241        |

<sup>a</sup> HJD - 2453000.  <sup>b</sup> Number of exposure.

2. FL TrA

2.1. introduction

FL TrA was first cataloged in Meinunger (1970) in which the system was numbered S 5770 TrA with the variable type of UG. Downes, Shara (1993) tabulated cataclysmic variable stars, including FL TrA, in which the variable was categorised as UG with the magnitude range of 15.5p – 17.0p. Downes, Shara (1993) also gave the coordinate of RA:16°30′37″, Dec:−61°50′33″. No outburst of FL TrA was reported to the VSNET (Kato et al. 2004) until 2005. We have suspected the WZ Sge subclass of the object. Spectroscopic observations were carried out by Mason, Howell (2003) in which the object showed a spectrum of a common G-type star. Mason, Howell (2003) pointed out the misidentification of FL TrA.

On 2005 July 27, Rod Stubbings reported to the VSNET that FL TrA appeared to be in outburst with a visual magnitude of 15.0 ([vsnet-alert 8574]). He further noticed that the position of the system looked slightly north from the above mentioned coordinate. It turned out that FL TrA was misidentified as USNOB1 0281-0691553 (RA:16°30′36″.4, Dec:−61°50′28″.1). In response to the report, Downes et al. (2001) refined the finding chart of the system, which can be seen from the website. The precise coordinate of the system is RA:16°30′36″.61, Dec:−61°50′21″.0, where no optical counterpart exists in the USNO B1 catalog, which indicates the magnitude in quiescence may be fainter than 21 mag.

2.2. observations

Time resolved CCD photometric observations were carried out from 2005 July 27 to 2005 August 2 at Bronberg Observatory in South Africa using a 32 cm Schmidt-Cassegrain telescope equipped with a SBIG ST-7XME CCD camera. We tabulate journal of observations in table 1. All of the observations were performed with 30 sec exposure time. The total data points amounted to 2347. No filter was used during the observations. The unfiltered data are close to the $R_c$ system. After debiasing and flat-fielding, we performed aperture photometry using AIPWIN software. As a comparison star, we used USNO A2.0 0225−25536030 (RA:16°30′38″.79, Dec:−61°49′58″.0, B = 14.2, $R = 13.2$), whose constancy was checked by some stars located in the same image. The 1-sigma error for each differential magnitude is of an order of 0.03 mag, which is small enough to perform the following analysis, including exploring superhump period and profile variations. Heliocentric corrections to our run were applied before the following analysis.

2.3. results

Figure 1 shows light curves of FL TrA during the 2005 July/August superoutburst. The vertical and horizontal axis indicate differential magnitude and the fractional HJD, respectively. The magnitude of the comparison star is 13.2 in $R$. The star showed almost the constant decline from HJD 2453581 (2005 July 28) at a rate of 0.13 mag d$^{-1}$.

![Figure 1](http://archive.stsci.edu/prepds/cvcat/index.html)

Figure 2. Enlarged light curve on HJD 2453579 (2005 July 27), the first night of our run. The light curves provide no evidence of superhumps during this phase.

![Figure 2](http://archive.stsci.edu/prepds/cvcat/index.html)

was checked by some stars located in the same image. The 1-sigma error for each differential magnitude is of an order of 0.03 mag, which is small enough to perform the following analysis, including exploring superhump period and profile variations. Heliocentric corrections to our run were applied before the following analysis.

2.3. results

Figure 1 shows light curves of FL TrA during the 2005 July/August superoutburst. At the onset of our observations, FL TrA was at the magnitude of 15.0 on 2005 July 27, after which the system almost constantly declined at the rate of 0.13(1) mag d$^{-1}$. This decline rate is a typical value among SU UMa-type dwarf novae. As can be seen in figure 2, the light curve showed almost no feature on 2005 July 27 (HJD 2453579), indicating that superhumps did not yet develop. After subtracting a linear decline trend of daily light curves, we performed a period analysis of the phase dispersion minimization (PDM) method (Stellingwerf 1978) applied between HJD 2453580 and 2453285. Figure 3 displays the results of the PDM analysis, by which we determined 0.059897(11) days as the best estimated period during this stage. A
statistical F-test provided the confidence level of 99\%. The 1-sigma error was calculated using the Lafler-Kinman method (Fernie 1989).

