Fusaris: The Study of Fusion-like Processes in Abstract Mathematics

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Abstract

Fusaris is a newly proposed field in mathematics focusing on fusion-like processes and their implications in abstract mathematics. This field aims to explore the amalgamation of mathematical structures, properties, and operations to form new, unified entities with distinct characteristics. The study encompasses the theory, applications, and computational aspects of fusion processes in various mathematical contexts.

1 Introduction

Fusaris explores the fusion of mathematical objects to form new entities. This paper introduces the fundamental notations and operations in Fusaris, providing a rigorous foundation for further study.

2 New Mathematical Notations and Formulas

2.1 Fusion Operator ($\mathcal{F}$)

The fusion operator $\mathcal{F}$ represents the process of combining two or more mathematical objects into a new entity:

$$\mathcal{F} : \mathcal{A} \times \mathcal{B} \to \mathcal{C}$$

where $\mathcal{A}$, $\mathcal{B}$, and $\mathcal{C}$ are mathematical structures.

2.2 Fusion Algebra ($\mathbb{F}$)

Fusion algebra $\mathbb{F}$ is a set equipped with a fusion operation that combines elements within the set:

$$\mathbb{F} = \{x \in \mathbb{F} \mid \forall x, y \in \mathbb{F}, \mathcal{F}(x, y) \in \mathbb{F}\}$$

2.3 Fusion Product ($*$)

The fusion product $*$ is defined as the result of the fusion operator applied to two elements:

$$a * b = \mathcal{F}(a, b), \quad \forall a, b \in \mathbb{F}$$

2.4 Fusion Space ($\mathcal{F}^n$)

Fusion space $\mathcal{F}^n$ is an n-dimensional vector space where the fusion product is defined for vectors:

$$\mathcal{F}^n = \{(x_1, x_2, \ldots, x_n) \mid x_i \in \mathbb{F}, \forall i \in \{1, 2, \ldots, n\}\}$$

2.5 Fusion Matrix (F)

A fusion matrix $\mathbf{F}$ represents the fusion interactions between elements in a set:

$$\mathbf{F}_{ij} = \mathcal{F}(a_i, b_j), \quad \forall a_i, b_j \in \mathbb{F}$$

2.6 Fusion Tensor ($\mathcal{T}$)

A fusion tensor $\mathcal{T}$ generalizes the fusion product to higher dimensions:

$$\mathcal{T}_{i_1 i_2 \cdots i_n} = \mathcal{F}(a_{i_1}, a_{i_2}, \ldots, a_{i_n}), \quad \forall a_{i_k} \in \mathbb{F}, k \in \{1, 2, \ldots, n\}$$

2.7 Fusion Homomorphism ($\phi_{\mathcal{F}}$)

A fusion homomorphism is a structure-preserving map between two fusion algebras:

$$\phi_{\mathcal{F}} : \mathbb{F}_1 \to \mathbb{F}_2, \quad \text{such that} \quad \phi_{\mathcal{F}}(a * b) = \phi_{\mathcal{F}}(a) * \phi_{\mathcal{F}}(b)$$

2.8 Fusion Derivative ($\mathcal{D}_{\mathcal{F}}$)

The fusion derivative measures the rate of change in a fusion process:

$$\mathcal{D}_{\mathcal{F}}(f) = \lim_{\epsilon \to 0} \frac{\mathcal{F}(f, \epsilon) - f}{\epsilon}$$

2.9 Fusion Integral ($\int_{\mathcal{F}}$)

The fusion integral aggregates the effect of continuous fusion processes:

$$\int_{\mathcal{F}} f(x) \, d_{\mathcal{F}} x = \lim_{\Delta x \to 0} \sum_i \mathcal{F}(f(x_i), \Delta x_i)$$

2.10 Fusion Equation ($\mathcal{E}_{\mathcal{F}}$)

A fusion equation is an equation involving fusion products and operations:

$$\mathcal{E}_{\mathcal{F}}(x) = \mathcal{F}(x, y) + \mathcal{D}_{\mathcal{F}}(x) - \int_{\mathcal{F}} g(x) \, d_{\mathcal{F}} x = 0$$

3 Example Applications

3.1 Fusion of Functions

Given two functions f and g, their fusion can be defined as:

$$(f * g)(x) = \mathcal{F}(f(x), g(x))$$

3.2 Fusion in Geometry

In geometric contexts, fusion can describe the combination of shapes or spaces to form new geometric entities:

$$\mathcal{F}(\mathcal{S}_1, \mathcal{S}_2) = \mathcal{S}_3$$

where $\mathcal{S}_1, \mathcal{S}_2, \mathcal{S}_3$ are geometric shapes or spaces.

3.3 Fusion in Topology

Fusion can be applied to topological spaces to explore the properties of combined spaces:

$$\mathcal{F}(\mathcal{T}_1, \mathcal{T}_2) = \mathcal{T}_3$$

where $\mathcal{T}_1, \mathcal{T}_2, \mathcal{T}_3$ are topological spaces.

These notations and formulas establish a foundation for the rigorous development of Fusaris, opening avenues for further research and applications in abstract mathematics.

4 Conclusion

The introduction of Fusaris as a new mathematical field provides a novel framework for exploring fusion-like processes. The notations and formulas presented lay the groundwork for future studies and applications.

References

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