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TWO NEW SOUTHERN RAPIDLY OSCILLATING Ap STARS - HD 193756 & HD 218495.

The rapidly oscillating Ap (roAp) stars are cool magnetic Ap stars with Sr, Cr and Eu line strength anomalies which pulsate in low degree ($\ell \leq 3$), high overtone ($n >> \ell$) p-modes. The periods of pulsation range from 4-15 min and the Johnson B peak-to-peak pulsation amplitudes are all ≤ 16 mmag. The most comprehensive recent review of these stars is that of Kurtz (1990).

As part of a survey of the roAp phenomenon in the southern skies we searched for and discovered rapid oscillations in the stars HD 193756 and HD 218495. We used the University of Cape Town Photometer attached to the 1.0-m Elizabeth telescope of the South African Astronomical Observatory. The observations consist of continuous 10-s integrations through a Johnson B filter and a 30-arcsec aperture. After removing the bad points from the data, we corrected the data for coincidence counting losses, subtracted the sky contribution and corrected for mean extinction. We then removed some long-term ($P \geq 0.5$hr) trends from the data which almost certainly arose from sky transparency variations. Finally we binned the data to 40-s integrations and computed amplitude spectra using Kurtz's (1985) implementation of Deeming's (1975) Discrete Fourier Transform out to 12.5 mHz, the Nyquist frequency for 40-s integrations.

HD 193756

We accumulated 12.45 hr of high-speed photometry of this star over the 5 widely spaced nights JD2448072, 8074, 8104, 8105 & 8110. In Figure 1 we present an amplitude spectrum of the entire data set which reveals the presence of oscillations at $\nu = 1.284$ mHz. There are reasonably convincing indications of amplitude modulation in the amplitude spectra of the nightly data sets. Such modulation can arise through beating of unresolved modes, through changing aspect as the star rotates, through intrinsic variations in the pulsation amplitude or, indeed, through all of these effects operating together. Further observations will be required to enable us to discriminate among these possibilities.

HD 218495

We acquired 7.39 hr of high-speed photometric observations of this star on the nights JD2448104, 8107 and 8110. The amplitude spectrum presented in Figure 2 reveals the presence of oscillations with a frequency $\nu = 2.24$ mHz.

