Corrigendum to "Regular and singular pulse and front solutions and possible isochronous behavior in the short-pulse equation: Phase-plane, multi-infinite series and variational approaches" [Commun Nonlinear Sci Numer Simulat 20 (2015) 375–388]

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Section 7 of the original paper contained several errors which are corrected here. Equations (54) and (55) are incorrect. In the following, the corrected versions of these equations is given and the subsequent results of Section 7 are also revised.

The corrected variational Euler–Lagrange equations, which substitute the old equations (54) and (55), are the following system of algebraic equations:

$$\frac{A\sqrt{\pi}}{3\rho}\left(\sqrt{6}A^4 - 3A^2(4c+\rho^2) + 6\sqrt{2}c(2c+\rho^2)\right) = 0, \quad (1)$$

$$\frac{A^2\sqrt{\pi}}{36\rho^2}\left(-2\sqrt{6}A^4 + 9A^2(4c-\rho^2) + 36\sqrt{2}c(\rho^2-2c)\right) = 0. \quad (2)$$

As is the case for most variational solitons, explicit solutions of equations (1)-(2) for the optimized amplitude and width, and which replace the incorrect (56) and (57) in the original paper, are now somewhat lengthy. They satisfy the cubic equation

$$5\sqrt{6}f^3 - 8(9+4\sqrt{3})cf^2 + 324\sqrt{2}c^2 f - 576c^3 = 0, \quad (3)$$

with:

$$\rho^2 = \frac{12\sqrt{2}c^2 - 12cf + \sqrt{6}f^2}{3f - 6\sqrt{2}c} \quad \text{and} \quad A^2 = f. \quad (4)$$

Rather than write out the lengthy roots for (3), the optimized regular soliton is thus considered for some typical cases. These replace the incorrect Figure 7 in the original paper. For $c = 1$, we obtain $A = 1.982$ and $\rho = 1.52$. The corresponding optimized regular solitons, given by the equation (52) in the original paper, is shown in Fig.1(a). Analogously, once we choose $c = 2$, the solution of system (1) is $A = 2.803$ and $\rho = 2.15$ and the corresponding regular soliton is shown in Fig.1(b).

Note that, unlike the high-accuracy results in earlier sections of the original paper, variational solitons are directly obtained, but do not have a high degree of numerical accuracy. For this reason, considering the

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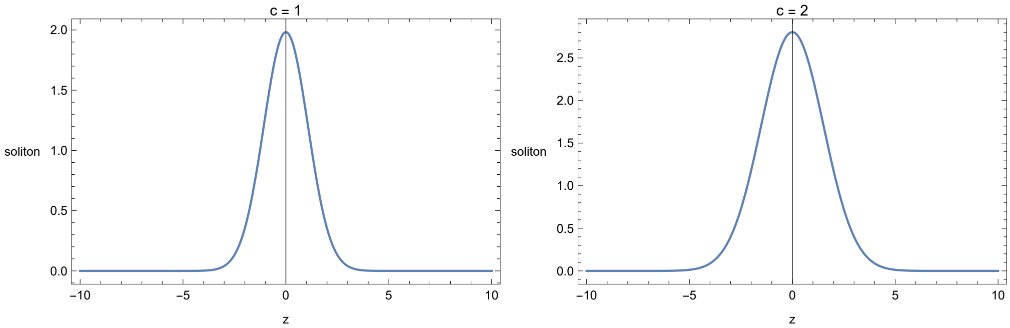

Figure 1: The regular soliton. (a) $c = 1$, (b) $c = 2$.

discriminant of the variational cubic (3) to distinguish parameter regimes of c where the number of roots go from one to three (via a saddle-node bifurcation) is not considered here. The original cubic equation itself does not have the required accuracy to really conduct such further analysis reliably. We may also substitute our variational soliton given by (52) in the original paper for the above cases directly into the left hand side of the governing model (2) in the original paper to gauge the residual error at various points of our spatial z domain. For $c = 1$, this residual error is shown in Fig.2(a). Analogously, for $c = 2$, the corresponding error is shown in Fig.2(b). These replace the incorrect Figure 8 in the original paper.

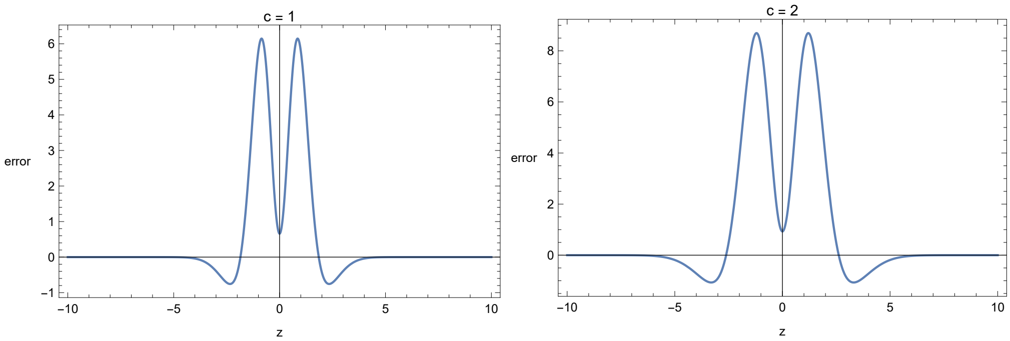

Figure 2: The residual error for: (a) $c = 1$, (b) $c = 2$.

The second half of Section 7, i.e. Section 7.2 of the original paper, is correct as it stands, except that Equation (60) should be replaced by:

$$\kappa(c) = \pm\frac{1}{\sqrt{-c}}. \tag{5}$$

Note that the extension of the variational method to embedded solitary waves in this sub-section is still not that widely known outside the embedded solitary waves community.