

On the Higher Order Non-Linear Acoustic Waves in A Multicomponent Plasma

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Abstract

In this investigation, we examine three evolution equations: the damped Burgers equation, the nonplanar (cylindrical and spherical) Burgers equation, and the damped nonplanar Burgers equation. We employ a successful semi-analytical approach to achieve the study's objectives. To derive approximations for these equations, we apply the ansatz method. These derived approximations enable the study of all traveling waves, including solitary waves (SWs), shock waves (ShWs), and others described by the mentioned equations. Additionally, we use the tanh method to find an exact shock wave solution for the Burgers equation, allowing us to investigate the properties of dissipative Burgers ShW, nonplanar ShW, and dissipative nonplanar ShW using the obtained solutions. These derived approximations are valuable for researchers in plasma physics, enabling them to analyze different structures and interpret the results of their observations and experiments.

Keywords: damped Burgers equation, nonplanar Burgers equation, damped nonplanar Burgers equation, ansatz approach, shock wave solution