OBSERVATIONS OF VARIABILITY IN THE RADIAL VELOCITY OF α BOO

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Abstract. We have made precise radial velocity observations of α Boo (K1 III) which raise the possibility that giant stars redward of the Cepheid instability strip can pulsate. Our first measurements, made in early 1986 (Smith, McMillan and Merline 1987, Ap.J.,317, L79) revealed a systematic, apparently periodic, variation in radial velocity having a "sawtooth" waveform with a full amplitude of 160 $m \cdot sec^{-1}$ and period of 1.84 or 2.18 days. This discovery was qualitatively confirmed by Cochran (1987, B.A.A.S.,19, 1052). Additional data show that large night-to-night velocity variations of magnitude about 80 $m \cdot sec^{-1}$ persist over a 192 day baseline. A sharp velocity transition has been monitored on at least one night, which covers a range of 100 $m \cdot sec^{-1}$ with an acceleration of $19 m \cdot sec^{-1} \cdot hr^{-1}$. The positive slope during this transition argues for a 2.18 day rather than the 1.84 day period. Furthermore, the amplitude and shape of the variation may be changing, perhaps suggesting multiple periods. To test the likelihood that radial pulsation could be responsible for the observed variations, stellar pulsation models are being conducted with Dr. Arthur Cox at Los Alamos National Laboratory. Using a structure model based on our best estimates for the stellar parameters, we have found that the 2 day period would require the third or fourth radial overtone, which are driven (unstable) with relatively high growth rates.

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