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SPECTROPHOTOMETRIC INVESTIGATION OF MAGNETIC VARIABLE STAR AF (73) Dra.

The investigations of AF Dra carried out by Preston (1967a), Babcock (1958), Preston (1967b) show variability in the magnetic field amplitude, in the radial velocity and in the intensity of absorption lines of some chemical elements. Moreover the lines of Ti, Mn, Y, Ba, and Eu compared with iron and chromium show considerable variations correlating with the magnetic field intensity. Herein there are no estimations of abundance parameters lg (N/H) for separate chemical elements. Spectral characteristics of AF Dra A3IVp does not give sufficient information on the peculiarities of its atmosphere. Probably in this case first the metal abundances in the stellar atmosphere should be determined as it had been suggested by Foy (1979) and only then the spectral type and luminosity class should be ascertained.

In the present work two spectrograms of AF Dra obtained in SAO, Academy of Sciences of the USSR, with the 6 m telescope have been studied. The spectra have been exposed in near phases (ϕ=0.3) but the results of the investigation are given for each spectrogram separately. Some differences in the parameters obtained may be due not only to the errors of determination but also to their rapid variability. The spectrograms are obtained with the dispersion 9 Å/mm in the wavelength interval from 3800 to 4900 Å. The parameters of excitation temperature θ_{ex}, electron pressure lg Pe, abundances of a number of chemical elements (lg N/H) have been determined by the "curve of growth" method using the most perfect system of oscillator strength developed in Oxford and the solar data obtained at the Main Astronomical Observatory of the Ukrainian Academy of Sciences. After the analogous scope of material is collected enough for other phases of the magnetic field variation, it may be possible to unambiguously estimate the chemical composition of the atmosphere of AF Dra and determine principal regularities of its spectral peculiarities.

It should be noted that in the spectrograms studied the lines of elements lighter than titanium are practically absent. The strong line of ionized magnesium Mg 4481.1 is an exception. The line of ionized calcium Ca II is

Table I

	J.D.$_\odot$=2444817.4990^d	J.D.$_\odot$=2444817.5024^d	Sun
	Θ_{ex}=0.819	Θ_{ex}=0.793	
	$\lg P_e$=0.40	$\lg P_e$=0.28	
	lg (N/H)	lg (N/H)	lg (N/H)
Mg	7.89(1)	7.79(1)	7.49(Kurucz, 1979)
Ti	4.70(17)	4.80(16)	4.88(Kostik, 1983)
Cr	6.13(28)	6.33(15)	5.69(Kostik, 1983)
Mn	5.74(8)	5.34(5)	5.15(Kurucz, 1979)
Fe	6.68(58)	6.92(48)	7.44(Blackwell, 1980)
Co	5.37(7)	5.52(7)	4.98(Gurtovenko, 1983)
Sr	1.85(2)	1.74(2)	2.77(Kurucz, 1979)
Y	2.80(3)	2.21(3)	1.57(Kurucz, 1979)
Zr	-	1.88(4)	2.37(Kurucz, 1979)
Eu	2.23(2)	2.40(2)	0.51(Biemont, 1982)

weakened abnormally (W_λ=0.3 Å) as compared with stationary stars of A3 spectral type (W_λ=1.5-2.0Å). The lines of neutral and ionized nickel are absent too.

Table I gives the Julian dates of observations J.D. with corresponding parameters of excitation temperature Θ_{exc}, electron pressure lg P_e determined from ionization equation and the parameter of abundance lg(N/H) for those elements, the lines of which are surely identified in the spectrograms. The number of lines is given in brackets. The solar data are given for comparison with the source of information.

On the basis of results obtained one can suppose the following. Absence of lines of some elements in the spectra studied does not mean that the given element is absent in the stellar atmosphere. Its lines can appear in other phases. The overabundance and significant difference in the yttrium and europeum abundance in separate spectra may be due to enhanced ionization of these atoms influenced by the magnetic field. The parameters of iron and chromium are only of real quantitative significance because of the greatest stability of their atoms.

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