Available online at http://ijim.srbiau.ac.ir/
Int. J. Industrial Mathematics (ISSN 2008-5621)
Vol. 10, No. 3, 2018 Article ID IJIM-00992, 2 pages
Research Article

A Note On 'A New Method For Solving An Arbitrary Fully Fuzzy Linear System'

S. Salahshour *†, A. Ahmadian ‡, F. Ismail §

Received Date: 2016-12-07 Revised Date: 2017-07-17 Accepted Date: 2018-05-1

Abstract

In [1], the authors claimed by a counterexample that the cross product definition in [2] is not correct and thus the proposed technique is false. In this note, we show that this assertion is incorrect.

Keywords : Cross product; Fully fuzzy linear system; Fuzzy approximate solution.

1 Introduction

Moloudzadeh et al. [2] presented an approximate technique to solve an arbitrary fully fuzzy linear system (FFLS). In fact, using the cross product definition of two fuzzy number, the solutions of FFLS in 0-cut and 1-cut cases are obtained. Recently, Behera and Chakraverty [1] claimed that the cross product definition used by Moloudzadeh et al. citemolo is not correct, generally. To validate this claim, they solved a counterexample. In the next section, we prove that this assertion is stated incorrectly.

*Corresponding author. soheilsalahshour@yahoo.com, Tel: +(98)9359130694.

†Young Researchers and Elite Club, Mobarakeh Branch, Islamic Azad University, Mobarakeh, Iran.

‡Institute for Mathematical Research, University Putra Malaysia, 43400 UPM, Selangor, Malaysia

§Institute for Mathematical Research, University Putra Malaysia, 43400 UPM, Selangor, Malaysia.

2 Corrigendum

We denote by $\mathbb{R}_F$ the set of all these fuzzy numbers. In addition, $\mathbb{R}_F^* = \{u \in \mathbb{R}_F : u \text{ is positive or negative}\}$.

Theorem 2.1 *(Theorem 2.1 of Moloudzadeh et al. [2]).*
If u and v are positive fuzzy numbers then $w = u \otimes v$ defined by $[w]^r = [\underline{w}^r, \overline{w}^r]$, where

$$\begin{cases} \underline{w}^r = \underline{u}^r \underline{v}^1 + \underline{u}^1 \underline{v}^r - \underline{u}^1 \underline{v}^1 \\ \overline{w}^r = \overline{u}^r \overline{v}^1 + \overline{u}^1 \overline{v}^r - \overline{u}^1 \overline{v}^1 \end{cases} \tag{2.1}$$

for every $r \in [0, 1]$, is a positive fuzzy number.

Corollary 2.1 *(Corollary 2.1 of Moloudzadeh et al. [2]).*
Let u and v be two fuzzy numbers.
1. If u is positive and v is negative then $u \otimes v = -(u \otimes (-v))$ is a negative fuzzy number.
2. If u is negative and v is positive then $u \otimes v = -((-u) \otimes v)$ is a negative fuzzy number.
3. If u and v are negative then $u \otimes v = (-u) \otimes (-v)$ is a positive fuzzy number.

Definition 2.1 *(Definition 2.3 of Moloudzadeh et al. [2]).*
(Cross product) The binary operation $\otimes$ *on* $\mathbb{R}_F^*$ *introduced by Theorem 2.1 and Corollary 2.1 is called cross product of two fuzzy numbers.*

Example 2.1 *(Counterexample 2.1 of Behera and Chakraverty [1]).*
Consider a simple example of fuzzy equation (linear case) as

$$[1+r, -r+3] \otimes x = [6r+4, -8r+18] \quad (2.2)$$

The authors in [1] claimed that the proposed solution by Moloudzadeh et al. [2]) does not satisfy in Eq. (2.2). On the other hand, they stated that the obtained solution $(4.5, 5, 6.5)$ based on the cross product does not satisfy in Eq. (2.2). Indeed, this statement is completely inaccurate. Since using the cross product definition 2.1, we have:

$$[1+r, -r+3] \otimes [4.5+0.5r, 6.5-1.5r] = [4+6r, 18-8r].$$

The exact solution of Example 2.1 is as follows:

$$[\frac{6r+4}{1+r}, \frac{18-8r}{3-r}]. \quad (2.3)$$

In fact, the above exact solution is an r-cut exact solution. On the other hand, there is an essential difference between the application of interval analysis and using the cross product to solve FFLS. Therefore, the exact solution (2.3) does not satisfy in the original problem when we use cross product. Moreover, Moloudzadeh et al. [2] do not claim that the proposed solution is the same as the interval solution. More precisely, we believe that the suggested solution in [2] is an approximate solution not an exact interval solution (r-cut solution). Hence, the approach made by Moloudzadeh et al. [2] is correct and the assertion presented in [1] is incorrect.

3 Conclusion

In this paper, we show that the note paper [1] claims a wrong assertion on the approximate method proposed by Moloudzadeh et al. [2].

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Soheil Salahshour received the Ph.D. degree from the Islamic Azad University (IAU), Science and Research Branch, Tehran, Iran, in 2012. He joined the Department of Mathematics, IAU, Mobarakeh Branch, Mobarakeh, Iran, in 2010, where he is currently an Assistant Professor. He has worked in various fields of fuzzy setting theory including fuzzy fractional calculus.

Ali Ahmadian received the Ph.D. degree in applied mathematics from the University Putra Malaysia, Serdang, Selangor, Malaysia, in 2013. He joined to the Institute for Mathematical Research at UPM, as a Research fellow in 2017 after he was a Postdoctoral Research fellow for three years at UPM.

Fudziah Ismail: She is a Professor of Applied Mathematics in University Putra Malaysia. She was graduated from Ph.D. in 1999 from University Putra Malaysia. She published more than 100 papers in international journals. She could obtain different types of research grants from Ministry of higher education, Malaysia. She conducted 15 Ph.D. students in numerical analysis. Her main interests are numerical methods for different types of differential equations.