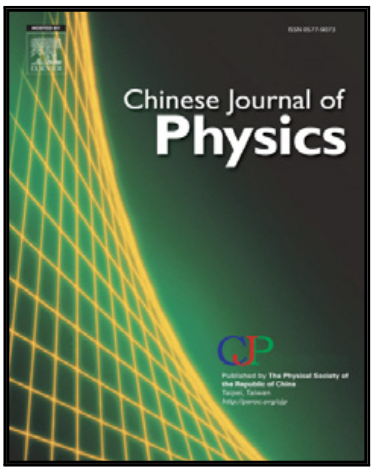

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Nonlinear shock structures with contributions of arbitrary dust size distribution and nonadiabatic charge fluctuation in dusty plasmas

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Abstract

The nonlinear characteristics of shock structures have been investigated in dusty plasma consisting of inertialess Boltzmann distributed electrons, nonthermally distributed ions, and stationary dust grains with nonadiabatic charge fluctuation and arbitrary dust size distribution in present work. A Korteweg-de Vries (KdV) Burgers equation governing the dust acoustic shock structures is obtained by Reductive Perturbation Method. The relevance of shock waves' evolution to the dust size distribution and nonadiabatic charge fluctuation is illustrated both analytically and numerically. The numerical results show that dust size distribution, and nonadiabatic charge fluctuation have strong common influence on the propagation of shock structures.

Keywords: nonlinear shock structures, dusty plasmas, charge fluctuation, dust size distribution

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I INTRODUCTION

It is well known that the dusty plasma exists in various astrophysical as well as laboratory environments[1]-[3]. The collective motion of the plasma will be affected and by the exiting of charged dust grains and some new eigen modes will be introduced[4]-[7] in the scope of low frequency and very low frequency oscillations. In fact, the mass and the charge of dust grains are variant due to collisions with ions and electrons. Its dynamic

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