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Self-Similar Kinetic Theory in the Solar Wind: Data and Simulations KONSTANTINOS HORAITES, STANISLAV BOLDYREV, University of Wisconsin-Madison, SERGEI KRASHENINNIKOV, University of California-San Diego, CHADI SALEM, STUART BALE, MARC PULUPA, Space Sciences Laboratory, University of California-Berkeley — If the temperature Knudsen number $\gamma(x) = L_{mfp}|dlnT/dx|$ in a plasma is constant thoughout the system, the collisional kinetic equation for electrons admits self-similar solutions. These solutions have the novel property that the 'shape' of the eVDF does not vary in space. Such a theory should be applicable in the solar wind, where the density and temperature are observed to vary as power laws with heliocentric distance r such that $\gamma(r)$ ∼constant. We present results of numerical simulations, where we find the steady-state eVDF for various γ. We then compare the predictions of the theory with satellite observations from the Helios and Wind missions. Overall, the theory exhibits remarkable consistency with a variety of electron measurements, and provides an intuitive context for understanding the steady-state solar wind eVDFs.

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