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Transport properties for magnetized sun chromosphere based on the Chapman-Enskog expansion

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Currently, non-ideal MHD models can represent the sun atmosphere and solar flares. However, that such simulations are still not able to provide a predictive tool and do not capture the proper dynamics of the system . The origin of this problem can be related to the incorporation of consistent dissipative phenomena related to interspecies. A non-equilibrium model based on the model theoretically derived from kinetic theory by B.Graille, M. Massot and T.Magin (2009), which is general, for every range of temperature, and a large range of magnetic field, is going to be presented. The development of the system of equations has been developped by linearizing Boltzmann equations using the Chapman Enskog method, based on non-dimensional parameters using a small parameter equal to the square root of the ratio of electron mass to a characteristic heavy-particle mass. At the highest Chapman-Enskog order investigated, multicomponent Navier-Stokes equations are derived for heavy particles coupled to first-order drift-diffusion equations for electrons. The set of equations can be used both for partially and fully ionized plasmas. The spectral Galerkin method based on Laguerre Sonine approximation has been used for the development of the transport properties. Anisotropies transport systems with two temperatures have been obtained. The transport properties have been compared with the usual model of Braginskii, for values that can be found in the chromospere of the sun.