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CG CYGNI REDUX: MORE 1989 BVR DATA

Our 1989 July and August BVR light curves of CG Cygni (= BD + 34° 4217 = #142 in the catalog of Strassmeier *et al.* 1988) exhibited small "waves" (Beckert *et al.*, 1989). To confirm that these peculiar features were real (rather than instrumental or weather-generated artifacts), we decided to re-observe this short-period RS CVn system as soon after as possible on 10 and 11 Sept., 13 Oct., and 11 and 13 Nov., 1989. We note that our earlier data were obtained on different nights with overlapping phase coverage, yet the small-scale structure matched smoothly. Also, we tracked the instrumental magnitude of the comparison star and found it constant within statistical fluctuations. Finally, observations of RT And done at about the same time with the same system showed no such small waves. These facts support the claim that the "waves" originated in the binary system rather than in the instrumentation or from the observing technique.

We used our 60-cm Capilla Peak telescope with a CCD camera (Laubscher *et al.*, 1988) in the mode of a multichannel photometer with our new filter set (Beckert and Newberry, 1989). Data were reduced with a softward mask for an effective aperture of 30 arcsec. The orbital phases were calculated from the ephemeris of Strassmeier *et al.* (1988).

Figures 1-3 present the data (converted from instrumental magnitudes to normalized intensity units) at BVR. As before, the statistical error in each datum is less than 0.01 mag. In fact, tests of our CCD system indicate that for *V*-band exposures of 30 seconds, the S/N for a system of the magnitude of CG Cyg is about 500. Hence, our differential photometry is the most precise done to date and can reliably detect phenomenon at the level of 0.01 mag. To provide a baseline for comparison, Figures 1-3 also include an optimized binary model fit (solid line) for $i = 82.8°$, and photospheric temperatures $T_1 = 5300$ K, and $T_2 = 4600$ K.