We present daily averaged light curves in figure 4. These light curves are folded with the above obtained period. On HJD 2453580 (2005 July 28), the profile is characteristic of superhumps, with the mean amplitude of about 0.2 mag, from which we first confirmed the SU UMa nature of FL TrA. On 2005 July 29, the amplitude of the superhumps was at the maximum value of about 0.3 mag. No eclipse feature was detected during the observations, indicating a low-to-mid inclination of FL TrA.

In order to investigate the variations of the superhump period during the plateau phase, we measured the timings of the superhump maxima listed in table 2. The typical error is an order of 0.002 days. A linear fitting yielded as the following equation,

\[
HJD(\text{max}) = 2453580.2930(9) + 0.059864(21) \times E, \quad (1)
\]

where the parentheses denote 1-sigma error for each value. By using the above ephemeris, we draw an \(O-C\) diagram, which is displayed in figure 5. The best fitted quadratic for \(16 < E < 84\) can be represented as follows:

\[
O-C = 5.23(2.98) \times 10^{-3} - 2.56(1.46) \times 10^{-4}E \\
+ 2.53(1.50) \times 10^{-6}E^2. \quad (2)
\]

The above obtained value implies that the superhump period may increase since HJD 2453581 with \(P_{\text{dot}} = \dot{P}/P = +8.4(5.0) \times 10^{-5}\).

2.4. FL TrA as a short period SU UMa star

The present photometric studies and the previous archival survey reasonably qualified FL TrA as a new member of SU UMa-type dwarf novae with short periods. The outburst amplitude of FL TrA exceeded 6 mag, suggestive of a large amplitude SU UMa-type dwarf novae (TOAD, Howell et al. 1995). Unfortunately, the
et al. (2005) have further stated that systems which show
double-peaked humps existed, which is exclusively ob-
served among WZ Sge stars in early phase of super-
outburst (Osaki, Meyer 2002; Kato 2002a; Patterson et al. 2002).

As for superhump period changes, the estimated posi-
tive $P_{\text{dot}}$ derivative indicates that the superhump pe-
riod increases during the plateau stage. Such systems
include all of confirmed WZ Sge-type dwarf novae (Kato et al. 2001), as well as SU UMa-type dwarf novae with
short superhump periods (Oizumi et al. 2007). Recently,
Uemura et al. (2005) found that a short period SU UMa
star TV Crv shows two types of $P_{\text{dot}}$. The 2001 super-
outburst of TV Crv showed positive $P_{\text{dot}}$, while the 2004
superoutburst showed almost constant $P_{\text{sh}}$. The big dif-
fERENCE BETWEEN THE TWO SUPEROUTBURSTS IS NOT ONLY THE
difference between the two superoutbursts is not only the
different $P_{\text{dot}}$, but also the light curves themselves: a pre-
cursor was present for the 2004 superoutburst while it was
absent for the 2001 superoutburst. One interpretation is
that an appearance of the positive or constant/negative
$P_{\text{dot}}$ depends on the maximum radius of the accretion disc
during the superoutburst (Uemura et al. 2005). Uemura et al. (2005) have further stated that systems which show
both types of $P_{\text{dot}}$ will be restricted to short period SU
UMa stars, because the tidal truncation radius should be
significantly larger than the 3:1 resonance radius (see
Osaki, Meyer 2003). With this respect, the 2005 super-
outburst of FL Tri had a large disc radius, which is consistent
with the large amplitude of the outburst.

