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The rotation period of the Ap star HD 220825 (κ Psc)

The Ap star HD 220825 was first monitored by Rakosch (1962), who determined a rotation period of 0.5805 day and found the amplitude to vary less than 20 millimagnitudes (mmag) peak-to-peak in blue and yellow filters. A refinement of the rotation period was undertaken by van Genderen (1971), who obtained five-color Walraven photometry. He utilized a second comparison star, HD 221318, in addition to the one used by Rakosch (HD 220858), and found HD 220858 to be slightly variable. A new period of 0.5853 days was determined, based on using HD 220858 as the sole comparison star.

Spectroscopy by Schneider in 1988 revealed spectral line variation that did not agree in phase with this period. For this reason, we decided to reobserve HD 220825. Here, we present our first data obtained by Kreidl at Lowell Observatory in September and October 1988.

Photometry was obtained on seven nights with the Lowell 1.1-m telescope and a narrowband (FWHM $\approx$70 Å) filter centered at 4060 Å. As comparison stars, HD 221318 (which was utilized by van Genderen), and HD 221950 were used. Neither comparison star showed any indications of variability; HD 221318 (C1) was taken as the primary comparison star and all differential magnitudes reported here are in reference to HD 220825 minus C1.

A periodicity analysis of the differential data was undertaken utilizing Kurtz' (1985) more efficient method of the Deeming (1975) DFT technique. Figure 1 shows peaks in the amplitude spectrum of nearly equal height at the frequencies .704 day^{-1} and 1.708 day^{-1}, the amplitude of the former being slightly greater. The second frequency corresponds to

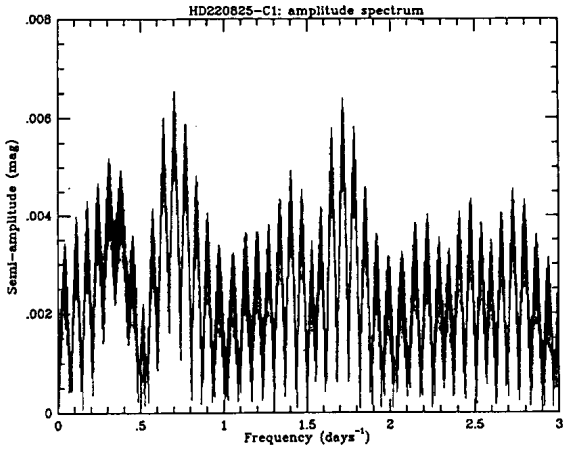

Figure 1.

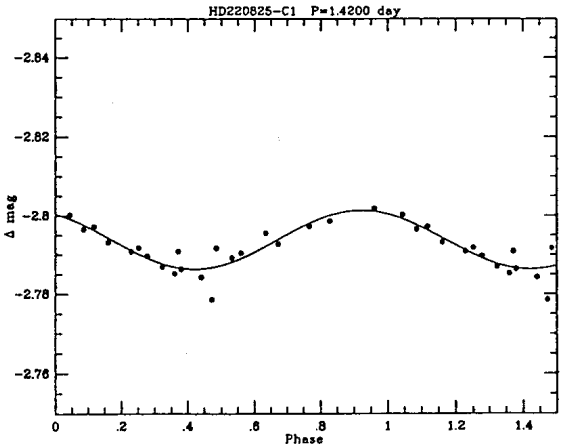

Figure 2.

a period of 0.585 day, essential identical with the period found by both Rakosch and van Genderen. However, the photometric accuracy of the data obtained in this investigation is high enough to show that in a phase plot, the frequency .704 day^{-1} (period=1.420 days) is actually the correct one and that the peak corresponding to .704 day^{-1} is actually a one-day alias in the frequency domain.

A cosine fit to the data yield a best fit to the period 1.4200 $\pm$ 0.0005 days; the phased data and corresponding cosine fit are shown in Fig. 2. The rms error of this fit is just 1.8 mmag, compared with the rms error of 2.7 mmag if one assumes a period of 0.5853 day.

A more thorough discussion of this star, including additional photometric data and spectroscopic results obtained by Schneider, will be presented elsewhere.

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