Influence of Mass Flows on the Energy Balance and Structure of the Solar Transition Region

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We have extended our previous modeling of energy balance in the chromosphere-corona transition region to include the effects of particle and mass flows. We consider quasi-steady cases satisfying the momentum and energy balance equations throughout the transition region and low corona. We include particle diffusion as well as flows in the non-LTE equations for H, HeI, and HeII. Mass flows substantially affect the ionization and radiative losses of H and He, thereby affecting the structure and extent of the transition region. We find that the H and He line profiles are greatly affected by flows, and that line shifts are much less important than the changes in line intensity and central reversal due to the effects of flows on atmospheric structure. The profiles we compute can generally explain the range of observed high spectral and spatial resolution Lyman alpha profies from the quiet Sun. A full account of this work appears in a paper by Fontenla, Avrett, and Loeser submitted to The Astrophysical Journal.