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1996 PHOTOMETRY OF RT ANDROMEDAE

RT Andromedae (=BD +52° 3383A = #201 in the catalog of Strassmeier et al. 1993) is a member of the short period eclipsing group of RS CVn stars. Zeilik et al. (1989) modeled the spot structure for available data from 1920 to 1989 and reviewed previous work. Heckert (1995) model the spots on RT And during 1995. Building on the above work we model the spot structure during 1996. We observed RT And on the nights of 2, 3, 4, and 8 January 1996 using the San Diego State University 61-cm telescope on Mt. Laguna. We used the same instrument, technique, and calibration as described by Heckert (1995). The light curves contain a few gaps, most noticeably just before the eclipses and during the first half of the primary eclipse. The data are however sufficient to model the spots. Figures 1 and 2 show differential magnitudes (star-comparison) in the standard Johnson-Cousins system. The data are available in digital form from PAH. Budding and Zeilik (1987) describe in detail the Information Limit Optimization Technique (ILOT) that we used to model the data. We performed the initial fits, starting with the orbital parameters found by Zeilik et al. (1989). Unlike most of the short period RS CVns, RT And has an elliptical orbit. However, we were unable to fit the ellipticity parameters and kept them fixed at the initial values. From the initial fits, we extracted a distortion wave and fit it to the longitude and radius of a single circular spot at 0K. With the exception of the B band, we were unable to fit for the latitude simultaneously with the other parameters and used a fixed latitude of 45°. The fits for each wavelength are performed independently. We get:

| | B band | V band | R band | I band |
|-----------|-------------------|-----------------|-------------------|------------------|
| | | | | |
| Longitude | 217.5 ± 3.6 | 223.1 ± 4.3 | $213.6 {\pm} 5.2$ | 209.8 ± 5.8 |
| Latitude | $38.9 {\pm} 16.6$ | 45 | 45 | 45 |
| Radius | 11.7 ± 2.3 | 12.2 ± 0.6 | $11.7 {\pm} 0.7$ | $11.7 {\pm} 0.8$ |
| χ^2 | 112.1 | 58.0 | 73.6 | 119.5 |

Spot Fits

Figures 3 and 4 show the initial and spot fits in the V band. We did not attempt to do clean fits to remove the spot effects and find the binary star parameters because the incompleteness of the primary eclipse would reduce the confidence in such solutions. These results are similar to the previous long term trend found by Zeilik et al. (1989). A single spot in one of two Active Longitude Belts fits the data well. Comparing these results to those of Heckert (1995), we find that the spot in 1996 was roughly the same size as in 1995 but was in the opposite active longitude belt. We also note that in 1996 the spot was near the edge of the 270° active longitude belt. In both this and previous work the spots seem to be at middle latitudes, but the latitude fits generally have low confidence and were usually fixed at 45° rather than fit to the data.



Figure 1. RT And 1996 B and V light curves



Figure 2. RT And 1996 R and I light curves



Figure 3. RT And 1996 V band initial fit



Figure 4. RT And 1996 V band spot fit

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