Another important finding is that unfitable cycle
counts by the equation (2) exists at the earliest stage of our
run. These correspond to $0 < E < 4$ in figure 5. Similar
results are found in V1028 Cyg (Baba et al. 2000), RZ Leo
(Ishioka et al. 2001), HV Vir (Ishioka et al. 2003), V844
Her (Oizumi et al. 2007) and GW Lib (Imada et al. in
preparation). During the cycle count of $0 < E < 4$, the
superhump period keeps constant, while an abrupt change
of the superhump period occurred after $E > 4$. The ori-
gin of the abrupt period change remained unknown, which
should be elucidated in the future observations.

3. CTCV J0549-4921

3.1. Introduction

CTCV J0549-4921 (hereafter CTCV J0549) was first identified as a candidate of cataclysmic variables after
spectroscopic observations in the Calan-Tololo Survey
(Maza et al. 1989). The optical spectrum shows Hα and
He i 5876 emission (Tappert et al. 2004), indicating the dwarf nova nature of the system. Tappert et al. (2004)
pointed out there is no evidence of the secondary star in
the optical spectrum because of the absence of TiO bands.

Optical observations during quiescence and outburst were
also performed by Tappert et al. (2004). During the qui-
escence, Tappert et al. (2004) found photometric orbital
modulations with the period of 0.080218(70) days, which
they interpreted as the orbital period of CTCV J0549.

Tappert et al. (2004) pointed out the shape of the mod-
ulation is reminiscent of quiescent light curve of WZ Sge.
During the outburst, CTCV J0549 brightened up to $V = 13.75$ on 1996 October 5. However, superhumps were
not detected. It is likely Tappert et al. (2004) observed
a normal outburst of SU UMa-type dwarf novae. In con-
junction with the above observations, CTCV J0549 has
been a promising candidate for SU UMa-type dwarf no-
vae.

On 2006 April 2, a brightening of the star was discov-
ered by L.A.G. Monard ([vsnet-alert 8896]) at the mag-
nitude of 13.8, who detected the rising phase of out-
burst. On 2006 April 4, we first detected superhumps
of CTCV J0549, and confirmed the SU UMa nature of the
object. Long-term monitoring by the ASAS-3 have de-
tected 3 outbursts, of which one was possibly a superout-
burst. This occurred in 2004 January. The precise coor-
dinate of the system is RA:05h49m55s.4, Dec:−49°21′56″,
where the 2MASS counterpart of CTCV J0549 yields $J = 15.619(50)$, $H = 15.210(81)$, and $K = 14.869(112)$, re-
spectively (Imada et al. 2006b).

3.2. Observations

Time resolved CCD photometric observations were car-
rried out from 2006 April 2 to 2006 April 12. The ob-
serving site and instrument are the same as described in
section 2.2. The journal of observations is summarized in
table 3. All of the observations were performed with 30-
sec exposure time with no filter. The total data points
of our run amounted to 1979. For obtained data, we
performed the same manner as mentioned in section 2.2.
We used USNO A2.0 0375−2158238 (RA:05h49m53.41,
Table 3. Observation log of CTCV J0549 during the 2006 April superoutburst.

| 2006 Date | Start[^\text{a}] | End[^\text{a}] | N[^\text{b}] |
|-----------|------------------|---------------|-------------|
| Apr. 2    | 828.2200         | 828.3839      | 452         |
| Apr. 4    | 830.2275         | 830.3658      | 286         |
| Apr. 5    | 831.1955         | 831.3463      | 428         |
| Apr. 6    | 832.1991         | 832.3524      | 428         |
| Apr. 12   | 838.1970         | 838.3339      | 385         |

[^\text{a}]: HJD - 2453000.  
[^\text{b}]: Number of exposure.

