

Application of Maxwellian mixture model to plasma velocity distribution

Genta Ueno[1], Tomoyuki Higuchi[2], Shinobu Machida[3], Tohru Araki[4], Yoshifumi Saito[5], Toshifumi Mukai[5]

[1] ISM, [2] Inst. Stat. Math., [3] Dept. of Geophys., Kyoto Univ., [4] Geophysics, Kyoto Univ., [5] ISAS

Recent space plasma observations have provided us with three-dimensional velocity distributions having multiple peaks. We propose a method for analyzing such velocity distributions via a multivariate Maxwellian mixture model where each component of the model represents each of the multiple peaks. The parameters of the model are determined through the Expectation-Maximization (EM) algorithm. For the automatic judgment of the preferable number of components in the mixture model, we introduce a method of examining the number of extrema of a resulting mixture model. We show applications of our method to velocity distributions observed in the Earth's magnetotail.