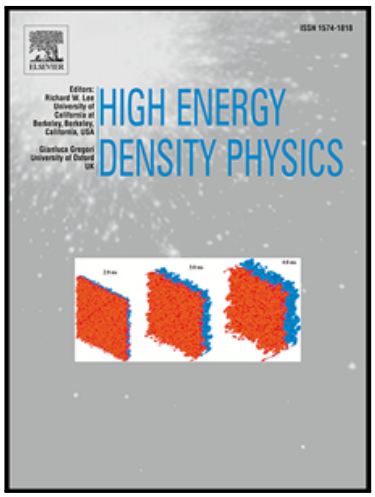

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Electrostatic shock waves in a nonthermal dusty plasma with oppositely charged dust

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Abstract

Theoretical and numerical investigations of dust acoustic shock waves (DASHWs) have been carried out in electron depleted magnetized dusty plasmas (consisting of mobile positively charged as well as negatively charged dust particles, and nonextensive q-distributed ions). The both positively and negatively charged dust kinematic viscosities are taken into account to derive the Burgers equation. It is observed that the viscous force (acting on both polarity charged dust particles) is the dissipitive source and responsible for the formation of DASHWs. It is seen that the electron-depleted magnetized plasma supports both (positive and negative) polarity shock structures. It is also seen that the basic features (i.e., amplitude, width, polarity, phase speed, etc.) of DASHWs are modified by the effects of ion nonextensivity, coefficient of viscosity, oblique angle, negative-to-positive dust mass ratio, ratio of the number of electrons on a negatively charged dust-to-the number of protons on a positively charged dust, and the ratio of the ion number density-to-the negative dust number density. The results of our present investigation may be useful to study the various space and laboratory plasmas, where dissipation due to kinematic viscosity can not be neglected.

Keywords: Burger Equation, Shock wave, Electron-depleted plasma, Oppositely charged dust, Magnetized plasma.

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