یازدهمین همایش ملی ریاضی دانشگاه پیام نور
۲۵ و ۲۶ مهرماه ۱۴۰۳ – دانشگاه پیام نور استان یزد
11th National Mathematics Conference of Payame Noor University
16-17 October 2024
Yazd-Iran

m-Variable n-Refined Neutrosophic AH-Isometry

Florentin Smarandache[1], Karim Ghadimi[2, *] and Akbar Rezaei[3]

[1]Emeritus Professor, Mathematics, Physic and Natural Science Division,
University of New Mexico, 705 Gurley Ave., Gallup, NM 87301, USA
[2,3]Department of Mathematics, Payame Noor University, P.O.Box 19395-4697, Tehran, Iran
[1]smarand@unm.edu, [2]kghadimi@pnu.ac.ir & [3]rezaei@pnu.ac.ir

---

Abstract. We extend new for the first time, the (one-variable) n-refined neutrosophic AH-isometry to the m-variable n-refined neutrosophic AH-isometry. The reason is similar: if we knew the determinate and non-indeterminate parts of the m arguments:
$\alpha_1 = a_0^1 + a_1^1 I_1 + a_2^1 I_2 + \cdots + a_n^1 I_n$,
$\alpha_2 = a_0^2 + a_1^2 I_1 + a_2^2 I_2 + \cdots + a_n^2 I_n$,
$\vdots$
$\alpha_m = a_0^m + a_1^m I_1 + a_2^m I_2 + \cdots + a_n^m I_n$
how the we similarly find the determinate and non-indeterminate parts of a function (of operation) of these m arguments $f(\alpha_1, \alpha_2, \cdots, \alpha_m)$? This paper demonstrate that.

Keywords: Indeterminacy, Neutrosophic, n-refined, AH-isometry.

AMS Mathematics Subject Classification [2020]: ?????????????????

---

1. Introduction

The literal indeterminacy (I) was for the first time refined/split into literal sub-indeterminacies $(I_1, I_2, \cdots, I_n)$ by Smarandache [5] in 2015, who defined a multiplication law of these literal sub-indeterminacies to be able to build the Refined I-Neutrosophic Algebraic Structures. The AH-isometry [2] was firstly introduced by Mohammad Abobala and Ahmad Hatip in 2021, where AH stands for Abobala-Hatip. The 2-refined AH-isometry [3] was introduced by Celik and Hatip in 2022. Many papers (e.g. see [1]) were published about this fundamental AH-isometry in the rings of neutrosophic literal numbers. The n-refined AH-isometry [4] was introduced by Smarandache and Abobala in 2024. Now we extend it for the first time, extend one variable to many variable, called m-variable n-refined AH-isometry.

2. Main results

One-variable AH-isometry
$f(x + yI) = f(x) + I.[f(x + y) - f(x)]$

*Speaker.

Two-variable AH-isometry

$f(x_1+y_1I, x_2+y_2I) = f(x_1,x_2) + I[f(x_1+y_1, x_2+y_2) - f(X_1,x_2)]$

Three-variable AH-isometry

$f(x_1+y_1I, x_2+y_2I, x_3+y_3I) = f(x_1,x_2,x_3) + I[f(x_1+y_1, x_2+y_2, x_3+y_3) - f(x_1,x_2,x_3)]$

m-variable AH-isometry, for integer $m \geq 1$

$f(x_1+y_1I, x_2+y_2I, \cdots, x_m+y_mI) = f(x_1,x_2,\cdots,x_m) + I[f(x_1+y_1, x_2+y_2, \cdots, x_m+y_m) - f(x_1,x_2,\cdots,x_m)]$

One-variable 2-refined AH-isometry

$f(a_0+a_1I_1+a_2I_2) = f(a_0) + [f(a_0+a_1+a_2) - f(a_0+a_2)]I_1 + [f(a_0+a_2) - f(a_0)]I_2$

Two-variable 2-refined AH-isometry

$f(a_0+a_1I_1+a_2I_2, b_0+b_1I_1+b_2I_2) = f(a_0,b_0) + [f(a_0+a_1+a_2, b_0+b_1+b_2) - f(a_0+a_2, b_0+b_2)]I_1 + [f(a_0+a_2, b_0+b_2) - f(a_0,b_2)]I_2$

