
We present some results concerning the continuum contrast of solar filigrees, observed during a stay of one of the authors (KOUTCHMY) at the Sacramento Peak Observatory (S.P.O.).

Solar filigrees were discovered soon after the accomplishment of the solar vacuum-tower-telescope of the S.P.O. as a new feature of photospheric fine structure by Dunn and Zirker, 1973. Filigrees are located in the dark inter granular lanes and visible only under best seeing conditions (≤ 03'). Dunn and Zirker 1973 and Mehleterangan 1974 identified the filigrees with the finestructure of the photospheric network and facular-points. It is supposed that network and facula are built up by the same basic elements having the same magnetic field structure and differing only in the number density of these elements (concept of concentrated magnetic fields, see e.g. Stenflo 1976). The filigrees are linked to the footpoints of the concentrated fields. The idea of elementary fields suggests then that a model of such a single element may be related to the modeling of a series of solar phenomena: network, facula. Especially will the true continuum contrast of filigrees be important since it is directly related to their radiative excess from which the non radiative input should be deduced.

A narrow band (UBF) picture of the solar photosphere near the disc-centre showing filigrees was chosen; effective wavelength 6441 Å, passband 0,5 Å, exposure time 0,25 sec. A 2-dimensional restoration technique is applied to the picture, analysed with a digital microphotometer, using fast Fourier Transform (FTT) technique. The 1-dimensional modulation transfer-function (MTF) was determined using the solar limb and also directly in autocollimation using Ronchi-rules. Assuming isotropy of the smearing the 2-dimensional MTF is deduced (Koutchmy, 1977).

The intensity of a single filigree compared to the intensity of the mean photosphere at λ 6441 Å is I/I_{phot} ≥ 1.8; its diameter (at half intensity) is obtained to only D = 0.28" (≥ 200 Km).

The brightness excess leads to an estimation of the effective temperature for a filigree which is about 1000°K higher than that of the mean photosphere (T_{eff} ≥ 5800°K).

The 2-dimensional restoration shows very well the effect of instrumental (and, a fortiori, atmospheric) smearing and definitely proves that the non-observation of the facular contrast at the disc center when spectrographs or photoelectric devices are used, should be understood as an effect of limited spatial resolution.

References