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Effects of dust-charge gradient and polarization forces on the waves and Jeans instability in strongly coupled dusty plasma. (English) [Zbl 1448.76174](#)

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Summary: The effects of dust charge gradient (DCG) force and polarization force have been investigated on the properties of dust acoustic wave (DAW) and linear Jeans instability in strongly coupled dusty plasma. In the kinetic regime, DCG and polarization forces modify the DAW mode and couple with compressional viscoelastic wave mode. The Jeans instability criterion and critical wavenumber have been modified due to DCG force, polarization force and strong coupling effects. The results have been discussed in the warm photodissociation region and in the laboratory complex plasmas. The strong correlation effect and the charge variation parameter stabilize the growth rate of Jeans instability. But, the polarization parameter stabilize the growth rate for positively charged dust grains and destabilize for negatively charged dust grains. The implications of charge gradient and polarization parameters are discussed for lower and higher charges in the laboratory complex plasma which decreases the growth of the propagating DAW.

MSC:

[76T15](#) Dusty-gas two-phase flows

[82D10](#) Statistical mechanics of plasmas

[76E20](#) Stability and instability of geophysical and astrophysical flows

[76E25](#) Stability and instability of magnetohydrodynamic and electrohydrodynamic flows

Keywords:

[strongly coupled dusty plasma](#); [polarization force](#); [charge gradient force](#); [Jeans instability](#); [dust acoustic wave](#)

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