Is the Solar Intranetwork Field a Resolved Turbulent Field?

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Abstract. The spectropolarimetric map observed below an active region filament on 7 December 2003 in the Fe I 6302.5 Å line has been inverted by using the UNNOFIT code of Landolfi et al. (1984), improved by the introduction of a magnetic filling factor parameter. The magnetic and non-magnetic theoretical atmospheres, mixed in the proportion given by the filling factor, are derived from the same set of parameters, except for the presence (or absence) of a magnetic field. The fundamental ambiguity is not solved. The results clearly appear two regimes, corresponding to two ranges of filling factors: (a) the network zone extended to spatially broad lanes, having a field about 20°-30° from the vertical, with a homogeneous azimuth. In this zone the filling factor may be high, typically 10%-20% on the network itself and decreasing on both sides. (b) the intranetwork zone, where the field is turbulent and the filling factor typically 2% as expected by several authors. In both regions the field strength is found of the order of 1 kGauss. No clear difference in field strength is found between both zone types, they differ only by field direction homogeneity and filling factor. The turbulent nature of the intranetwork field has been confirmed by an independent inversion of Fe I 6301.5 Å.

This work has been submitted to Astronomy & Astrophysics, as a paper by the same authors in the same order. This paper is now in revision and discussion with the referee, who has rightly asked for further tests. These tests are in progress now and the paper will be resubmitted under the new (provisional) title: “UNNOFIT inversion of spectro-polarimetric maps observed with THEMIS”

References

Landolfi, M., Landi Degl’Innocenti, E., & Arena, P. 1984, Solar Physics, 93, 269