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1995 PHOTOMETRY OF SV CAMELOPARDALIS

SV Camelopardalis (= SAO 1038 =#65 in the catalog of Strassmeier et al. 1993) is a member of the short period group of eclipsing RS CVn systems. Budding and Zeilik (1987) first modeled the starspots on this system and Zeilik et al. (1988) modeled the starspots for data available over the previous half century. Sarma et al. (1991) have also modeled the spots on this system. Continuing this work, I obtained BVRI light curves during 1995 and modeled the starspot structure. I observed SV Cam on the nights of 22, 28, 30, and 31 January and 1 and 4 February 1995 with the San Diego State University 61-cm telescope on Mt. Laguna. The photometer has a Hamamatsu R943-02 tube cooled to −15°C and operated at −1450V. Following Patkós (1982), I used SAO 1020 (=BD +82°168 = HD 43883) as the comparison star. In over seven years of photometry of SV Cam, Patkós found no evidence of variability of this comparison star. Using Landolt standard stars, I transformed the data into differential magnitudes in the standard Johnson Cousins system. Figures 1 and 2 show the differential (star–comparison) magnitudes in the BVRI bands. I modeled the data with the Information Limit Optimization Technique (ILOT) of Budding and Zeilik (1987). I started with the various stellar and orbital parameters from Budding and Zeilik (1987) and Zeilik et al. (1988) to perform initial fits to the data. The ILOT programs then subtract eclipse effects from the data and fit starspots to the remaining distortion wave. These SV Cam data fit best with two spots. Figure 3 shows the V band spot fit. The results in degrees are:

Spot fits

	B band	V band	R band	I band
Longitude$_1$	289.8±1.8	300.0±3.3	299.2±3.9	302.3±5.2
Latitude$_1$	−0.1±12.1	−0.5±18.8	−1.5±27.4	0(fixed)
Radius$_1$	11.6±0.4	9.0±0.4	9.1±0.5	8.3±0.5
Longitude$_2$	81.6±2.5	62.5±4.0	60.0±5.4	61.9±8.3
Latitude$_2$	0.0±14.5	0.2±20.0	−1.4±44.4	−0.2±29.2
Radius$_2$	10.6±0.4	8.0±0.5	7.3±0.6	5.8±0.8
χ^2	168.2	176.0	123.2	118.8

The spot models of Zeilik et al. (1988) show that over a 50 year span one fairly large high latitude spot tends to fit the data. These 1995 data are fit best with two low latitude spots, an apparently unusual occurrence for this system. Both spots are however located in the active longitude belts (ALBs) at roughly 90° and 270° noticed by Zeilik et al. (1988). After finding the best spot fits, the ILOT programs allow one to subtract the spot effects to perform clean fits to the data. Figure 4 shows the initial and clean fits for the V band. For the clean fits, I get:

Clean fits

	B band	V band	R band	I band
U	1.022±0.001	0.991±0.001	0.973±0.002	0.979±0.001
L_1	1.018±0.005	0.968±0.005	0.898±0.016	0.905±0.005
$k(=r_2/r_1)$	0.635±0.004	0.625±0.006	0.846±0.047	0.618±0.006
r_1	0.355±0.004	0.348±0.004	0.316±0.009	0.347+0.004
i(deg)	87.6±1.7	87.1±1.3	77.7±0.7	86.8±1.4
L_2	0.004±0.006	0.023±0.006	0.075±0.018	0.074±0.007
$q(=M_2/M_1)$	0.439±0.028	0.449±0.034	0.865±0.114	0.517±0.050
χ^2	69.4	65.9	84.8	80.5

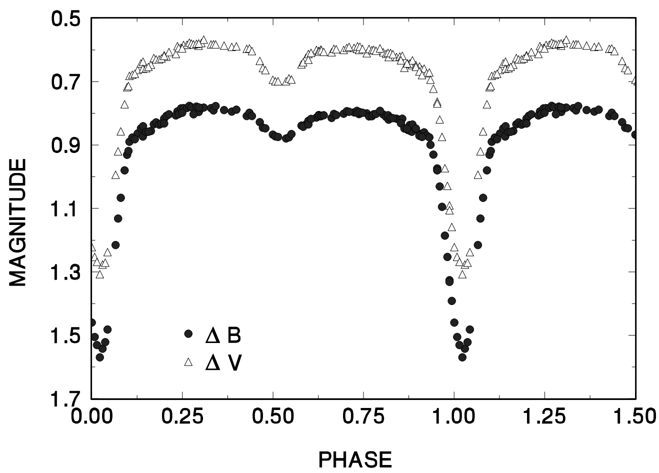

Figure 1. B and V light curves of SV Cam in Jan/Feb 1995.