Fig. 6. Light curves of CTCV J0549 during the 2006 April superoutburst. The ordinate means the ASAS-3 V and R magnitude. The magnitude of the comparison star is 12.7 in R. The filled circles show time resolved CCD observations. The crosses indicate the ASAS-3 light curves, which contains 0.2 mag error originated from the modulation of superhumps. The negative observation was performed by the ASAS-3 on HJD 2453849, when the object was fainter than 14.4 in V.

Dec: $-49^\circ 18' 50'' 8$, $B = 13.3$, $R = 12.8$) as a comparison star, whose constancy was checked by some stars in the same image. The 1-sigma error for each differential magnitude is of an order of 0.01 mag. Heliocentric corrections to our run were applied before the following analyses.

### 3.3. results

The overall light curves during our run are presented in figure 6, in which we also demonstrate the ASAS-3 positive and negative observations. The discrepancy between our CCD observations and the ASAS-3 archive is large, presumably due to different filters between the site and the “snapshot” in the ASAS-3 photometry. Nevertheless, it is well determined that the bright maximum of CTCV J0549 was on HJD 2453831 with the magnitude of $\sim 13.0$. The rarely observed rising phase was fortunately detected on HJD 2453879, providing $-1.0(1)$ mag d$^{-1}$ as the rising rate. Although our observations were absent between HJD 2453833-2453837, during which the magnitude was assumed to decline linearly, the decline rate could be estimated to be $0.12(1)$ mag d$^{-1}$. The value is typical for usual SU UMa-type dwarf novae during the plateau phase.

Enlarged light curves for each night are depicted in figure 7, after subtracting linear rising or declining trend. There were almost no modulation on April 2. The growth time of superhumps is as short as 2 days. The amplitude of superhumps is the largest on April 5 with 0.4 mag. There is no evidence for an eclipse, which indicates of low to mid inclination system.

Fig. 7. Daily light curves after removing the linear trend. As can be seen in this figure, there are no features on HJD 2453829 (2006 April 2), corresponding to the rising phase, while prominent superhumps are shown from HJD 2453831 (2006 April 4). Therefore, we first confirmed CTCV J0549 as an SU UMa star.

In order to determine the mean superhump period during the plateau phase, we performed the PDM method (Stellingwerf 1978). The strongest periodicity can be found at 0.084257(8) days. However, due to the lack of our observations, we cannot rule out the second strongest

Table 4. Superhump timing maxima

| $E[^\text{a}]$ | Time[^\text{b}] | Error[^\text{c}] |
|--------------|----------------|-----------------|
| 0            | 830.2360       | 0.001           |
| 1            | 830.3230       | 0.005           |
| 12           | 831.2567       | 0.002           |
| 13           | 831.3401       | 0.001           |
| 24           | 832.2591       | 0.001           |
| 25           | 832.3474       | 0.001           |

[^\text{a}]: Cycle count.  
[^\text{b}]: HJD - 2453000.  
[^\text{c}]: Error in unit of days.
period, 0.083249(10) days. Hence, we carried out another approach to determine the mean superhump period by measuring the maximum timing of the superhumps. We tabulate the result on table 4. The best fitting linear regression is yielded in the following equation:

$$HJD(max) = 2453830.2396(29) + 0.08433(18) \times E. (3)$$

The above equation favors the former period of the superhump, 0.084257(8) days. If the quiescent modulations reflect the orbital period of the system, and the mean superhump period is \(P_{sh} = 0.084257(8)\) days, then the fractional superhump period excess is \(\sim 5\%\). This value is significantly larger than that observed in common SU UMa-type dwarf novae (Patterson et al. 2005). The actual \(P_{orb}\) and \(P_{sh}\) should be measured in the future observations.

3.4. CTCV J0549 as a long period SU UMa star

We first confirmed the SU UMa nature of CTCV J0549 by the detection of superhumps. Although the mean superhump period cannot be determined, the period exceeds 0.08 days, which we safely qualify CTCV J0549 as a long period SU UMa star. This is also supported by quiescent photometric observations (Tappert et al. 2004).

