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Electron Contribution in Mirror mode Instability in Quasilinear Regime

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The solar wind is characterized by proton temperature anisotropies. The plasma compression generates the perpendicular anisotropy, $T_{\perp} > T_{ll}$ which may lead to the mode instability for high beta situation. In the literature, the said unstable mode is largely discussed on the basis of linear theory of direct numerical simulations. In the present paper the mirror mode instability is discussed in the framework of simplified and reduced quasi-linear kinetic theory, which includes the contribution of electrons. It is found that the linear growth rate associated with the electron mirror mode can be much higher than that the proton mirror mode, and the electron mirror instability operates over a range of carrying out the quasi-linear analysis, it is shown that for the proton mirror instability. However, upon carrying out the quasi-linear analysis, it is shown that for the high initial growth rate does not necessarily imply dynamical importance, since the saturated magnetic field intensity associated with electron mirror instability is extremely low and that the influence on the particle temperature is minimal. The present finding shows that under some circumstances, the dynamical consequences of a system cannot simply be estimated on the basis of the linear prediction alone and that nonlinear analysis must be taken into account. The electron mirror instability is a prime example if such a case.