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Reply to the comment on

Kadomtsev-Petviashvili (KP) Burgers equation in a dusty plasmas with non-adiabatic dust charge fluctuation

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PACS. 52.35.Sb Solitons; BGK modes – 52.35.Mw Nonlinear phenomena: waves, wave propagation, and other interactions (including parametric effects, mode coupling, ponderomotive effects, etc.)

In a recent paper [1], I focused on the investigation of the effects of non-adiabatic dust charge fluctuation on the formation of shock waves in a two-dimensional dusty plasmas. As a result, a KP-Burgers equation

$$\frac{\partial}{\partial \xi}\left[\frac{\partial \psi}{\partial \tau}+A\psi\frac{\partial \psi}{\partial \xi}+B\frac{\partial^3 \psi}{\partial \xi^3}-C\frac{\partial^2 \psi}{\partial \xi^2}\right]+D\frac{\partial^2 \psi}{\partial \eta^2}=0 \quad (1)$$

is obtained. Where A, B, C, and D are all related to the physical parameters [1]. A particular travelling shock wave solution for equation (1) is deduced, i.e., equation (44) in reference [1]. The effects of the non-adiabatic dust charge fluctuation on the shock waves is clearly presented in this solution. Gao and Tian [2] commented on my paper [1] and argued that the solution of equation (44) in reference [1] is questionable. Then, they presented some of other possible solutions of equation (1) which are also available in other references [3–7]. However, their comments did not criticize the results obtained in my paper [1], nor adds more to the physics of the shock propagation in dusty plasmas with non-adiabatic dust charge fluctuation effects.

First, I pointed out that their solution of equation (3) in reference [2], which can also be deduced from their equation (5), is equivalent to the solution of equation (44) in reference [1] when some particular value of the arbitrary constants u_2, a_2 and a_4 in their equation (3) are taken. On the other hand, if we set $u_2 = a_4 = 0$, $k = -1$, and $a_2 = (C/5B)(k_2/k_1)$, then, equation (3) in reference [2] can be changed to

$$\psi = -\frac{3C^2}{25AB}\left[1+\tanh\frac{C}{10Bk_1}(k_1\xi+k_2\eta-\omega\tau)\right]^2 \quad (2)$$

where $\omega = k_1[6C^2/25B - D(k_2/k_1)^2]$. It is clear that equation (2) is the same as equation (44) in reference [1] (where just a sign is mistyped). That is, the solution of equation (1) I presented in reference [1] is correct. We also must bear in mind that the discussions for equation (1) given in reference [1] are more physically.

Finally, Gao and Tian presented an interesting solution, i.e., equation (10) in reference [2], for KP-Burgers equation. As they declared in reference [2] that this solution may provides us with several observable effects, i.e., the transverse disturbance effect, the non-constant propagation velocities, etc. [2]. However, the physical meaning of the two arbitrary differentiable functions, i.e., $a(t)$, $b(t)$, are not clear. This may be lead to some difficulties for comparing the theoretical predictions with the experimental results. Hence, a careful physical discussion for the transverse perturbation effects on shock wave propagation in high dimension is needed. That is, a more physical and more applicable investigation is needed. This work is underway and will be presented in a future paper.

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