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THE DEPENDENCE OF THE EFFECTIVE TEMPERATURE UPON THE RADIUS VARIATION IN THE PULSATING VARIABLE STAR XZ Cyg

The Blazhko effect in the pulsating RR Lyrae - type variable stars can be interpreted by the interference of primary and perturbing variations in the radius (Zessevich, 1970; Romanov, 1975). In order to study the nature of the Blazhko effect it is of interest to consider the relationship between the main stellar parameters, T_e and R, responsible for the luminosity of the star and varying with the pulsation process.

Based upon observations the dependence of T_e on the radius variation of XZ Cyg is considered for four phases ψ covering a whole period of the Blazhko effect. When constructing the dependence $(T_e - \Delta R)_\psi$ the results of simultaneous photoelectric (Kinchev, 1974) and spectral observations (Romanov and Fenina, 1981) were used.

The effective temperature was determined from the B-V colour index corrected for the interstellar absorption. The interstellar absorption in the direction of XZ Cyg was taken equal to 0.05 mag (Romanov and Fenina, 1981).

The B-V colour index was converted into effective temperature by means of the effective temperature scale determined by Zaikova and Romanov (1978). When transforming B-V into T_e the ratio of the heavy element abundance of XZ Cyg (Z) and the population I stars (Z_I) was considered to be equal to 0.7 (Gadun et al., 1982). The influence of the shock wave effects was not taken into account.

The curves of radius variation ΔR in XZ Cyg at the level of continuous spectrum formation for four intervals of the Blazhko effect phases were constructed by transforming the radius curve variation ΔR_H at the level of hydrogen absorption line formation. It was supposed that the ratio of the amplitudes of the radius variation on that level was equal to 1.6 (Romanov, 1977), whereas the phase of the minimum radius coincided with that of the origin of the

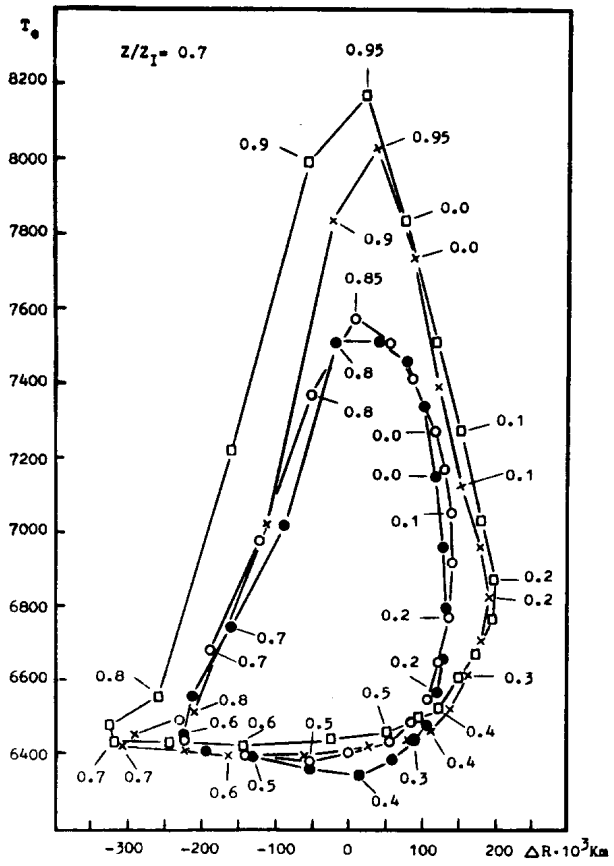

Figure 1. The dependence of the effective temperature upon the radius variation with the phase of the primary period. Phases of the primary period are plotted with the interval of 0.05 P , the values of some of these being indicated in the diagram for four phases of Blazhko effect: ψ=0.0 (rectangles), ψ=0.9 (crosses), ψ=0.6 (open circles), ψ=0.5 (filled circles).

ascending branch of the light curve (Romanov, 1974). The radius variations were obtained by Kinchev and Romanov by integrating the curves of radial velocity variations constructed from measurements of the hydrogen lines.

The $(T_e - \Delta R)_\psi$ diagram is given in Figure 1. The zero point of the ΔR scale coincides with the mean stellar radius. The diagram shows that the dependences $T_e - \Delta R$ represent closed loops. The loops near the Blazhko effect maximum cover a large area in the diagram and fully cover the loops near the Blazhko effect minimum.

The differences between the T_e values for the brightness minima at different phases of the Blazhko effect are insignificant, and when $Z/Z_I = 0.7$, the mean value of T_e is about 6400 K, this does not overlap the T_e values of the red edge of the instability strip for RR Lyrae - type stars (Deupree, 1977).

On the other hand, the decrease of the minimum radius, while the star is compressed, is followed by an increase of the amplitude of the effective temperature variation and the loop area in the diagram.

Future series of simultaneous photoelectric and spectral observations will make it possible to specify the set of dependences $(T_e - \Delta R)_\psi$ and use it for comparing with model calculations of pulsating RR Lyrae - type variable stars.

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