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Lack of chemical equilibrium and propagation of ion-acoustic waves in the solar chromosphere from 2.5D multifluid simulations

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The base of the solar chromosphere is strongly dominated by neutral and partial ionization effects there are extremely important. The ionization and recombination processes there govern the balance between ions and neutrals, resulting in the transition from partially ionized plasma at the photosphere to almost fully ionized plasma in the transition region and the corona. The chromospheric layer though is known to be filled with non-equilibrium plasma and there are expected deviations from the chemical reactions balance. In this work we perform 2.5D multifluid simulations combining resistive and viscous MHD plasma with a separate neutral fluid to study the coupling between ions and neutrals and the corresponding deviation from chemical (ionization-recombination) balance. This lack of equilibrium results in generation of ion-acoustic waves, whose presence is expected to be found in the solar chromosphere. In addition we study the interaction between the chemically-induced ion-acoustic waves and boundary driven ion-acoustic fluctuations. Last we comment on the role of partial ionization for the damping of the driven oscillations.