Contributed Talk

Splinter HiRes

Probing the photospheric magnetic field with new spectral line pairs

H. N. Smitha[1], S. K. Solanki[1,2]

[1] *Max-Planck-Institut für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany*
[2] *School of Space Research, Kyung Hee University, Yongin, Gyeonggi, 446-701, Republic of Korea*

The magnetic line ratio (MLR) method has been extensively used in the measurement of photospheric magnetic field strength. It was devised for the neutral iron line pair at 5247.1 Å and 5250.2 Å (5250 Å pair). Other line pairs as well-suited as this pair have not been reported in the literature. We have identified two new line pairs that are very well adapted to be used for MLR measurements. The first pair is in the visible, Fe I 6820 Å - 6842 Å, and the other is in the infrared (IR), Fe I 15534 Å - 15542 Å. We use a three dimensional magnetohydrodynamic (MHD) simulation representing the quiet Sun atmosphere to synthesize the Stokes profiles. Then, we apply the MLR technique to the Stokes V profiles to recover the fields in the MHD cube both, at original resolution and after degrading with a point spread function. In both these cases, we have made the first attempt to empirically represent the field strengths returned by the MLR method in terms of the field strengths in the MHD cube. The lines in the new pairs reproduce the magnetic fields in the MHD cube rather well, better than the original 5250 Å pair. Due to their higher Zeeman sensitivity, the lines in the new pairs are ideal for the measurement of weak fields. The new IR pair, due to its large Stokes V signal samples more fields in the MHD cube than the old IR pair at 1.56 μm, even in the presence of noise, and hence likely also on the real Sun, making them favourable also for the inversions.