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Reply of the manuscript of authors (Elsayed and Abdul-Ghani) in title (Comment on the paper of our paper [Superlattices and Microstructures, 113 (2018) 346–358]) (in press)

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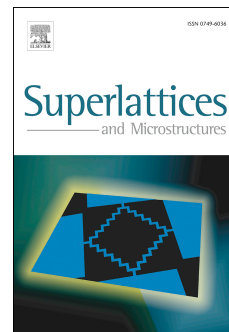
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Reply of the manuscript of authors (Elsayed and Abdul-Ghani) in title (Comment on the paper of our paper [Superlattices and Microstructures, 113 (2018) 346-358]) (in press)

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**Abstract** The used methods in our papers [1]- [13] named new modified and extended auxiliary equation methods. The calculations of our article were correct. All solutions satisfied the partial differential equations in our papers.

**Keywords** New auxiliary equation method; Maple; Mathematical methods; Mathematical Physics.

## 1 Reply in details:

They told our paper in Superlattices and Microstructures, 113 (2018) 346-358] [1], the calculation are not correct.

**The proof of our calculation are correct as following:**

**Comment Number 1.**

$a^f(\xi)$  given by (3) does not satisfy Eq. (2). To prove this, we see that:

$$a^f(\xi) = -\frac{\beta}{2\sigma} + \frac{\sqrt{-(\beta^2 - 4\alpha\sigma)}}{2\sigma} \tan\left(\frac{\sqrt{-(\beta^2 - 4\alpha\sigma)}}{2} \xi\right), \quad (1)$$

Now, by simple calculation, we have:

$$[\alpha a^{-f(\xi)} + \beta + \sigma a^f(\xi)] = \frac{\left(\left(\alpha - \frac{\beta^2}{\sigma}\right) \left(\sec\left(\frac{\xi}{2} \sqrt{\alpha\sigma - \beta^2}\right)\right)^2 - \frac{\beta \sqrt{\alpha\sigma - \beta^2} \tan\left(\frac{\xi}{2} \sqrt{\alpha\sigma - \beta^2}\right)}{\sigma} + \frac{\beta^2}{\sigma}\right)}{\left(-\frac{\beta}{\sigma} + \frac{\alpha\sigma - \beta^2}{\sigma} \tan\left(\frac{\xi}{2} \sqrt{\alpha\sigma - \beta^2}\right)\right)}. \quad (2)$$

From (3) we conclude that

$$f'(\xi) \ln(a) = \frac{0.5 \left(\alpha - \frac{\beta^2}{\sigma}\right) \left(\sec\left(\frac{\xi}{2} \sqrt{\alpha\sigma - \beta^2}\right)\right)^2}{-\frac{\beta}{\sigma} + \frac{\alpha\sigma - \beta^2}{\sigma} \tan\left(\frac{\xi}{2} \sqrt{\alpha\sigma - \beta^2}\right)}. \quad (3)$$

where  $' = d/d\xi$ : Note that the R. H. S of formula (8) is not equal to the R. H. S of formula (9). Thus the formula (3) is not a solution of Eq. (2).

**The Reply for this comment:**

$$\begin{aligned} \frac{1}{\ln(a)} [\alpha a^{-f(\xi)} + \beta + \sigma a^f(\xi)] &= \frac{\alpha}{\ln(a)} a^{\frac{\ln(2)}{\ln(a)}} \left( a^{\frac{1}{\ln(a)} \ln\left(-\frac{\beta}{\sigma} - \frac{\sqrt{-4\alpha\sigma + \beta^2} \tanh(0.5 \sqrt{-4\alpha\sigma + \beta^2} \xi)}{\sigma}\right)} \right)^{-1} + \frac{\beta}{\ln(a)} \quad (4) \\ &+ \frac{\sigma}{\ln(a)} a^{\frac{1}{\ln(a)} \ln\left(-\frac{\beta}{\sigma} - \frac{\sqrt{-4\alpha\sigma + \beta^2} \tanh(0.5 \sqrt{-4\alpha\sigma + \beta^2} \xi)}{\sigma}\right)} \left( a^{\frac{\ln(2)}{\ln(a)}} \right)^{-1}. \end{aligned}$$

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