Investigation of the Double-mode Cepheid TU Cas: Atmospheric Parameters and Chemical Composition

S. M. Andrievsky, V. V. Kovtyukh, E. N. Makarenko, I. A. Usenko

Odessa State University, Department of Astronomy
Shevchenko Park, 270014 Odessa, Ukraine

Abstract

Atmospheric parameters and abundances of 25 elements were determined from two spectrograms of TU Cas (with dispersion 9 Å/mm) obtained in 1977 and 1990. We find $T_{\rm eff} = 5860 - 6000K$; $\log g = 1.0 - 1.5$; and $v_t = 2.9 - 5.3$ km/s.

The value of $[Fe/H] \sim -0.5$ testifies to the fact that TU Cas is deficient in metals compared with other double-mode Cepheids. More exact values of $[Fe/H]$ for 9 double-mode Cepheids in the Southern Hemisphere (Barrell 1982), V367 Sct (a member of the open cluster NGC 6649) and our value for TU Cas all show a good correlation with P_1/P_0. As the atmospheric Fe abundance increases, the ratio P_1/P_0 decreases.

Our measured values for abundances (in brackets) of various elements in the atmosphere of TU Cas are: **C** (8.26), **Na** (6.32), **Mg** (7.07), **Si** (6.85), **S** (6.96), **Ca** (5.88), **Sc** (2.71), **Ti** (4.34), **V** (3.35), **Cr** (5.29), **Mn** (4.92), **Fe** (6.94), **Co** (4.47), **Ni** (5.70), **Zn** (3.63), **Sr** (2.00), **Y** (2.17), **Zr** (2.21), **Ba** (1.41), **La** (1.08), **Ce** (0.96), **Nd** (0.82), **Sm** (0.42), **Eu** (1.04), and **Gd** (0.92).

References:

Barrell, S.L., 1982, MNRAS, 200, 127

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