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ИЗВЕСТИЯ КРЫМСКОЙ АСТРОФИЗИЧЕСКОЙ ОБСЕРВАТОРИИ

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Diagnostics of the physical conditions in the powerful flare on October 28.2003.

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To study physical conditions in the solar flare we chose temperature sensitive lines of neutral iron with Lande-factor being equal to zero λ5434.534A, λ5123.73A. Usually such lines do not allow one to reproduce magnetic fields. Upper levels of FeI are connected with strong UV-lines which are thick in the photosphere and temperature minimum region and the lines support the level excitation nearly thermal. So non-LTE parameters of the lower and upper levels for the lines considered here are approximately equal that leads to S ≈ B; the latter condition provides the high sensitivity of lines to the temperature stratification.

Height stratifications of the atmosphere parameters are reproduced by solving nonequilibrium inverse radiation transfer problem using Tikhonov stabilizers. Observed and theoretical profiles obtained practically coincide with the exception of some peculiarities in line wings. And we can confirm that reproduced physical conditions are close to real ones.

In the low photosphere below the flare we observe the physical conditions in the penumbra: the temperature plateau $T \approx 5600$ K, and the temperature increases in the deeper layers; in the lower layers the temperature is about 2400 K less than one in a quiet atmosphere; the minimum of the temperature ($T \approx 4750$ K) lies at 490 km. In the layers $h > 500$ km we observe the steep increase of the temperature. Velocity stratifications reveal a layer 50 km $< h <$ 300 km with increased turbulence, where *Vmicro* reaches a value of 7.4 km/s; the matter in the layer is in descending motion, which may be due to penetration of the flare perturbation into the lower layers of the photosphere. But in the higher photosphere layers $h > 400$ km, where turbulence is depressed by magnetic field, the microturbulent velocity is comparable with that for quiet atmosphere. And the matter in that layers participates in the ascending motion, which may be a consequence of the atmosphere intensive evaporation.

In the upper photosphere layers inside the flare the gas pressure is two-three times larger than that in the corresponding layers of the quiet atmosphere; and that is mostly due to gas matter bunch formation.