

Intermediate state of the cataclysmic variable V794 Aquilae in 2009

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Abstract. We present data from observations of the cataclysmic variable V794 Aquilae obtained in the period July - Oktober, 2009. We observed the variable while it was in intermediate state with brightness of about 16 mag in V band, which is about 1.5-2.0 mag below its high state. We received two multicolor and two BV light curves in this period. Flickering amplitude was about 0.4-0.5 mag in all bands.

Key words: *cataclysmic variables, nova-likes, VY Scl type*; individual: *V794 Aquilae*

Междинно състояние на катаклизмичната променлива V794 Aquilae през 2009

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Представени са наблюдения на катаклизмичната променлива V794 Aql, получени в периода юли и октомври 2009 г. Регистрирано е междинно състояние на променливата - около 16 зв. вел. във V филтър, което е с около 1.5 - 2 звездни величини под високото ѝ състояние. Получени са 2 многоцветни и 2 двуцветни (BV) криви на блясъка. Амплитудата на фликеринга е около 0.4 - 0.5 зв. вел. за всички цветове.

1 Introduction

V794 Aql is a nova-like cataclysmic variable of VY Scl type; i.e. close semi-detached binary system consisting of white dwarf and low-massive red dwarf with orbital period of 3.68 h (Honeycutt and Robertson, 1998). The secondary star fills its Roche-lobe and it transfers mass upon the primary through the inner Lagrange point, forming an accretion disc. Novalike stars are systems with a high rate of accretion and a relatively stable disc, but the luminosity of the VY Scl subclass systems, which are usually in a high photometric state, sometimes decrease by several magnitudes. Such low states are relatively rare and usually occasional.

The variable V794 Aql was discovered by Hoffmeister in 1936 (Hoffmeister, 1936). Its *V* magnitude is usually 14.3, though sometimes it can reach 19.5 (Honeycutt and Schlegel, 1985). Compared to the other stars of its class, the system shows "sawtooth" form of the light curve (Honeycutt and Robertson, 1998). After it reaches its maximum, the luminosity starts to decrease almost immediately, the decrease period being longer than the time necessary to reach its high state. The variable has three distinct types of behaviour in its low state, but the minimums usually last for several weeks, while the period of increase of luminosity – maximum 10 days. The typical repetition period is in the range from several weeks up to 100-250 days. V794 Aql has

another characteristic feature – flickering - fast irregular variations of luminosity within a couple of tenths of the magnitude.

In the current observation we have registered the star in its intermediate state, around 1.2-2.0 mag under its maximum luminosity on the average.

2 Observations

13 light curves observed during 4 nights in 2009 are presented. The patrol observations lasted from 1 up to 3 hours (see Table 1). The observations are obtained with the telescopes of the National Astronomical Observatory Rozhen (2m RCC telescope with dual channel focal reducer FoReRo2, equipped with CCD cameras Photometrics and VersArray (Jockers et al., 2000); 50/70 cm Schmidt telescope with CCD camera FLI PL 16803; 60 cm Cassegrain telescope with CCD camera FLI PL 9000) and AO Belogradchik (60 cm Cassegrain telescope with CCD camera FLI PL 9000).

Standard 2 of the field has been taken as a comparison star (Henden and Honeycutt, 1995), with the following magnitudes: $U=14.51$, $B=14.36$, $V=13.74$, $R=13.22$, $I=12.89$.

Table 1. The journal of observations: the date of the observations is given, as well as the telescope, filter and exposures used, start (UT) and duration of the patrol observations(* - total, without interruptions), the number of frames, the average magnitude in the respective filter and the average errors of the photometry.

Date	Telescope	Filter	Exposure, [s]	Start	Duration	N	Mag	Err
23/24.7.2009	2m	U	180, 240	00:16:03	01:03:28	14	15.26	0.06
23/24.7.2009	Sh	B	90, 180	00:04:34	01:30:31	28	16.22	0.04
23/24.7.2009	2m	V	60	00:18:09	01:01:50	54	16.00	0.02
23/24.7.2009	60B	R	60	00:38:06	01:04:22	58	15.48	0.05
23/24.7.2009	60R	I	90	00:25:13	00:54:43	33	15.12	0.03
24/25.7.2009	Sh	B	180	22:29:01	02:51:05	49	16.07	0.03
24/25.7.2009	60R	V	90, 120	22:18:02	02:57:57	48	15.77	0.03
24/25.7.2009	60B	R	60, 90	22:31:45	02:44:33	112	15.32	0.04
24/25.7.2009	60R	I	60, 90	22:19:38	02:53:30	47	15.07	0.03
13/14.8.2009	Sh	B	180	19:06:41	01:16:02*	15	15.94	0.03
13/14.8.2009	Sh	V	120	19:09:50	01:08:39*	14	15.67	0.03
6/7.10.2009	60R	B	120, 180	21:07:49	01:09:47	19	15.61	0.08
6/7.10.2009	60R	V	90	21:01:20	01:17:50	20	15.40	0.05

3 Results and Discussion

Figures 1-3 show the obtained light curves. On 24.07.2009 we have obtained simultaneous observations in 5 colours, using all the NAO Rozhen and AO Belogradchik telescopes with duration of about 1:30 hours. The average V magnitude was 16.00. Fig 1 represents data from the following night - a 4-colour light curve, obtained using 3 telescopes with duration of observations

about 3 hours. In this night the variable was slightly brighter - average V was about 15.80. On 13.08.2009 (Fig 2) ($V \sim 15.70$) and 06.10.2009 (Fig 3) ($V \sim 15.40$) we have obtained two-colour curves, using a single telescope and using 2 filters - B and V consecutively.

