Chaos, Solitons and Fractals 108 (2018) 224–227

Contents lists available at ScienceDirect

Chaos, Solitons and Fractals

Nonlinear Science, and Nonequilibrium and Complex Phenomena

journal homepage: www.elsevier.com/locate/chaos

Corrigendum

Corrigendum to “Extended theory of harmonic maps connects general relativity to chaos and quantum mechanism” [Chaos, Solitons and Fractals 103 (2017) 567–570]

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Abstract

In this corrigendum, we corrected the potential function $U(\Phi, \sigma)$ t'hat used to derive the Schrödinger equation for a one-dimensional harmonic oscillator in [Chaos, Solitons and Fractals 103 (2017) 567–570]. We also corrected several typos in the equations in the paper and the supplementary information. These corrections do not alter the conclusion of the article.

Keywords

Extended harmonic maps; Chaos equation; General relativity; Quantum physics.

1. The definition of the potential function *U* in Eq. (31)

The definition of the potential function U that used to derive the Schrödinger equation for a one-dimensional harmonic should be

$$U(\Phi,\sigma)=e^{\Phi+\sigma}\left[-\frac{m}{2\hbar^2}K\Phi\sigma^2+\frac{m}{4\hbar^2}K\sigma^2+\frac{m}{2\hbar^2}K\Phi\sigma+\frac{m}{2\hbar^2}\left(2E-\frac{1}{2}K\right)\Phi-\frac{m}{2\hbar^2}K\sigma+\frac{m}{2\hbar^2}\left(\frac{3}{4}K-E\right)\right] \tag{1}$$

instead of

$$U(\Phi,\sigma)=e^{\Phi+\sigma}\left[-\frac{m}{2\hbar^2}K\Phi\sigma^2-\frac{m}{4\hbar^2}K\sigma^2-\frac{m}{2\hbar^2}K\Phi\sigma+\frac{2m}{\hbar^2}(E-K)\Phi-\frac{m}{2\hbar^2}K\sigma+\frac{m}{\hbar^2}\left(\frac{3}{4}K-E\right)\right] \tag{2}$$

in Eq. (31) in [1].

Moreover, the Eq. (2) that was also showed in the 2nd equation in the 15th page of supplementary information should be removed.

2. Missed a “K” in the definition of the potential function *U* of the supplementary information (line #4 in page #15)

The equation in line #4 of page #15 of the supplementary information [1] should be

$$U(\Phi,\sigma)=e^{\Phi+\sigma}\left[-\frac{m}{2\hbar^2}K\Phi\sigma^2+\frac{m}{4\hbar^2}K\sigma^2+\frac{m}{2\hbar^2}K\Phi\sigma+\frac{m}{2\hbar^2}\left(2E-\frac{1}{2}K\right)\Phi-\frac{m}{2\hbar^2}K\sigma+\frac{m}{2\hbar^2}\left(\frac{3}{4}K-E\right)\right] \tag{3}$$

instead of

$$U(\Phi,\sigma)=e^{\Phi+\sigma}\left[-\frac{m}{2\hbar^2}K\Phi\sigma^2+\frac{m}{4\hbar^2}\sigma^2+\frac{m}{2\hbar^2}K\Phi\sigma+\frac{m}{2\hbar^2}\left(2E-\frac{1}{2}K\right)\Phi-\frac{m}{2\hbar^2}K\sigma+\frac{m}{2\hbar^2}\left(\frac{3}{4}K-E\right)\right] \tag{4}$$

DOI of original article: 10.1016/j.chaos.2017.07.004

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https://doi.org/10.1016/j.chaos.2018.01.032

0960-0779

3. The typos in Eq. (5)

The Eq. (5) should be

$$\frac{\partial L}{\partial \Phi^A} - \partial_\mu \frac{\partial L}{\partial \partial_\mu \Phi^A} = 0; A = 1, 2, \ldots, n \tag{5}$$

instead of

$$\frac{\partial L}{\partial \Phi^A} - \partial_\mu \frac{\partial L}{\partial \partial_\mu x \Phi^A} = 0; A = 1, 2, \ldots, n \tag{6}$$

4. The typos in the equation of supplementary information (line #3 in page #2)

In the line #3 of page #2 of supplementary information [1], for the Christoffels symbol Γ^2_{12} should be

$$\begin{aligned}\Gamma^2_{12} &= \frac{1}{2}G^{2D}\left[\frac{\partial G_{1D}}{\partial \Phi^2} + \frac{\partial G_{2D}}{\partial \Phi^1} - \frac{\partial G_{12}}{\partial \Phi^D}\right] \\ &= \frac{1}{2}G^{21}\left[\frac{\partial G_{11}}{\partial \sigma} + \frac{\partial G_{21}}{\partial \Phi} - \frac{\partial G_{12}}{\partial \Phi}\right] + \frac{1}{2}G^{22}\left[\frac{\partial G_{12}}{\partial \sigma} + \frac{\partial G_{22}}{\partial \Phi} - \frac{\partial G_{12}}{\partial \sigma}\right] \\ &= \frac{1}{2}G^{22}\left[\frac{\partial G_{22}}{\partial \Phi}\right] = \frac{1}{2}\left(\frac{1}{k-1}e^{-\Phi-\sigma}\right)\left[\frac{\partial\left[(k-1)e^{\Phi+\sigma}\right]}{\partial \Phi}\right] = \frac{1}{2}\end{aligned} \tag{7}$$

