

Effect of Higher-Order Corrections on the Propagation of Nonlinear Dust-Acoustic Solitary Waves in Mesospheric Dusty Plasmas

Sayed A. Elwakil, Mohamed T. Attia, Mohsen A. Zahran, Emad K. El-Shewy,
and Hesham G. Abdelwahed

Theoretical Physics Group, Physics Department, Faculty of Science, Mansoura University,
Mansoura, Egypt

Reprint requests to Dr. M. A. Z.; E-mail: m_zahran1@mans.edu.eg

Z. Naturforsch. **61a**, 316 – 322 (2006); received March 6, 2006

The contribution of the higher-order correction to nonlinear dust-acoustic waves are studied using the reductive perturbation method in an unmagnetized collisionless mesospheric dusty plasma. A Korteweg – de Vries (KdV) equation that contains the lowest-order nonlinearity and dispersion is derived from the lowest order of perturbation, and a linear inhomogeneous (KdV-type) equation that accounts for the higher-order nonlinearity and dispersion is obtained. A stationary solution is achieved via renormalization method.

Key words: Mesospheric Dusty Plasma; Dust-Acoustic Waves; Renormalization Method;
Higher-Order Correction; Solitary Solution.