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HD 190290 - ASTEROSEISMOLOGY IN ONE NIGHT

The Southern ($\delta = -79^\circ$) 10th mag star HD 190290 classified as Ap EuSr by Houk & Cowley (1975) was recently placed on our program to search for rapid oscillations in cool southern Ap stars. On the night of 4/5 August 1990 (JD 2448108) we observed this star photometrically for 8.85 hr in high-speed mode with the University of Cape Town Photometer attached to the 1.0-m Elizabeth telescope of the South African Astronomical Observatory (SAAO). We acquired continuous 10-s integrations through a Johnson *B* filter and a 30-arcsec aperture. The data were corrected for coincidence counting losses, sky background, mean extinction and some long period trends which almost certainly arose from sky transparency variations. We then binned the data to 40-s integrations and computed an amplitude spectrum using Kurtz's (1985) recursive coding of Deeming's (1975) widely used Discrete Fourier Transform for unequally spaced data.

In Figure 1 (a) we present the amplitude spectrum of these observations out to the Nyquist frequency of 12.5 mHz for 40-s integrations. We include the sky transparency variations in Fig. 1(a) so that the reader may form a value judgement of the data. The photometric quality of that night was excellent; one must bear in mind that the lowest airmass attained by this $\delta = -79^\circ$ star at SAAO is 1.4.

The prominent peak in Fig 1(a) is at $\nu_1 = 2.27$ mHz with an amplitude 1.13 mmag. In order to test for further frequencies in the data we subtracted a sinusoid of frequency ν_1 from the data. The resulting amplitude spectrum in Fig. 1(b) clearly indicates the presence of another frequency at $\nu_2 = 2.23$ mHz with an amplitude of 0.55 mmag. On prewhitening both ν_1 and ν_2 from the data, we are left with the spectrum shown in Fig. 1(c) which suggests the presence of further frequencies but we cannot meaningfully pursue the identification of further frequencies with these data.

The frequency separation between ν_1 and ν_2 is 40 μ Hz. This cannot be a rotation frequency because it would correspond to a rotation period of 6.9 hr, improbably short for an A star. We thus interpret this spacing as a crude measurement of the asymptotic *p*-mode spacing in HD 190290 consistent with values observed in other roAp stars. Of course, a thorough frequency analysis is required in order to refine our frequency determinations and to find the other frequencies which probably exist in this star.

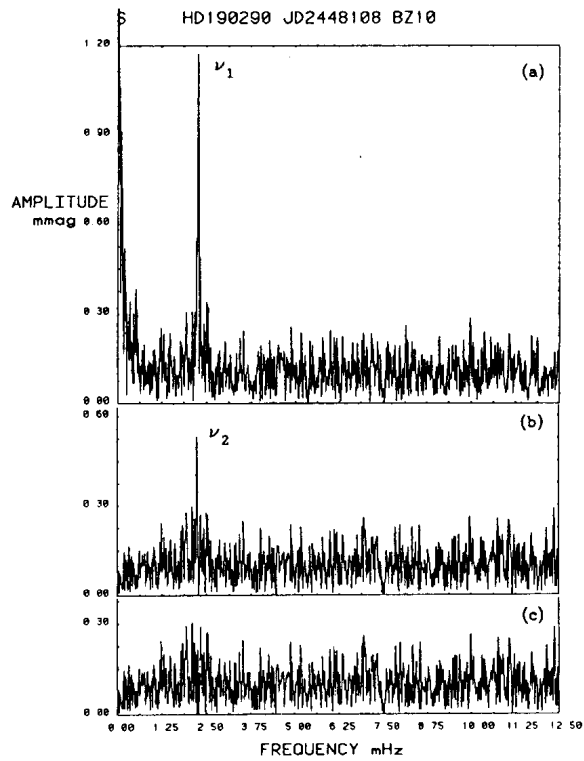


Figure 1

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