Three-variable 2-refined AH-isometry

$f(a_0+a_1I_1+a_2I_2, b_0+b_1I_1+b_2I_2, c_0+c_1I_1+c_2I_2) =$
$f(a_0,b_0,c_0) + [f(a_0+a_1+a_2, b_0+b_1+b_2, c_0+c_1+c_2) - f(a_0+a_2, b_0+b_2, c_0+c_2)]I_1 + [f(a_0+a_2, b_0+b_2, c_0+c_2) - f(a_0,b_0,c_0)]I_2$

m-variable 2-refined AH-isometry

$f(a_0^1+a_1^1+a_2^1I_2, a_0^2+a_1^2I_1+a_2^2I_2, \cdots, a_0^m+a_1^mI_1+a_2^mI_2) =$
$f(a_0^1, a_0^2, \cdots, a_0^m) + [f(a_0^1+a_1^1+a_2^1, a_0^2+a_1^2+a_2^2, \cdots, a_0^m+a_1^m+a_2^m) - f(a_0^1+a_2^1, a_0^2+a_2^2, \cdots, a_0^m+a_2^m)]I_1 + [f(a_0^1+a_2^1, a_0^2+a_2^2, \cdots, a_0^m+a_2^m) - f(a_0^1, a_0^2, \cdots, a_0^m)]I_2$

m-variable n-refined AH-isometry

$f(a_0^1+a_1^1I_1+a_2^1I_2+\cdots+a_n^1I_n, a_0^2+a_1^2I_1+a_2^2I_2+\cdots+a_n^2I_n, \cdots, a_0^m+a_1^mI_1+a_2^mI_2+\cdots+a_n^mI_n) = f(a_0^1, a_0^2, \cdots, a_0^m) + [f(\sum_{i=0}^n a_i^1, \sum_{i=0}^n a_i^2, \cdots, \sum_{i=0}^n a_i^m) -$
$f(\sum_{i \not\neq 1}^n a_i^1, \sum_{i\neq 1}^n a_i^2, \cdots, \sum_{i\neq 1}^n a_i^m]I_1 + [f(\sum_{i\neq 1}^n a_i^1, \sum_{i\neq 1}^n a_i^2, \cdots, \sum_{i\neq 1}^n a_i^m) -$
$f(\sum_{i\neq 1,2}^n a_i^1, \sum_{i\neq 1,2}^n a_i^2, \cdots, \sum_{i\neq 1,2}^n a_i^m]I_2 + [f(\sum_{i\neq 1,2}^n a_i^1, \sum_{i\neq 1,2}^n a_i^2, \cdots, \sum_{i\neq 1,2}^n a_i^m) -$
$f(\sum_{i\neq 1,2,3}^n a_i^1, \sum_{i\neq 1,2,3}^n a_i^2, \cdots, \sum_{i\neq 1,2,3}^n a_i^m]I_3 + \cdots +$
$[f(\sum_{i\neq 1,2,\cdots,k-1}^n a_i^1, \sum_{i\neq 1,2,\cdots,k-1}^n a_i^2, \cdots, \sum_{i\neq 1,2,\cdots,k-1}^n a_i^m) -$
$f(\sum_{i\neq 1,2,\cdots,k}^n a_i^1, \sum_{i\neq 1,2,\cdots,k}^n a_i^2, \cdots, \sum_{i\neq 1,2,\cdots,k}^n a_i^m]I_k +$
$[f(\sum_{i\neq 1,2,\cdots,n-1}^n a_i^1, \sum_{i\neq 1,2,\cdots,n-1}^n a_i^2, \cdots, \sum_{i\neq 1,2,\cdots,n-1}^n a_i^m) - f((a_0^1, a_0^2, \cdots, a_0^m)]I_n$

3. Conclusion

We have introduce, for the first time, the (one-variable) n-refined neutrosophic AH-isometry to m- -variables n-refined. Neutrosophic AH-isometry, which is needed in finding the determinate and non-indeterminate parts of a function (or, equation) of m arguments.

References

1. M. Abobala and A. Hatip, On a Novel Scheme for the Encryption and Decryption of 2×2 Fuzzy Matrices with Relational Entires Based on the Algebra of Neutrosophic Integers and EL-Gamal Crepto-System, Neutrosophic Sets and Systems, **54** (2023), 19–32.

2. M. Abobala and A. Hatip, *An Algebraic to Neutrosophic Euclidean Geometry*, Neutrosophic Sets and Systems, **43** (2021), 114–123.
3. M. Celik and M. Abobala, *On the Refined AH-Isometry and its Application in Refined Neutrosophic Surfaces,* Galoitica Journal of Mathematical Structures and Applications, **2(1)** (2022), 21–28.
4. F. Smarandache and M. Abobala, *Operations with n-Refined Literal Neutrosophic Numbers Using the Identification Method and the n-Refined AH-Isometry,* Neutrosophic Sets and Systems, **70** (2024), 350–358.
5. F. Smarandache, *Refined Literal Indeterminacy and the Multiplication Law of Subindeterminacies*, Ch. 5, 133-160, in his book Symbolic Neutrosophic Theory, EuropaNova asbl, Clos du Parnasse, 3E 1000, Bruxelles, Belgium, 2015.