The most remarkable fact for CTCV J0549 is that the object has shown only 4 outbursts over the past 6 years. According to the ASAS-3 archive, the recorded outbursts were 2001 February 12, 2001 September 20, 2004 January 21, and the present superoutburst. We summarize recorded outbursts monitored by the ASAS-3 in table 5. Judging from table 5, only two are superoutbursts, one is a normal outburst, and we cannot distinguish the type for one outburst. If we do not miss any superoutburst since 2001, a supercycle of CTCV J0549 is estimated as \(\sim 800\) days. This is one of the longest values among SU UMa-type dwarf novae (Kato et al. 2001). Inactive systems having a similar superhump period include QY Per \((P_{sh} = 0.07681\) days, Kato et al. 2000), EF Peg \((P_{sh} = 0.08705\) days, Kato 2002b) and V725 Aql \((P_{sh} = 0.09909\) days, (Uemura et al. 2001)). Although the exact mechanism of the long supercycle still remains unknown, mass evaporation during quiescence might be a possible explanation for the origin of the outburst and quiescent properties (Meyer, Meyer-Hofmeister 1994; Lasota et al. 1995; Mineshige et al. 1998). This may be consistent with relatively small amplitude of 4.5 mag of CTCV J0549. As for evaporation, Mineshige et al. (1998) predicted that quiescent superhumps could be observed even during quiescence if evaporation works in the accretion disc. Oizumi et al. (2007) also argued that a peak separation variation of an optical spectrum during quiescence is a powerful tool to check whether or not the evaporation works in the accretion disc. Future spectroscopic observations are required to elucidate the nature of CTCV J0549.

4. Summary

In this paper, we newly confirmed the SU UMa nature of FL TrA and CTCV 0549-4921.

After the discovery of the outburst of FL TrA, we found that the previous candidate of the object had been misidentified. The mean superhump period of FL TrA was determined to be 0.059897 days. This superhump period qualified FL TrA as a short period SU UMa-type dwarf nova. The superhump period increased at the rate of \(P_{\dot{dot}} = +8.4(5.0) \times 10^{-5}\), which is a typical value of short period SU UMa stars. At the early stage of the superoutburst, the period of the superhumps changed abruptly, as observed in some WZ Sge stars, as well as short period SU UMa stars. Although the exact mechanism of the abrupt change is unknown, the origin of this phenomenon should
be discussed in future.

A previously suspected dwarf nova CTCV J0549-4921 has been first confirmed as the SU UMa nature by the detection of superhumps. Although a short baseline of our observation hindered us from accurate determination of the mean superhump period, we found the strongest signal at 0.084257 days, which is consistent with our eye estimation. This candidate period leads us to the conclusion that CTCV J0549 belongs to a long period SU UMa star. The ASAS-3 archive for CTCV J0549 puzzles us in terms of its inactive behaviour, as well as the small amplitude of the outburst despite the long supercycle of the system. A possible explanation may be that the mass evaporation plays a role during quiescence.

