# THE BRIGHTENING OF VERY SHORT DURATION OBSERVED IN THE WING OF H-ALPHA LINE

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A new domeless solar telescope has been ready to operate at the beginning of 1980 at Hida Observatory. Although the full functions were not yet displayed, some kinds of solar observations were made during the testing period of this spring. The details of the telescope will be published elsewhere.

In the morning of 5 June, a fairly good seeing condition, though not the best in Hida Observatory, continued during almost two hours. The monochromatic image at Hα + 1.2 A which was formed by passing through a Zeiss birefringent filter with a passband of 0.25 A was photographed successively with an exposure time of 1/60 seconds. The time interval between the successive exposures was 4 or 5 seconds on the average. After the observation, Mr. Suêmatsu has made a 16 mm motion picture of 5 minutes long. Special care was paid for the uniform lapse of time. In the original sequence of films, the time interval between the successive exposures was not fixed in order to avoid the poor image due to bad seeing. The inspection of the motion picture revealed at once the progressive brightening of several points in line. The new phenomenon will be discussed in the following.

In the first brightening has occured at $22^h27^m47^s$ UT and the second $22^h32^m32^s$ UT, the second one in two parallel lines. The phenomena are similar to the flare brightening in two parallel ribons. Figure 1 shows the solar radio emission at 9.4 $GH_2$ observed at Toyokawa. The impulsive enhancement of radio flux was seen approximately at the same time period of the observed optical brightening. Then it seems to be reasonable to suppose that the observed brightening was produced by the bombardment of energetic particles on the chromosphere.

The light curve of each bright point are given in Figure 2 and 3. In the upper part, the vertical bars represent the moment of fine peaks of enhanced radio flux.

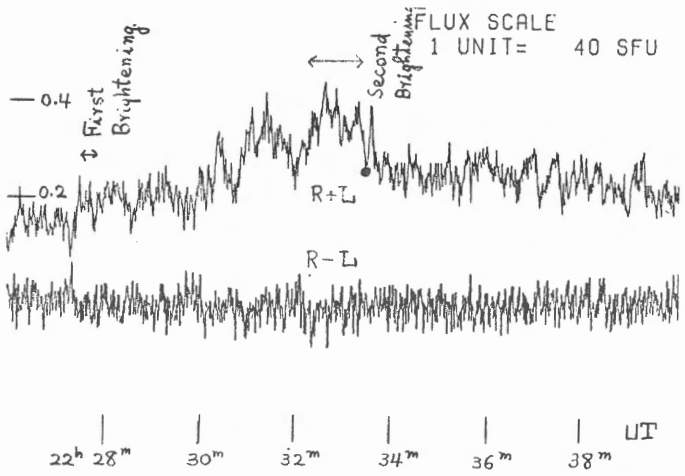


Fig. 1. Radio Flux of 9.4 GHz observed at Toyokawa

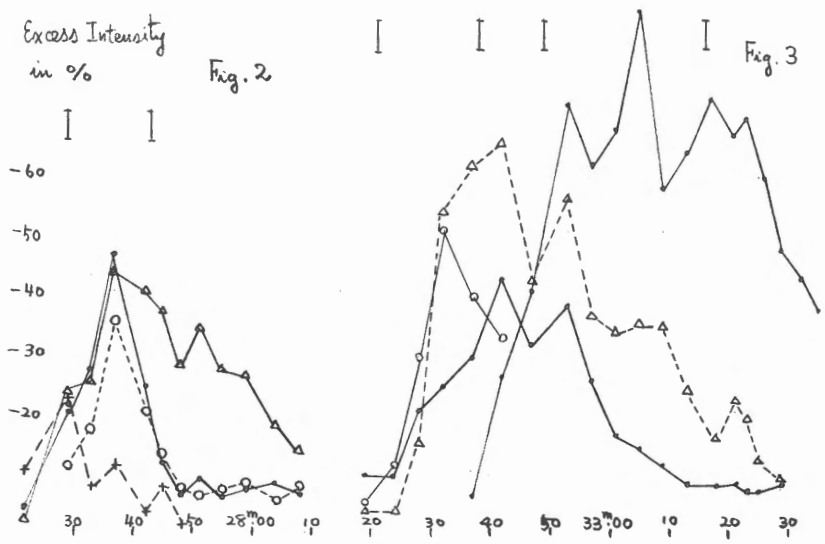


Fig. 2 and 3. The excess intensity versus time. The excess intensity is expressed in units of the undisturbed one. The vertical bars indicate the moment of fine radio peaks.

Recent improved time and space resolution of EUV spectroheliograms of solar flares showed the successive brightening of small magnetic loops. Vorpahl (1976) has interpreted the velocity of propagation as that of magnetoronic wave. He obtained the velocity of 180 - 280 km/sec. On the other hand, Widing and Dere (1977) observed the velocity of only 96 km/sec.

If the flaring small loops form an arcade of magnetic loops, then our bright points can be regarded as the brightening of footpoints of flaring magnetic loops. We obtained 460 ∿ 970 km/sec for the first brightening and 170 km/sec - 440 km/sec for the second. It means that the magnetic field strength required to explain the high propagation velocity - 970 km - is larger than 100 G or more in the flaring region.

The light curves shown in Figures 2 and 3 give a short rise and decay time of about 10 seconds for the first brightening. The light curve only the information about the intensity at Hα + 1.2 A, then we can say nothing about the importance of the flare. However, the effective half-width of Hα emission line increases rapidly at the impulsive and decreases slowly at the decaying phase (Svestka, 1976). Furthermore, the half-widths of Hα emission line of a flare are much larger than 1.2 A, so that we can reasonably suppose that the observed brightening is insignificant as regards to the flare importance.

References

Svestka, Z.; 1976, Solar Flares, D. Reidel p. 3.
Vorpahl, J. A.; 1976, Astrophys. J. 205, 868.
Widing, K. G. and Dere, K. P.; 1977, Solar Phys. 55, 431.