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On the velocity drift between ions in the solar atmosphere JUAN MARTINEZ-SYKORA, BAERI LMSAL — The solar atmosphere is composed of many species which are populated at different ionization and excitation levels. The upper chromosphere, transition region and corona are nearly collision less. Consequently, slippage between, for instance, ions and neutral particles, or interactions between separate species, may play important roles. We have developed a 3D multi-fluid and multi-species numerical code (Ebysus) to investigate such effects. Ebysus is capable of treating species (e.g., hydrogen, helium etc) and fluids (neutrals, excited and ionized elements) separately, including non-equilibrium ionization, momentum exchange, radiation, thermal conduction, and other complex processes in the solar atmosphere. Treating different species as different fluids leads to drifts between different ions and an electric filed that couple these motions. The coupling for two ionized fluids can lead to an anti-phase rotational motion between them. Different ionized species and momentum exchange can dissipate this velocity drift, i.e., convert wave kinetic energy into thermal energy. High frequency Alfven waves and reconnection, both thought to occur in the solar atmosphere, can drive such multi-ion velocity drifts.

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