2D Radiative Transfer in Magnetically-Confined Structures

Petr Heinzel

Astronomical Institute, CZ-25165 Ondřejov, Czech Republic

Magnetically confined structures in the solar atmosphere exhibit a large complexity in their shapes and physical conditions. As an example, we show the case of so-called magnetic dips in prominences which are in magnetohydrostatic equilibria. For such models we solve 2D non-LTE multilevel problem for hydrogen with PRD in Lyman resonance lines. The iterative technique used is based on the MALI approach with simple diagonal ALO and SC formal solver. To compute the hydrogen ionization balance, the preconditioned MALI equations are linearized with respect to atomic level populations and electron density and solved iteratively using the Newton-Raphson scheme. Two additional problems are addressed: (i) an adequate iteration method for cases when the column-mass scale is used in one of the two dimensions but varies along the other dimension (which has a geometrical scaling); and (ii) a possibility of using AMR (Adaptive Mesh Refinement) algorithms to account for steep 2D gradients of selected variables (temperature, density, etc.).