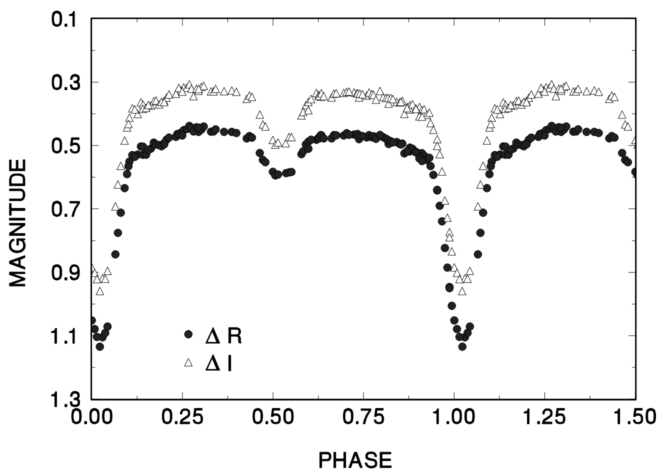

Figure 2. R and I light curves of SV Cam in Jan/Feb 1995.

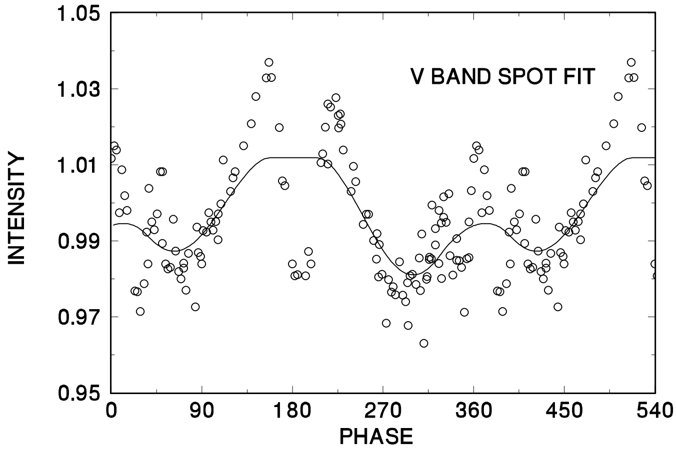

Figure 3. V band spot fit for Jan/Feb 1995.

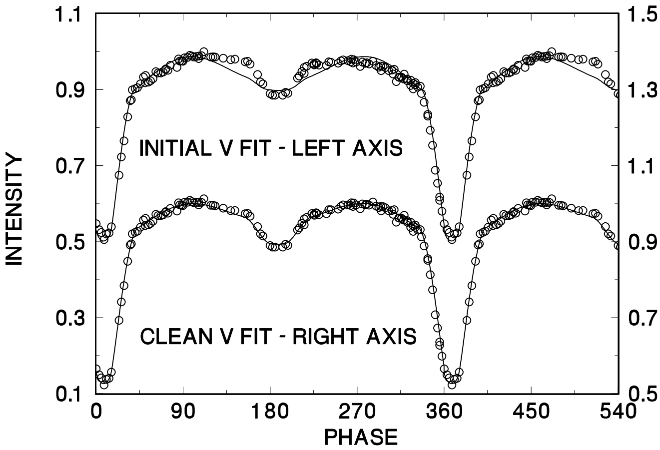

Figure 4. SV Cam - Jan/Feb 1995. Initial and clean fits for the V band.

The clean fit parameters are as defined by Budding and Zeilik (1987). L_1 and L_2, the fractional luminosities of the primary and secondary stars, sum to the unit of light, U, in the absence of a third light. Rainger et al. (1991) and Sarma et al. (1989, 1991) find evidence for a third component in this system, but I was unable to find evidence for a third light from my data. Note that the secondary is much fainter than the primary; if the third component were fainter than the secondary, it would not be detectable with this photometry. The primary and secondary radii, r_1 and r_2, are in units of the semi-major axis of the orbit, and i is the orbital inclination. The mass ratio from these models is somewhat lower than the usual value of 0.6 to 0.7 (Budding and Zeilik 1987, Sarma et al. 1989, Patkos and Hempelmann 1994) Otherwise these clean fits agree fairly well with the values found by Zeilik et al. (1988).

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