Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Landau damping of the dust ion-acoustic surface waves in a Lorentzian plasma[1] MYOUNG-JAE LEE, TAEJOON KIM, Hanyang University — The Lorentzian (kappa) velocity distribution function is employed to study the stability of dust ion-acoustic surface waves propagating on a boundary of semi-infinite plasma. We allow that the electrons and ions are Lorentzian but the dusts are cold. Then the dust ion-acoustic surface wave can be excited: the real and imaginary parts of the wave frequency $\omega = \omega_r + i\gamma$ are obtained as functions of $\delta = n_i/n_e$ (ion-to-electron mass ratio) as well as the normalized wave number $k_x\lambda_e$ where k_x is the x-component of the wave number and λ_e is the electron Debye length. The wave exhibits resonances and the resonant frequency is strongly dependent on the value of δ. For a negatively (positively) charged dust particles, the phase velocity of the wave increases as δ increases (decreases). When δ =1, the result displays the phase velocity of a Maxwellian wave. The imaginary part of the wave frequency appears to be negative always regardless of the value of δ. Such collisionless dissipation of the wave is known as the Landau damping. We also found that the damping is enhanced as δ increases (decreases) for a negatively (positively) charged dust particles.

[1]This work was supported by the Korean Research Foundation Grant funded by the Korean Government (MOEHRD, Basic Research Promotion Fund) (KRF-2007-331-C00186).

Myoung-Jae Lee
Hanyang University

Date submitted: 15 Jul 2008 Electronic form version 1.4