instead of

$$\begin{aligned}\Gamma^2_{12} &= \frac{1}{2}G^{2D}\left[\frac{\partial G_{1D}}{\partial \Phi^2} + \frac{\partial G_{2D}}{\partial \Phi^1} - \frac{\partial G_{12}}{\partial \Phi^D}\right] \\ &= \frac{1}{2}G^{21}\left[\frac{\partial G_{11}}{\partial \Phi} + \frac{\partial G_{21}}{\partial \Phi} - \frac{\partial G_{12}}{\partial \Phi}\right] + \frac{1}{2}G^{22}\left[\frac{\partial G_{12}}{\partial \Phi} + \frac{\partial G_{22}}{\partial \Phi} - \frac{\partial G_{12}}{\partial \sigma}\right] \\ &= \frac{1}{2}G^{22}\left[\frac{\partial G_{22}}{\partial \Phi}\right] = \frac{1}{2}\left(\frac{1}{k-1}e^{-\Phi-\sigma}\right)\left[\frac{\partial\left[(k-1)e^{\Phi+\sigma}\right]}{\partial \Phi}\right] = \frac{1}{2}\end{aligned} \tag{8}$$

5. The differential symbol of the equation of supplementary information (line #10 in page #6)

The equation in line #10 of page #6 of the supplementary information [1] should be

$$\frac{d^2\Phi}{d\sigma^2} + k\frac{d\Phi}{d\sigma} + \alpha\Phi^3 - \frac{1}{2}(2\beta)\Phi - \frac{4b + b\omega^2}{\omega^2 + 4}\cos(\omega\sigma) = 0 \tag{9}$$

instead of

$$\frac{d^2\Phi}{d\sigma^2} + k\frac{d\Phi}{d\sigma} + \alpha\Phi^3 - \frac{1}{2}(2\beta)\Phi - \frac{4b + b\omega^2}{\omega^2 + 4}\cos(\omega\sigma) = 0 \tag{10}$$

6. The cosine symbol of the equation of supplementary information (line #4 in page #14)

The equation in line #4 of page #14 of the supplementary information [1] should be

$$\begin{aligned}&\frac{d^2\Phi}{d\sigma^2} + k\frac{d\Phi}{d\sigma} + \left[\alpha\sin(\Phi) + \frac{\beta}{25 + 6\omega^2 + \omega^4}\left[-\left(\omega^2 + 7\right)\omega sin(\omega\sigma)sin(\Phi) - \left(\omega^2 - 1\right)\omega sin(\omega\sigma)cos(\Phi) + \left[\omega^4 + 5\omega^2 + 10\right]\right.\right. \\ &cos(\omega\sigma)sin(\Phi) - \left(3\omega^2 + 5\right)cos(\omega\sigma)cos(\Phi) + \left(\omega^3 + 7\omega\right)sin(\omega\sigma)sin(\Phi) + \left(\omega^3 - \omega\right)sin(\omega\sigma)cos(\Phi) \\ &\left.\left.+\left(\omega^2 + 15\right)cos(\omega\sigma)sin(\Phi) + \left(3\omega^2 + 5\right)cos(\omega\sigma)cos(\Phi) + \frac{2}{5}\alpha\sin(\Phi) - \frac{1}{5}\alpha\cos(\Phi)\right]\right] = 0\end{aligned} \tag{11}$$

instead of

$$\begin{aligned}&\frac{d^2\Phi}{d\sigma^2} + k\frac{d\Phi}{d\sigma} + \left[\alpha\sin(\Phi) + \frac{\beta}{25 + 6\omega^2 + \omega^4}\left[-\left(\omega^2 + 7\right)\omega sin(\omega\sigma)sin(\Phi) - \left(\omega^2 - 1\right)\omega sin(\omega\sigma)cos(\Phi) +\right.\right. \\ &+\left[\omega^4 + 5\omega^2 + 10\right]cos(\omega\sigma)sin(\Phi) - \left(3\omega^2 + 5\right)cos(\omega\sigma)cos(\Phi) + \left(\omega^3 + 7\omega\right)sin(\omega\sigma)sin(\Phi) + \left(\omega^3 - \omega\right)sin(\omega\sigma)cos(\Phi) \\ &\left.\left.+\left(\omega^2 + 15\right)cos(\omega\sigma)sin(\Phi) + \left(3\omega^2 + 5\right)cos(\omega\sigma)cos(\Phi) + \frac{2}{5}\alpha\sin(\Phi) - \frac{1}{5}\alpha\cos(\Phi)\right]\right] = 0\end{aligned} \tag{12}$$