Multidimensional radiative transfer effects on scattering polarization in He1083 line in solar prominences

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Abstract

Main information about vector magnetic fields in solar prominences comes from the state-of-the-art
inversion codes (e.g. HAZEL), where 1D plane-parallel slab models are used in order to solve radiative
transfer problem inside the prominence. Here we study 2D slabs which are finite in x and y coordinates
and therefore allow us to inspect effects of radiative losses through the lateral boundaries as well as
effect of the "edges" on emerging Q/I and U/I profiles of scattering polarization in diagnostically
important He1083 triplet. Line is modeled as a typical two-level atom line, which is created by
scattering of incident anisotropic radiation. Q/I and U/I scattering polarization is result of joint action of
scattering processes and vector magnetic field (i.e. Hanle effect). We demonstrate differences between
1D and 2D models and speculate on systematic errors in the inversion process which could arise due to
the neglect of effect of multidimensionality.

Keywords: scattering polarization, radiative transfer, magnetic field measurement

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