

SEARCH FOR TiO-BAND VARIABILITY OF COOL GIANT

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ABSTRACT. The dissipation of acoustic energy and bombardment of high energy particles of TiO molecules can be sources of temperature "inversion" and nonstability of outer layers of atmospheres of cool giants. In 1993 the trial observations on variability of outer layers of the cool giant HD73665 was made at the Mt. Dushak-Erekdag station of Odessa Astronomical Observatory. For simultaneous observations in TiO-band and Johnson V-band, a split prism in the dual-channel photometer was used. The observations show quasi-periodical variations at the time scale of 2-12 min.

Key words: Stars: cool giants, stars: individual: HD73665, stars: oscillations

Recently, the TiO spectroscopy is used for investigation of surface peculiarities of cool giants, particularly, for purposes of Doppler imaging. The speckle imaging in various TiO bands is used for determination of angular size of stars. We decided to use a narrow-band photometry instead the spectroscopy of high resolution. The two pairs of interference filters have been made in Kiev. When the 80 cm Ritchey-Chretien telescope at the Mt. Dushak-Erekdag station of Odessa Astronomical Observatory (Dorokhov et al., 1994a) was put into operation, and the high accuracy of the data was obtained (better than 2 mmag), we took a chance to test rapid variability in outer layers of cool giants. The reports of such experiments appeared in 80th (see, for example, Smith, 1983, Livi and Bergman, 1982).

We used for observations a split prism in the dual channel photometer (Dorokhov et al., 1994b). A narrow band interferometric filter with FWHM=50Å centered at the $\lambda=5500\text{\AA}$ (TiO-band) was mounted in the first channel, the Johnson V filter (the effective length of band 5450Å) was in the second channel.

This way assumes to exclude sky transparency and scintillation variations entirely because of high correlation in two channels. Therefore the normalized data showed the "clear" pattern of TiO-band processes relative to "continuum".

The set of observations of cool giant HD73665 ($m=6.39$, K0III), belonging to Praesepe, was about 100

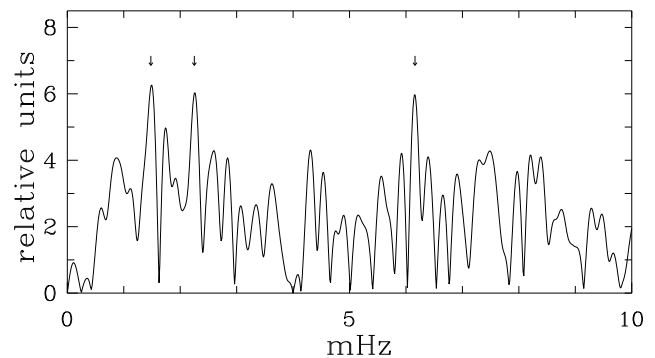


Figure 1: Amplitude Fourier-spectrum of normalized data. The arrows show peaks, for which S/N ratios exceed 2.

min. with the 10 sec. integrating time on the night October 19, 1993.

In Fig.1, an "amplitude" Fourier-spectrum of normalized data obtained by using the program PERIOD (Breger, 1989) is shown. The arrows indicate the peaks at the frequencies 1.48 mHz (11.3 min), 2.25 mHz (7.4 min), 6.16 mHz (2.7 min), where the signal/noise level exceeded 2. There were no similar features in the Fourier-spectrum of V-filter's data.

We do not expound the result, it was only a trial test for variability. Unfortunately, the work was not continued because of hard economical situation with our science.

References

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