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Effect of dust rotation on the stability of dust ion-acoustic surface waves in a kappa plasma MYOUNG-JAE LEE, KYU-SUN CHUNG, Hanyang University — In many literature, dust grains in astrophysical environments or terrestrial laboratories were often assumed to be negatively charged point particles, hence their geometrical features were neglected. However, the dust grains in space or laboratory are often non-spherical and sometimes elongated or flattened. The non-spherical dusts can have non-zero dipole moment and can acquire a rotational motion due to the oscillating electric field or due to their interaction with photons or particles of surrounding gas. Therefore, the dispersive properties of dusty plasma should be modified by the influence of the dust rotation. Meanwhile, plasmas encountered in space and laboratories are not in thermally equilibrium states and often well described by a kappa distribution function because it can effectively represent the properties of the superthermal plasma particles in the high energy tail. In this work, the temporal behavior of electrostatically perturbed dust ion-acoustic surface wave propagating in a kappa plasma containing elongated and rotating dust grains is investigated. For this purpose, we employ the Vlasov-Maxwell system and the specular reflection condition to derive the dispersion relation. We have found that the wave is stable against the linear perturbation for the full spectrum of the wave number and the damping rate is obtained. We also have found that the increase of angular frequency of rotating dust grains can enhance the damping of the wave.

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