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References

Baba, H., Kato, T., Nogami, D., Hirata, R., Matsumoto, K., & Sadakane, K. 2000, PASJ, 52, 429
Connon Smith, R. 2007, astro-ph/0701654
Downes, R. A., & Shara, M. M. 1993, PASP, 105, 127
Downes, R. A., Webbink, R. F., Shara, M. M., Ritter, H., Kolb, U., & Duerbeck, H. W. 2001, PASP, 113, 764
Fernie, J. D. 1989, PASP, 101, 225
Haefner, R., Schoembs, R., & Vogt, N. 1979, A&A, 77, 7
Hellier, C. 2001, Cataclysmic Variable Stars: how and why they vary (Berlin: Springer-Verlag)
Horne, K., Marsh, T. R., Cheng, F. H., Hubeny, I., & Lanz, T. 1994, ApJ, 426, 294
Howell, S. B., Szkody, P., & Cannizzo, J. K. 1995, ApJ, 439, 337
Imada, A., Kato, T., Monard, L. A. G., Retter, A., Liu, A., & Nogami, D. 2006a, PASJ, 58, 383
Imada, A., et al. 2006b, PASJ, 58, 143
Imada, A., & Monard, L. A. G. B. 2006, PASJ, 58, L19
Ishioka, R., et al. 2001, PASJ, 53, 905
Ishioka, R., et al. 2003, PASJ, 55, 683
Ishioka, R., et al. 2002, A&A, 381, L41
Kato, T. 2002a, PASJ, 54, L11
Kato, T. 2002b, PASJ, 54, 87
Kato, T., Sekine, Y., & Hirata, R. 2001, PASJ, 53, 1191
Kato, T., Uemura, M., Ishioka, R., Nogami, D., Kunjaya, C., Baba, H., & Yamaoka, H. 2004, PASJ, 56S, 1
Kato, T., et al. 2000, IAU Circ., 7343
Lasota, J.-P. 2001, New Astron. Rev, 45, 449
Lasota, J. P., Hameury, J. M., & Huré, J. M. 1995, A&A, 302, L29
Mason, E., & Howell, S. 2003, A&A, 403, 699
Maza, J., Ruiz, M. T., Gonzalez, L. E., & Wischnjewsky, M. 1989, ApJS, 69, 349
Meinunger, L. 1970, Mitt. Veränderl. Sterne, 5, 156
Meyer, F., & Meyer-Hofmeister, E. 1994, A&A, 288, 175
Mineshige, S., Liu, B., Meyer, F., & Meyer-Hofmeister, E. 1998, PASJ, 50, L5
Nogami, D. 2007, in The Seventh Pacific Rim Conference on Stellar Astrophysics, ed. Y. W. Kang, H.-W. Lee, K.-C. Leung, & K.-S. Cheng Vol. 362 of Astronomical Society of the Pacific Conference Series, pp 195–
Oizumi, S., et al. 2007, astro-ph/0702752
Oski, Y. 1989, PASJ, 41, 1005
Oski, Y. 1996, PASP, 108, 39
Oski, Y. 2005, Proceedings of the Japan Academy, Ser. B: Physical and Biological Sciences, Vol. 81, p. 291-305., 81, 291
Oski, Y., & Meyer, F. 2002, A&A, 383, 574
Oski, Y., & Meyer, F. 2003, A&A, 401, 325
Patterson, J., et al. 2005, PASP, 117, 1204
Patterson, J., Kemp, J., Jensen, L., Vanmunster, T., Skillman, D. R., Martin, B., Fried, R., & Thorstensen, J. R. 2000, PASP, 112, 1567
Patterson, J., et al. 2002, PASP, 114, 721
Patterson, J., et al. 2003, PASP, 115, 1308
Pojmanski, G. 2002, Acta Astron., 52, 397
Stellingwerf, R. F. 1978, ApJ, 224, 953
Tappert, C., Augusteijn, T., & Maza, J. 2004, MNRAS, 354, 321
Templeton, M.R., et al. 2006, PASP, 118, 226
Uemura, M., Kato, T., Pavlenko, E., Baklanov, A., & Pietz, J. 2001, PASJ, 53, 539
Uemura, M., et al. 2005, A&A, 432, 261
Vogt, N. 1974, A&A, 36, 369
Wade, R. A., & Horne, K. 1988, ApJ, 324, 411
Warner, B. 1995, Cataclysmic Variable Stars (Cambridge: Cambridge University Press)
Whitehurst, R. 1988, MNRAS, 232, 35
Wood, J., Horne, K., Berriman, G., Wade, R., O’Donoghue, D., & Warner, B. 1986, MNRAS, 219, 629
Wood, J. H., Horne, K., Berriman, G., & Wade, R. A. 1989, ApJ, 341, 974