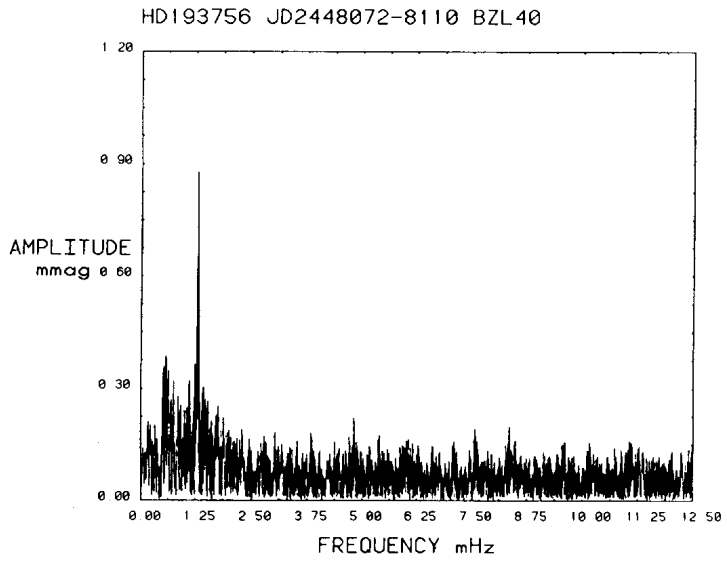

Figure 1

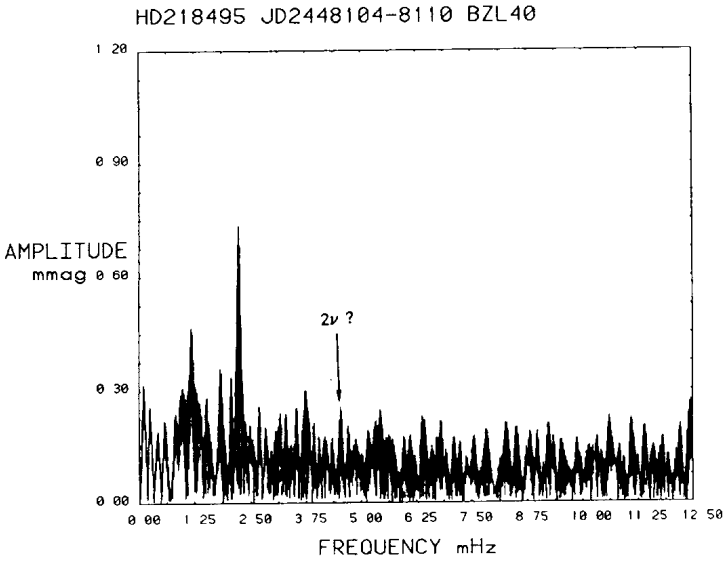

Figure 2

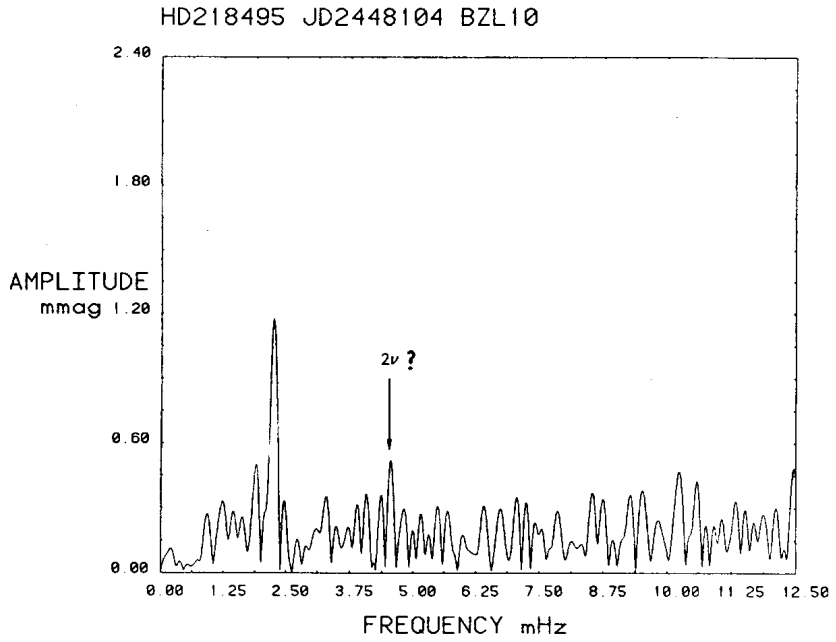

Figure 3

The peak at 4.5 mHz labeled "2ν?" in Fig. 2 is intriguing because, if real, it lies exactly where one would expect to find the first harmonic of the principal pulsation frequency ν. Such harmonics are observed in 5 other roAp stars. We also searched for this peak in the nightly data sets in order to test for the possibility that only one of the light curves might be dominating the analysis when all nights are analysed together. The peak at 2ν shows up fairly well in the JD2448104 data (Figure 3) and a peak appears at the *same* frequency on the other two nights but at such reduced amplitude that it does not draw attention to itself. This is not surprising given the lower amplitude of ν on those nights and the lower signal to noise which obtains in this higher frequency regime. The fact that the peak at 2ν persists if we Fourier analyse all 3 nights together argues for phase coherence of the conjectured harmonic across the different nightly data sets.

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References

Deeming, T.J., 1975. *Astrophys. Space Sci.*, **36,** 137.

Kurtz, D.W., 1985. *Mon. Not. R. astr. Soc.*, **213,** 773.

Kurtz, D.W., 1990. *Annual Reviews of Astronomy & Astrophysics*, **28,** 607.