

CORRIGENDUM

High-order strongly nonlinear long wave approximation and solitary wave solution – CORRIGENDUM

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I have discovered that there was an error in one of the second-order equations (the evolution equation for ϕ_b) given by (5.12*b*) in Choi (2022), which will be hereinafter referred to as C22. The correct evolution equation for ϕ_b is given by

$$\begin{aligned} & \left[\left\{ 1 - \frac{\eta^2}{2!} + \frac{\eta^4}{4!} (\nabla^2)^2 \right\} \phi_b \right]_t + g\zeta + \frac{1}{2} \nabla \phi_b \cdot \nabla \phi_b \\ & = \nabla \cdot \left(\frac{\eta^2}{2!} \nabla^2 \phi_b \nabla \phi_b \right) - \nabla \cdot \left[\frac{\eta^4}{4!} \nabla \phi_b (\nabla^2)^2 \phi_b + \frac{\eta^4}{16} \nabla (\nabla^2 \phi_b)^2 \right]. \end{aligned} \quad (0.1)$$

While the recursive formulas in C22 are correct, a mistake was made when the second-order model was simplified. As a result, the second-order evolution equation for $v = \phi_{b_x}$ for one-dimensional waves given by (6.1*b*) in C22 is also incorrect. The evolution equation should read

$$\left[v - \left(\frac{\eta^2}{2!} v_x - \frac{\eta^4}{4!} v_{xxx} \right) \right]_{x_t} + g\zeta_x + vv_x = \left[\frac{\eta^2}{2!} vv_x - \frac{\eta^4}{4!} (vv_{xxx} + 3v_x v_{xx}) \right]_{xx}. \quad (0.2)$$

Notice that the coefficient for $v_x v_{xx}$ on the right-hand side has been changed to 3 from 5 in C22.

The numerical results presented in figures 9, 11, and 12 in C22 are recomputed with the corrected second-order system, but the new numerical solutions are found close to the previous solutions as the error was introduced in the high-order dispersive terms of $O(\beta^4) \ll 1$. Therefore, no new numerical solutions are presented here although they are made available at <https://web.njit.edu/~wychoi/pub/Choi22~newfigures.pdf>. It should be remarked that the maximum difference between the new and old solutions, for example, for the head-on collision of two-counter propagating solitary waves presented in figure 12 in C22 is found about 3.76%. Therefore, the discussion about the second-order model in C22 remains valid. In the meantime, the loss of the truncated energy for the second-order model is found 0.179% at $t/(h/g)^{1/2} = 200$ for the propagation of a single solitary wave presented in figure 9 and 0.198% at $t/(h/g)^{1/2} = 20$ for the head-on collision of two solitary waves in figure 11, instead of 0.230% and 0.130%, respectively, reported in C22.

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REFERENCE

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