Santilli-Jiang Isomathematical theory for changing modern mathematics

Chun-Xuan Jiang

Institute for Basic Research, Palm Harbor, FL34682-1577, USA
And: P. O. Box 3924, Beijing 100854, China
jiangchunxuan@sohu.com, cxjiang@mail.bcf.net.cn, jcxuan@sina.com, Jiangchunxuan@vip.sohu.com

Abstract: We establish the Santilli's isomathematics based on the generalization of the modern mathematics. Isomultiplication $a\hat{\times}a=ab\hat{T}$, isodivision $a\hat{\div}b=\frac{a}{b}\hat{I}$, where $\hat{I}\neq 1$ is called an isounit, $\hat{T}\hat{I}=1$, $\hat{T}$ inverse of isounit. Keeping unchanged addition and subtraction, $(+,-,\hat{\times},\hat{\div})$ are four arithmetic operations in Santilli's isomathematics. Isoaddition $a\hat{+}b=a+b+\hat{0}$, isosubtraction $a\hat{-}b=a-b-\hat{0}$ where $\hat{0}\neq 0$ is called isozero, $(\hat{+},\hat{-},\hat{\times},\hat{\div})$ are four arithmetic operations in Santilli-Jiang isomathematics. We give an example to illustrate the Santilli-Jiang isomathematics.

[Chun-Xuan Jiang. **Santilli-Jiang Isomathematical theory for changing modern mathematics.** *N Y Sci J* 2016;9(1):53-56]. ISSN 1554-0200 (print); ISSN 2375-723X (online). http://www.sciencepub.net/newyork. 9. doi:10.7537/marsnys09011609.

Keywords: Santilli-Jiang; Isomathematical; theory; modern; mathematics

Dedicated to the 30-th anniversary of China reform and opening

Santilli [1] suggests the isomathematics based on the generalization of the multiplication × division ÷ and multiplicative unit 1 in modern mathematics. It is epoch-making discovery. From modern mathematics we establish the foundations of Santilli's isomathematics and Santilli-Jiang isomathematics.

(1) Division and multiplican in modern mathematics.

Suppose that

$$a\div a=a^{0}=1, \tag{1}$$

where 1 is called multiplicative unit, 0 exponential zero.

From (1) we define division ÷ and multiplication ×

$$a\div b=\frac{a}{b}, b\neq 0, a\times b=ab, \tag{2}$$

$$a=a\times(a\div a)=a\times a^{0}=a \tag{3}$$

We study multiplicative unit 1

$$a\times 1=a, a\div 1=a, 1\div a=1/a \tag{4}$$

$$(+1)^{n}=1, (+1)^{a/b}=1, (-1)^{n}=(-1)^{n}, (-1)^{a/b}=(-1)^{a/b} \tag{5}$$

The addition +, subtraction −, multiplication × and division ÷ are four arithmetic operations in modern mathematics which are foundations of modern mathematics. We generalize modern mathematics to establish the foundations of Santilli's isomathematics.

(2) Isodivision and isomultiplication in Santilli's isomathematics.

We define the isodivision $\hat{\div}$ and isomultiplication $\hat{\times}$ [1-5] which are generalization of division ÷ and multiplication × in modern mathematics.

$$a\hat{\div}a=a^{\bar{0}}=\hat{I}\neq 1, \quad \bar{0}\neq 0, \tag{6}$$

where $\hat{I}$ is called isounit which is generalization of multiplicative unit 1, $\overline{0}$ exponential isozero which is generalization of exponential zero.

We have

$$a \hat{\div} b = \hat{I}\frac{a}{b}, b \neq 0, a \hat{\times} b = a\hat{T}b, \tag{7}$$

Suppose that

$$a = a \hat{\times} (a \hat{\div} a) = a \hat{\times} a^{\overline{0}} = a\hat{T}\hat{I} = a. \tag{8}$$

From (8) we have

$$\hat{T}\hat{I} = 1 \tag{9}$$

where $\hat{T}$ is called inverse of isounit $\hat{I}$.

