[SS3-2] MHD approach in space: Application and limitation

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The fluid approximations often describe the gas dynamics in space well, which contains the variables of x and t. The simplest theory among such approximations is a single-fluid theory or MHD. Many aspects of the macroscopic phenomena can be studied with the MHD approach where their spatial and time scales are relatively large. However, MHD does not provide details about dynamic space phenomena, which require the multi-fluid approach, velocity distribution as well as individual particle motion. We introduce the basic derivation from the single-particle motion to the MHD equations and briefly discuss the limits of MHD approximations.

[SS3-3] Is the Solar Corona Heated by MHD Turbulence?

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EUV lines emitted from the solar transition region and corona are much broader than thermal broadening. This excess nonthermal broadening represents random mass motions that are spatially or temporarily unresolved, such as high frequency Alfven waves, randomly-directed flows along numerous unresolved fine threads, and MHD turbulence. I think that MHD turbulence is a very likely explanation for the observed EUV line nonthermal broadening. Based on this assumption, I have established a simple model of coronal loops heated by MHD turbulence. Using a theory of MHD turbuelnce cascade, the heating rate was inferred from the observed temperature dependence of EUV line nonthermal broadening on temperature. As a result, I have found that the modeled loops have several properties consistent with observations.