DETECTION OF NON-RADIAL PULSATIONS OF STARS WITH AN INH0M0GENE0US SURFACE DISTRIBUTION OF CHEMICAL ELEMENTS

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ABSTRACT. A method to detect non-radial pulsations of CP stars is suggested. It consists in analysis of Doppler shifts in spectral lines of chemical elements concentrated in local regions on stellar surfaces. The advantage of themethod is estimated. The opportunity is noted to get an information on spatial structure of non-radial oscillations from the analysis of radial velocities of chemical element lines, concentrated in the spots. To detect and identify the modes of non-radial oscillations of average grades it is suggested to use the methods of line profile analysis applying thee to the lines observed in the local spots on the stellar surface.

Taking into consideration the spatial structure of own non-radial oscillations of stars with amplitudes described in spherical system of coordinates(r, υ, φ) by spherical harmonics y_e^m (υ, φ) (Unno et al., 1979) a new procedure for detection of non-radial oscillations (NRO) from Doppler shifts of spectral lines for stars with inhomogeneous surface distribution of chemical elements is suggested. It is intended for revelating the radial velocity variations from chemical element lines concentrated in the "spots" of high concentration gradients and possessing low intensity outside the "spot" , which is typical for Ap stars (Goncharskij et al., 1983, Khokhlova and Pavlova, 1984). In this case the radial velocity, measured from the line gravity centre (when the spot is single), or from the line component (when there are several spots), is a mean value according to the spot and refers to the part of the surface occupied by the "spot". This effect weakens the averaging of positive and negative fluctuations of radial velocities of NRO which occurs in the course of observations of the "whole star disk" (Dziembovski, 1977, 1984) and makes possible detection of modes with $l > 3$.

The maximum amplitude ratio of the mean radial velocities in the spot and the disk for a typical spot size of 60° is estimated. It is seen that this ratio may reach 10 - 10^2 for $l = 3$, which shows the advantage of the procedure suggested.

A possibility to obtain data on NRO spatial structure from the analysis of radial velocities of chemical element lines, concentrated in the "spots" being in different regions of the stellar surface, is noted.

It is suggested to use the methods of line profile analysis (Osaki, 1971; Campos, Smith, 1980; Balona, 1986) for detection and identification of NRO modes of the mean degrees of l , applying thee to the lines, strengthened in the spots.

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