

# An introduction to the Smarandache n-Structures

Editors

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## 1. Introduction

In any field, a *Smarandache n-structure* on a set  $S$  means a weak structure  $\{w_0\}$  on  $S$  such that there exists a chain of proper subsets  $P_{n-1} < P_{n-2} < \dots < P_2 < P_1 < S$ , where ' $<$ ' means 'included in', whose corresponding structures verify the inverse chain  $\{w_{n-1}\} > \{w_{n-2}\} > \dots > \{w_2\} > \{w_1\} > \{w_0\}$ , where ' $>$ ' signifies 'strictly stronger' (i.e., structure satisfying more axioms).

By *proper subset* of a set  $S$ , we mean a subset  $P$  of  $S$ , different from the empty set, from the original set  $S$ , and from the idempotent elements if any.

And by *structure* on  $S$  we mean the strongest possible structure  $\{w\}$  on  $S$  under the given operation(s).

As a particular case, a *Smarandache 2-algebraic structure* (two levels only of structures in algebra) on a set  $S$ , is a weak structure  $\{w_0\}$  on  $S$  such that there exists a proper subset  $P$  of  $S$ , which is embedded with a stronger structure  $\{w_1\}$ .

## 2. Examples

For example, a Smarandache semigroup is a semigroup that has a proper subset which is a group.

Also, a Smarandache ring is a ring that has a proper subset which is a field.

### 3. Properties

Properties of Smarandache fuzzy semigroups, groupoids, loops, bigroupoids, biloops, rings, birings, vector spaces, semirings, semivector spaces, non-associative semirings, bisemirings, near-rings, non-associative near-ring, binear-rings, fuzzy algebra and linear algebra are presented in the References' books together with examples, solved and unsolved problems, and theorems.

### 4. Applications

Also, applications of Smarandache groupoids, near-rings, and semirings in automaton theory, in error correcting codes, in the construction of S-sub-automaton, in social and economic research can be found in the below e-books.

### 5. Conference

**International Conference on Smarandache Algebraic Structures**, December 17-19, 2004, Loyola College, Madras, Chennai - 600 034 Tamil Nadu, India.

#### **Program of the Conference**

- a) Smarandache type groupoids, semigroups, rings, fields;
- b) Smarandache type k-modules, vector spaces, linear algebra, fuzzy algebra.

**Organizer: Dr. M. Mary John, Head of Department of Mathematics**

#### References:

**Neutrosophic Rings**, by W. B. Vasantha Kandasamy, F. Smarandache, Hexis, 2006.

**N-Algebraic Structures**, by W. B. Vasantha Kandasamy, F. Smarandache, 2005.

**Introduction to N-Adaptive Fuzzy Models to Analyze Public Opinion on AIDS**, by W. B. Vasantha Kandasamy, F. Smarandache, 2005.

Smarandache Algebraic Structures, book series by W. B. Vasantha Kandasamy: (**Vol. I: Groupoids**; **Vol. II: Semigroups**; **Vol. III: Semirings, Semifields, and Semivector Spaces**; **Vol. IV: Loops**; **Vol. V: Rings**; **Vol. VI:**

Near-rings; Vol. VII: Non-associative Rings; Vol. VIII: Bialgebraic Structures; Vol. IX: Fuzzy Algebra; Vol. X: Linear Algebra), 2002-2003.

**These books can be downloaded from the following Digital Library of Science:**

[www.gallup.unm.edu/~smarandache/eBooks-otherformats.htm](http://www.gallup.unm.edu/~smarandache/eBooks-otherformats.htm)