SIMULATIONS OF PARTIALLY IONISED CHROMOSPHERE: PROGRESS AND CHALLENGES

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In this contribution we are interested to study the influence of partial ionization of solar plasma into the energy balance of the solar chromosphere. We will discuss our realistic 3D radiative-MHD simulations of magneto-convection that include effects from partial ionization in the single-fluid approach (ambipolar diffusion) as well as other non-ideal effects such as the Biermann battery effect and the Hall effect. It will be shown that ambipolar diffusion causes measurable effects on the amplitudes of waves excited by convection in the simulations, on the absorption of Poynting flux and heating and on the formation of chromospheric structures. Thanks to the simulations with battery-excited dynamo fields we can provide a low bond on the chromospheric temperature increase due to the ambipolar effect. The Hall effect acts into the direction of significantly increasing the Poynting flux to the upper chromospheric layers, in a rough agreement from what is expected from idealistic wave simulations.