ABSTRACT

It has been widely observed that temperature anisotropies linked to various charged species enrich solar wind plasmas with propagating modes and instabilities. The bounded magnitudes of these anisotropies at enormous heliocentric distances were found by in situ observations. The current thesis describes electron firehose instability as a key contender to control the temperatures of parallel electrons in connection with the interaction of electrons with solar wind ions in the context of diluted space plasmas. By using a bi-Maxwellian model for both electrons and ions, whose temperatures may also change over time t, a velocity-moments based approach is used. A closed set of equations is developed based on the macroscopic quasilinear process to represent the dynamical image of the wave spectrum, ions, and electron temperatures as well as the wave energy density related to the unstable mode development rate. It could be a crucial step in comprehending the solar wind plasma on a global scale by examining the contributions of ions and electrons.