

Some traveling wave solutions to the generalized (3+1)-dimensional Korteweg-de Vries-Zakharov-Kuznetsov equation in plasma physics

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Abstract

In this article, the generalized (3+1)-dimensional Korteweg-de Vries-Zakharov-Kuznetsov equation is investigated, which describes the influence of magnetic fields on weak ion-acoustic waves in plasma made up of cool and hot electrons and may be regarded as a nonlinear complicated physical model. To find out some new traveling waves solutions and other exact solutions, the improved F -expansion approach and the $\exp(-\phi(\zeta))$ -expansion approach is applied to above mentioned nonlinear higher dimensional model. Several solutions have been found, including dark soliton, periodic type solitons, bell shaped solitons, single bell shaped solitons. We also show a graphical representation of a number of exact solutions to the equation, together with a description of their behaviour. The proposed techniques can also be used to solve a range of nonlinear evolution problems in mathematical physics and plasma physics.

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