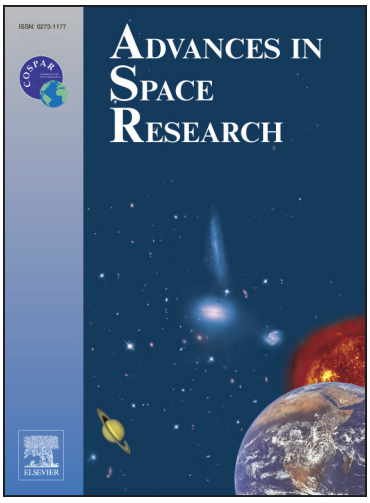

Effects of dust polarity and nonextensive electrons on the dust-ion acoustic solitons and double layers in earth atmosphere

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Effects of dust polarity and nonextensive electrons on the dust-ion acoustic solitons and double layers in earth atmosphere

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Abstract

Propagation of dust-ion acoustic solitary waves (DIASWs) and double layers is discussed in earth atmosphere, using the Sagdeev potential method. The best model for distribution function of electrons in earth atmosphere is found by fitting available data on different distribution functions. The nonextensive function with parameter $q = 0.58$ provides the best fit on observations. Thus we solve the propagation of localized waves on an unmagnetized plasma containing nonextensive electrons, inertial ions, and negatively/positively charged stationary dust. It is found that both compressive and rarefactive solitons as well as double layers exist depending on the sign (and the value) of dust polarity. Characters of propagated waves are described using the presented model.

1 Introduction

Physical properties of dusty plasmas have received considerable attentions in the past few decades because of their applications as well as theoretical interests [1]-[6]. The study of dusty plasmas is also important to understand the nature of space environments, characteristics of astrophysical objects, such as planetary rings, comets, and describing the evolution of interstellar medium, the earth's ionosphere, the magnetosphere and many other situations. It is also important because of its industrial applications too [1, 2] and [7-12]. One of the important electrostatic dust-associated waves in plasmas

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