Dispersion solver for arbitrary distribution functions

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Linear stability analysis based on non-Maxwellian distributions is important to examine realistic effects of micro-instablities on larger scale phenomena, however, most of linear calculation methods have been developed mainly on Maxwellian distributions so far.

Recently Lofgren & Gunell, (1997) and Nakamura & Hoshino (1998) have shown a rational approximation to the distribution function provides highly accurate solution to the linear dispersion problem. In the present paper we examine the applicability of this method to arbitrary given distribution functions. The result shows the method can provide precise dispersion relation.

Recent development of observational instruments provides highly detailed information on particle distribution functions of space plasmas. Also today's advanced computers enable us to perform simulations with the particle number large enough to distinguish fine structures in the phase space. In this situation, linear stability analysis based on non-Maxwellian distributions becomes important to examine the realistic effect of micro-instablities on larger scale phenomena. However, linear dispersion calculation methods have been developed mainly based on Maxwellian distributions so far.

Recently Lofgren & Gunell, (1997) and Nakamura & Hoshino (1998) have shown a rational approximation to the distribution function provides highly accurate solution to the linear dispersion problem. In the present paper we examine the applicability of this method to arbitrary distribution functions. The result shows the method can provide precise dispersion relation.

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