ИЗВЕСТИЯ КРЫМСКОЙ АСТРОФИЗИЧЕСКОЙ ОБСЕРВАТОРИИ

Изв. Крымской Астрофиз. Обс. 109, № 2, 73−73 (2013)

УДК 523.942

Fine structure of the small-scale solar convection

M.M. Koval`chuk, M.B. Hirnyak

Astronomical Observatory of the Ivan Franko National University of Lviv,
Kyrylo and Mephodiy str.,8, Lviv, Ukraine
hirnyak@astro.franko.lviv.ua

Simulation of theoretical profiles and equivalent widths of absorption lines in the solar spectrum was carried out by using numerical solution of the radiative transfer equation within limits of the six-component model of the solar atmosphere VAL-80.

To study solar inhomogeneities we choose suitable lines that cover the wide range of values of excitation and ionization energies of various chemical elements. We obtained a set of physical parameters values of different intensities lines formed in the extended layers of the solar photosphere.

For numerical investigation of solar inhomogeneities the comparison of obtained theoretical profiles and equivalent widths of absorption lines with observed spectra of the small-scale solar convection was carried out.

The detailed analysis of ratios of equivalent widths in structures of the small-scale solar convection (granular/intergranular lanes) is performed on the base of alternative grouping of these lines according to the following features:

1. differences in ionization potentials;
2. differences in excitation potentials;
3. differences in atomic weights;
4. differences of magnetic and non-magnetic lines;
5. differences of the red and violet ranges of spectrum;
6. differences in the lines of atomic and ionized elements;
7. differences in equivalent widths.

So such an individual approach for the lines of the solar spectrum was shown to be suitable to determine physical conditions in the inhomogeneous solar atmosphere.

The results of calculations in hot (D) and cold (A) flows of the model VAL-80 give good agreement with observed equivalent widths, and their ratios in the structures granular/intergranular lanes are carried out.