Introducion

Scuti and γ Doradus stars are remarkable pulsating variables for asteroseismology. The discoveries of space telescopes increased their numbers significantly and many problems concerning these stars have been revealed. What are the exact locations of δ Scuti and γ Doradus stars’ instability strips? How strong are the relations between rotational velocity and pulsation period and amplitude? These are some of the most important questions to be answered. For these reasons, we performed detailed spectroscopic studies of a sample of δ Scuti and γ Doradus stars. The atmospheric parameters (effective temperature, surface gravity, microturbulent velocity) and projected rotational velocities were obtained by using exactly the same methods for both types of variables. The atmospheric chemical abundances of the analysed stars were derived by using the spectrum synthesis method. Finally, the relations between pulsation period, amplitude and atmospheric parameters, rotation velocity and metallicity were examined. Additionally, the chemical abundance patterns of both types of pulsating stars were compared with each other and with non-pulsating stars. In this paper, the results of these investigations are shown.

δ Scuti Stars

The high-resolution and high S/N spectra of 41 δ Scuti variables were analysed (Kahraman Aliciçavuş et al., in preparation). The spectral and luminosity types of stars were found to be F8-A1 and B6V, respectively. The spectrum synthesis method was used during the spectral analysis. The distributions of the obtained atmospheric parameters, effective temperature (Teff), surface gravity (log g) and microturbulent velocity (ξ) are demonstrated in Figure 1.

![Figure 1](image1.png)

The abundance analysis of δ Scuti stars was performed by applying the spectrum synthesis and profile fitting methods. In the analysis, three Am stars were found. The average [Fe/H] value of δ Scuti stars was found to be -0.03 dex. The abundance pattern of these stars is shown in Figure 2.

![Figure 2](image2.png)

In Figure 3, the abundance pattern of δ Scuti stars is shown.

Correlations between the pulsation quantities and obtained parameters of δ Scuti stars

The relations between the pulsation quantities (pulsation period and amplitude) and derived parameters for 8 Scuti stars were examined. A significant inverse correlation was found between pulsation period and Tg as shown in Figure 4. Additionally, a probable correlation exists between pulsation amplitude and Tg. According to this correlation, the pulsation amplitudes of δ Scuti stars decrease with increasing Tg values.

![Figure 4](image3.png)

![Figure 5](image4.png)

The abundance analysis of δ Scuti stars was performed by applying the spectrum synthesis and profile fitting methods. In the analysis, three Am stars were found. The average [Fe/H] value of δ Scuti stars was found to be -0.03 dex. The abundance pattern of these stars is shown in Figure 2.

![Figure 6](image5.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

Conclusions

We carried out spectral analyses of both δ Scuti and γ Dor stars. Thus we had an opportunity to examine and compare these various details. Consequently, we found that:

- Fundamental atmospheric parameters’ ranges of δ Scuti and γ Dor stars almost cover each other. However, Teff and ξ values for δ Scuti stars are higher than γ Dor stars.
- Strong inverse and probable correlations are available between pulsation periods, pulsation amplitudes and Teff of δ Scuti and γ Dor stars, respectively. A weak correlation was found between pulsation amplitude and Tg for δ Scuti stars as well.
- A correlation between Vsini and pulsation period was found for γ Dor stars. However, the average pulsation periods for δ Scuti stars was found to be F3-A8 and IV-V, respectively. The distributions of atmospheric parameters of δ Scuti and γ Dor stars are remarkable pulsating variables for asteroseismology. The discoveries of space telescopes increased their numbers significantly and many problems concerning these stars have been revealed. What are the exact locations of δ Scuti and γ Doradus stars’ instability strips? How strong are the relations between rotational velocity and pulsation period and amplitude? These are some of the most important questions to be answered. For these reasons, we performed detailed spectroscopic studies of a sample of δ Scuti and γ Doradus stars. The atmospheric parameters (effective temperature, surface gravity, microturbulent velocity) and projected rotational velocities were obtained by using exactly the same methods for both types of variables. The atmospheric chemical abundances of the analysed stars were derived by using the spectrum synthesis method. Finally, the relations between pulsation period, amplitude and atmospheric parameters, rotation velocity and metallicity were examined. Additionally, the chemical abundance patterns of both types of pulsating stars were compared with each other and with non-pulsating stars. In this paper, the results of these investigations are shown.

![Figure 7](image6.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 8](image7.png)

The abundance pattern of δ Scuti stars is shown in Figure 2.

![Figure 9](image8.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 10](image9.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 11](image10.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 12](image11.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 13](image12.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 14](image13.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 15](image14.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 16](image15.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 17](image16.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.

![Figure 18](image17.png)

The abundance pattern of δ Scuti stars is shown in Figure 3.