We conjectured [1-5] that (9) is true. Now we prove (9). We study isounit $\hat{I}$

$$a \hat{\times} \hat{I} = a,\ a \hat{\div} \hat{I} = a,\ \hat{I} \hat{\div} a = a^{-\hat{I}} = \hat{I}^2 / a, \tag{10}$$

$$(+\hat{I})^{\hat{n}} = \hat{I}, (+\hat{I})^{\frac{\hat{a}}{\hat{b}}} = \hat{I}, (-\hat{I})^{\hat{n}} = (-1)^n \hat{I}, (-\hat{I})^{\frac{\hat{a}}{\hat{b}}} = (-1)^{\frac{a}{b}} \hat{I} \tag{11}$$

Keeping unchanged addition and subtraction, $(+, -, \hat{\times}, \hat{\div})$ are four arithmetic operations in Santilli's isomathematics, which are foundations of isomathematics. When $\hat{I} = 1$, it is the operations of modern mathematics.

(3) Addition and subtraction in modern mathematics.

We define addition and subtraction

$$x = a + b, \quad y = a - b \tag{12}$$

$$a + a - a = a \tag{13}$$

$$a - a = 0 \tag{14}$$

Using above results we establish isoaddition and isosubtraction

(4) Isoaddition and isosubtraction in Santilli's new isomathematics.

We define isoaddition $\hat{+}$ and isosubtraction $\hat{-}$.

$$a \hat{+} b = a + b + c_1,\ a \hat{-} b = a - b - c_2 \tag{15}$$

$$a = a \hat{+} a \hat{-} a = a + c_1 - c_2 = a \tag{16}$$

From (16) we have

$$c_1 = c_2 \tag{17}$$

Suppose that $c_1 = c_2 = \hat{0}$,

where $\hat{0}$ is called isozero which is generalization of addition and subtraction zero

We have

$$a \hat{+} b = a + b + \hat{0}, \quad a \hat{-} b = a - b - \hat{0} \tag{18}$$

When $\hat{0} = 0$, it is addition and subtraction in modern mathematics.

From above results we obtain foundations of santilli's new isomathematics

$$\hat{\times} = \times\hat{T}\times,\ \hat{+} = +\hat{0}+;\ \hat{\div} = \times\hat{I}\div,\ \hat{-} = -\hat{0}-;\ a \hat{\times} b = ab\hat{T}, a \hat{+} b = a + b + \hat{0};$$

$$a \hat{\div} b = \frac{a}{b}\hat{I}, a \hat{-} b = a - b - \hat{0}; a = a \hat{\times} a \hat{\div} a = a, a = a \hat{+} a \hat{-} a = a;$$

$$a \hat{\times} a = a^2 T, a \hat{+} a = 2a + \hat{0}; a \hat{\div} a = \hat{I} \neq 1, a \hat{-} a = -\hat{0} \neq 0; \hat{T}\hat{I} = 1. \quad (19)$$

$(\hat{+}, \hat{-}, \hat{\times}, \hat{\div})$ are four arithmetic operations in Santilli-Jiang isomathematics.

Remark, $a \hat{\times} (b \hat{+} c) = a \hat{\times} (b + c + \hat{0})$, From left side we have

$a \hat{\times} (b \hat{+} c) = a \hat{\times} b + a \hat{\times} \hat{+} + a \hat{\times} c) = a \hat{\times} (b + \hat{+} + c) = a \hat{\times} (b + \hat{0} + c)$, where $\hat{+} = \hat{0}$ also is a number.

$a \hat{\times} (b \hat{-} c) = a \hat{\times} (b - c - \hat{0})$. From left side we have

$a \hat{\times} (b \hat{-} c) = a \hat{\times} b - a \hat{\times} \hat{-} - a \hat{\times} c) = a \hat{\times} (b - \hat{-} - c) = a \hat{\times} (b - \hat{0} - c)$, where $\hat{-} = \hat{0}$ also is a number.

It is satisfies the distributive laws. Therefore $\hat{+}, \hat{-}, \hat{\times}$ and $\hat{\div}$ also are numbers.

