an approach to the behaviour of the plasma inside magnetic clouds

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We present a first attempt to understand the whole behavior (current density and pressure tensor) of the plasma inside the magnetic clouds (MCs), using as a starting point our elliptical cross section model for their magnetic field. Although, during the last two decades, several models have been developed to analyze the magnetic field, fitting them to the experimental data, similar theoretical treatments of the plasma magnitudes are missing. In this work we show an extension of our magnetic field model in order to consider not only the pressure tensor but also the current density, all of them expressed in the GSE coordinate system inside MCs. An attempt of fitting simultaneously all these magnitudes are also presented. The main difficulty found was the determination of the whole current density of the plasma inside the MC from the magnitudes directly measured (particle densities and corresponding velocities). This current density is provided by the difference between the corresponding to protons and electrons; then, the error in its calculation can be very high. However, the fits obtained are quite good and, even more, the plasma parameters of the model are better determined respecting to the previous version of the model where only the magnetic field components were fitted.