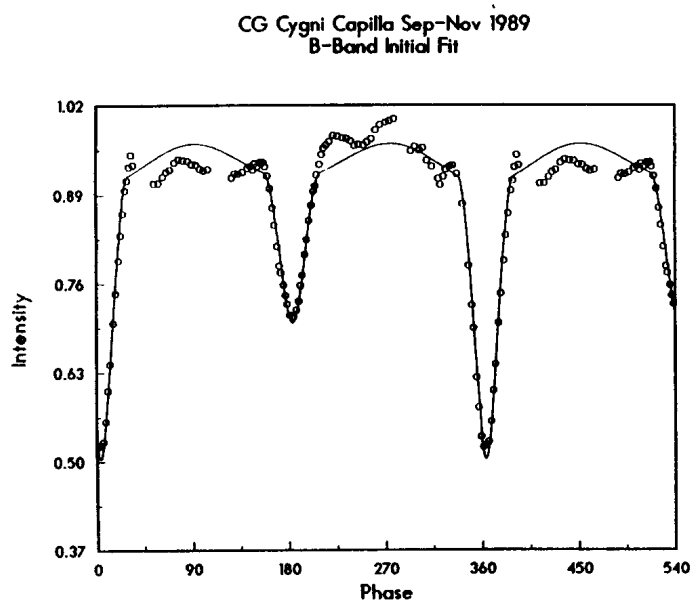

Figure 1

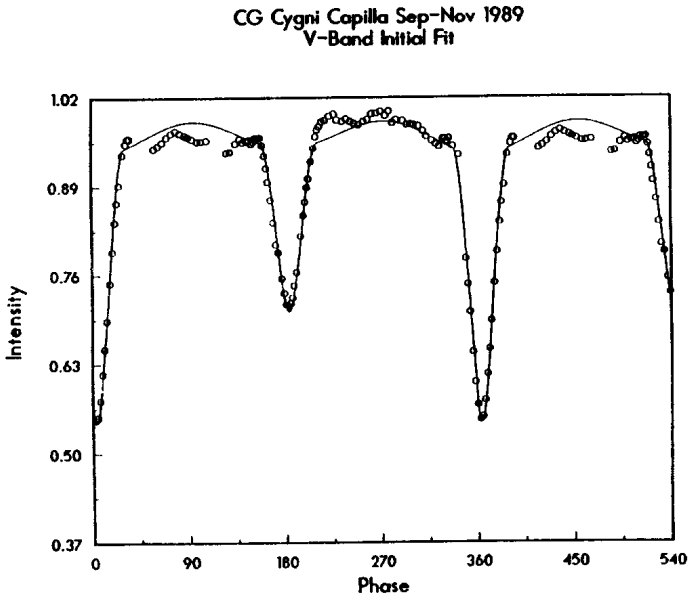

Figure 2

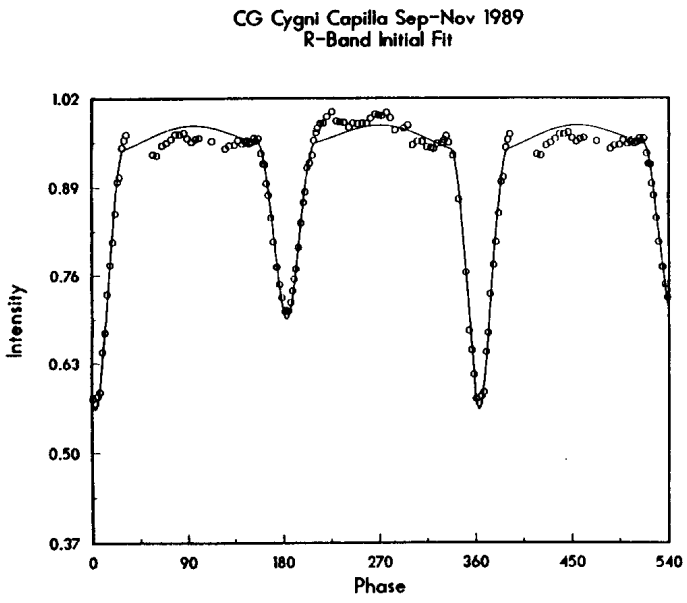

Figure 3

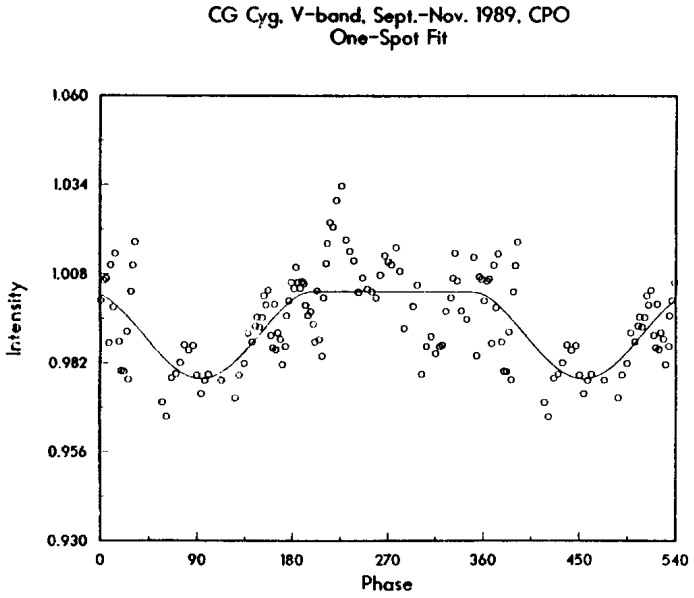

Figure 4

We can plainly see that the small "waves" are still visible, though not as clearly defined as in our previous data. The peaks and troughs on the 90° shoulder match very well those seen before; the fit is not good on the 270° shoulder. The peak-to-peak amplitude is about the same. Hence, we conclude that these small-scale features arise in the binary system, though we have no obvious physical mechanism.

Following Budding and Zeilik (1987), we apply a black, circular spot model to represent the maculation effect. For *V*-band, our optimized fit gives: longitude = 96.2°±4.3°, radius = 16.2°±2.9° and latitude = 60.0° ± 2.9°. Figure 4 shows the results. Within the errors, the longitude is the same as that for July-August (88.6°±3.5°) and also the radius (15.6°±0.5°). Using the *B* and *R* band data, we infer a temperature difference between the spotted region and the photosphere of 1060K ± 170K, similar to that found before (1140K ± 160K).

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D. BECKERT, S. GORDON, E. JADERLUND,
E. MANN and M. ZEILIK
Capilla Peak Observatory
Institute for Astrophysics
The University of New Mexico
Albuquerque, NM 87131
U.S.A.

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