It is the mathematical problems in the 21st century and a new mathematical tool for studying and understanding the law of world.

(5) An Example

We give an example to illustrate the Santilli-Jiang isomathematics.

Suppose that algebraic equation

$$y = a_1 \times (b_1 + c_1) + a_2 \div (b_2 - c_2) \quad (20)$$

We consider that (20) may be represented the mathematical system, physical system, biological system, IT system and another system. (20) may be written as the isomathematical equation

$$\hat{y} = a_1 \hat{\times} (b_1 \hat{+} c_1) \hat{+} a_2 \hat{\div} (b_2 \hat{-} c_2) = a_1 \hat{T}(b_1 + c_1 + \hat{0}) + \hat{0} + a_2 / \hat{T}(b_2 - c_2 - \hat{0}). \quad (21)$$

If $\hat{T} = 1$ and $\hat{0} = 0$, then $y = \hat{y}$.

Let $\hat{T} = 2$ and $\hat{0} = 3$. From (21) we have the isomathematical subequation

$$\hat{y}_1 = 2a_1(b_1 + c_1 + 3) + 3 + a_2 / 2(b_2 - c_2 - 3). \quad (22)$$

Let $\hat{T} = 5$ and $\hat{0} = 6$. From (21) we have the isomathematical subequation

$$\hat{y}_2 = 5a_1(b_1 + c_1 + 6) + 6 + a_2 / 5(b_2 - c_2 - 6). \quad (23)$$

Let $\hat{T} = 8$ and $\hat{0} = 10$. From (21) we have the isomathematical subequation

$$\hat{y}_3 = 8a_1(b_1 + c_1 + 10) + 10 + a_2 / 8(b_2 - c_2 - 10). \quad (24)$$

From (21) we have infinitely many isomathematical subequations. Using (21)-(24), $\hat{T}$ and $\hat{0}$ we study stability and optimum structures of algebraic equation (20).

Acknowledgements

The author would like to express his deepest appreciation to A. Connes, R. M. Santilli, L. Schadeck, G. Weiss and Chen I-Wan for their helps and supports.

References

1. R. M. Santillis, Isonumbers and genonumbers of dimension 1, 2, 4, 8, their isoduals and pseudoduals, and “hidden numbers” of dimension 3, 5, 6, 7, Algebras, Groups and Geometries 10, 273-322 (1993).
2. Chun-Xuan Jiang, Foundations of Santilli’s isonumber theory, Part I: Isonumber theory of the first kind, Algebras, Groups and Geometries, 15, 351-393(1998).
3. Chun-Xuan Jiang, Foundations of Santilli’s isonumber theory, Part II: Isonumber theory of the second kind, Algebras Groups and Geometries, 15,

509-544 (1998).
4. Chun-Xuan Jiang, Foundations of Santilli's isonumber theory. In: Foundamental open problems in sciences at the end of the millennium, T. Gill, K. Liu and E. Trell (Eds) Hadronic Press, USA, 105-139 (1999).
5. Chun-Xuan Jiang, Foundations of Santilli's isonumber theory, with applications to new cryptograms, Fermat's theorem and Goldbach's conjecture, International Academic Press, America- Europe- Asia (2002) (also available in the pdf file http: // www. i-b-r. org/jiang. Pdf)
6. B. Green and T. Tao, The primes contain arbitrarily long arithmetic progressions, Ann. Math., 167,481-547(2008).
7. E. Szemerédi, On sets of integers containing no k elements in arithmetic progression, Acta Arith., 27, 299-345(1975).
8. H. Furstenberg, Ergodic behavior of diagonal measures and a theorem of Szemerédi on arithmetic progressions, J. Analyse Math., 31, 204-256 (1977).
9. W. T. Gowers, A new proof of Szemerédi's theorem, GAFA, 11, 465-588 (2001).
10. B. Kra, The Green-Tao theorem on arithmetic progressions in the primes: an ergodic point of view, Bull. Amer. Math. Soc., 43, 3-23 (2006).

1/24/2016