Dispersion properties of the dust-acoustic waves in a Lorentzian plasma containing elongated dust grains.[1] TAEJOON KIM, MYOUNG-JAE LEE, Department of Physics, Hanyang University, Seoul, Korea, KYU-SUN CHUNG, Department of Electrical Engineering, Hanyang University, Seoul, Korea — The dispersion relation for electrostatic waves propagating in an unmagnetized dusty plasma whose constituents are electrons, ions, and elongated charged dust grains is obtained and analyzed. Electrons and ions are assumed to be Lorentzian (kappa velocity distribution) and dust grains are assumed to be cold. We consider the one-dimensional dust grain rotation so that the principal moment of inertia has z-component only. In the limit of low frequency, i.e., $\omega << kv_e$, kv_i, the dust acoustic (DA) wave dispersion relation is kinetically derived by employing Poisson-Maxwell equations. The result shows that the dispersion relation can admit complex solutions and the growth rate is proportional to the rotation frequency. The effects of spectral index κ are also discussed.

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