Stability of dust-acoustic surface waves in a kappa plasma containing elongated and rotating dust grains

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The effect of dust grain rotation on the damping of a dust acoustic surface wave is investigated for the semi-bounded kappa plasma containing elongated and rotating dust grains. We first report the temporal behavior of a dust-acoustic wave with an electrostatic perturbation imposed on it in a kappa plasma containing elongated and rotating dust grains. We also investigate the effect of the rotation frequency of elongated dust particles on a perturbed dust-acoustic wave that oscillates at a much lower frequency than that of the dust ion-acoustic wave. For this purpose, the dispersion relation and the damping rate are kinetically derived by employing the Vlasov-Maxwell equations and is analyzed for various physical parameters such as the dust grain’s angular frequency, the wave number, etc. The result shows that the damping can be enhanced by increasing the dust grain’s angular frequency.