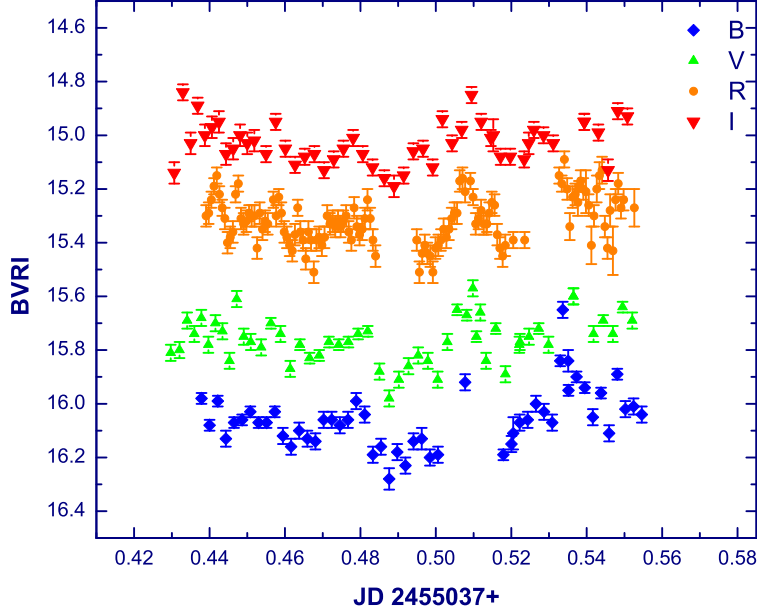


Fig. 1. Four-color light curve of V794 Aql derived on 24/25.07.2009.

The flickering amplitudes of V794 Aql varied in the range from 0.40 to 0.50 mag in all filters for July and August, but on October 6th we obtained smaller amplitudes - about 0.20 - 0.30 mag. It seems that with the increase of the brightness of the system, the flickering amplitude decreases. We need more data in different states to confirm such dependence. The average colours of the star in July were $(U - B) \sim -1.0$, $(B - V) \sim 0.2 - 0.3$, $(V - R) \sim 0.5$, $(R - I) \sim 0.3$.

Due to lack of consistency in the observations from July to Oct 2009, we cannot verify whether the last data relates to the same or another minimum of the star. The estimated V -magnitude on 14.11.2009 is around 15.2, which is closer to the high state of the variable.

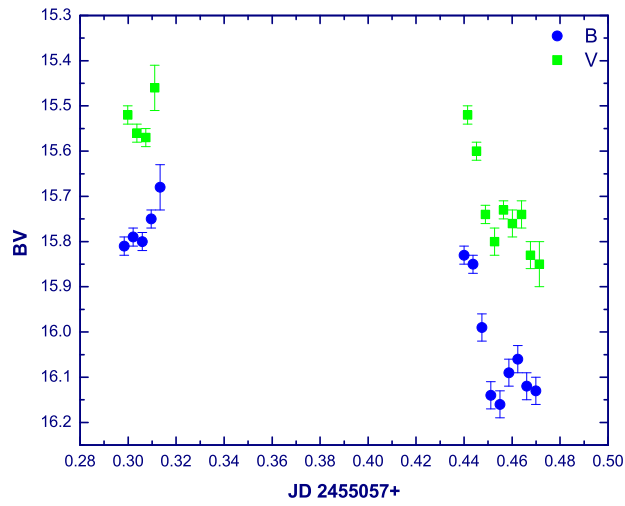


Fig. 2. Two-color light curve of V794 Aql obtained on 13.08.2009.

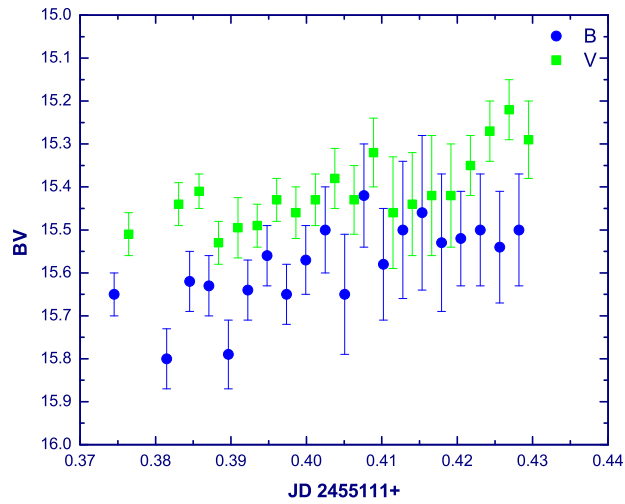


Fig. 3. Two-color light curve of V794 Aql obtained on 06.10.2009.

Acknowledgments

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Fig. 4. Georgi Latev and Sunai Ibryamov



Fig. 5. At the Poster Session of the Conference



Fig. 6. In the Museum of the Madara Horseman