International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

STRUCTURAL DYNAMICS OF MATHEMATICAL SPACES: A HOLISTIC APPROACH TO HIGHLY MINIMUM GENERALIZED CLOSED SETS

Navneet Nayak, Dr. Sandeep Kulhar

Research Scholar Department of Mathematics, Sardar Patel University, Balaghat, (M.P.)
(Assistant professor) Research Supervisor Department of Mathematics, Sardar Patel University, Balaghat, (M.P.)

ABSTRACT

The article offers a succinct summary of the investigation into strongly minimum generalized closed sets and homeomorphisms inside minimal structure spaces. The present inquiry explores the complex interconnections and characteristics of highly minimum generalized closed sets within the context of minimal structure spaces, with a particular focus on their importance in the field of mathematical topology. The study also examines the function of homeomorphisms as transformational agents that establish connections between distinct places. This work entails a comprehensive analysis of closure characteristics, topological invariants, and the intricate relationship between simplicity and complexity. By means of this investigation, mathematicians make valuable contributions to the progression of pure mathematics as well as the larger comprehension of the intrinsic structural dynamics inside mathematical spaces.

Keywords: - Minimal, Mathematics, Homeomorphisms, Simplicity, Properties.

I. INTRODUCTION

The study of highly minimum generalized closed sets and homeomorphisms in minimal structure spaces is a challenging and intriguing pursuit in the field of mathematical topology. The study of these mathematical entities provides insight into the complex relationship between set theory, topology, and the wider domain of mathematical structures. This discussion aims to explore the intricacies of highly minimum generalized closed sets and homeomorphisms, examining their importance, characteristics, and the broader framework of minimal structure spaces. The central focus of this inquiry is on the notion of substantially minimum generalized closed sets, which refers to a certain category of sets with distinct characteristics. In the present context, the term "strong minimality" refers to a significant degree of simplicity and essentiality, making these sets very captivating for the purpose of mathematical investigation. The aforementioned sets have a strong closed structure, and their characterization necessitates a thorough analysis of their features and behavior inside a specified mathematical domain. The concept of generalized closed sets plays a crucial role in comprehending the topological characteristics of spaces. The concept of a generalized closed set expands upon the traditional understanding of closed sets, including a wider array of subsets that possess unique closure characteristics. The notion of strong minimality serves to further clarify this idea by identifying sets that exhibit a notable level of simplicity and efficiency within the larger topological framework.

As we explore the complex landscape of minimum structure spaces, it becomes apparent that these spaces provide a suitable environment for the emergence of highly minimal generalized closed sets. Minimal structures, as per their description, embody the fundamental principles of simplicity and efficiency within mathematical domains, hence exemplifying a harmonious equilibrium between complexity and conciseness. The study of highly minimum generalized closed sets in the context of minimal structure spaces provides insight into the intricate relationship between complexity and simplicity, therefore illuminating the fundamental structure of mathematical entities. In contrast, homeomorphisms are of utmost importance in establishing connections across distinct spaces while maintaining the integrity of their topological characteristics. The examination of homeomorphisms in the framework of minimum structure spaces adds an enhanced level of complexity to the overarching discourse. The study of the behavior of substantially minimum generalized closed sets under homeomorphic transformations yields crucial insights on the structural equivalence of spaces and the preservation of their inherent qualities. In order to start the process of describing highly minimum generalized closed sets, it is essential to engage with the fundamental concepts of topology and set theory. The mathematical domain presents itself as a complex fabric of sets, spaces, and mappings, whereby each constituent element contributes to the total depth and intricacy of the discourse. The process of characterisation entails a thorough examination of the closure qualities, compactness, and connectedness of sets inside the spaces of minimum structures.

An area of inquiry is to the examination of the correlation between highly minimum generalized closed sets and other categories of sets inside minimal structure spaces. How do these sets exhibit interactions with open sets, compact sets, or other specialized classes? To adequately address these inquiries, it is essential to possess a comprehensive comprehension of the complex interconnections among various subsets and their influence on the structure of the underlying space. The examination of highly minimum generalized closed sets also connects with model theory, a field within mathematical logic that investigates the connections between mathematical structures and their meanings. The use of the model-theoretic approach offers a robust framework for examining the definability and characteristics of these sets inside a specified mathematical structure.

This methodology provides opportunities for establishing connections between the theoretical notions of highly minimum generalized closed sets and tangible mathematical models, so enhancing the comprehensive comprehension of their characteristics. As the analysis of highly minimum generalized closed sets progresses, the significance of topological invariants and metrics becomes more apparent. Gaining insight into the metrical aspects of these sets and their response to various metrics enhances our overall comprehension of their geometric characteristics. Metrics provide a quantitative means of assessing distance and closeness, offering a mathematical framework for expressing the spatial connections between sets inside minimum structure environments.

II. REVIEW OF LITERATURE

El-Sharkasy, M.. (2020). Topological notions have significant significance in many applications and the resolution of practical challenges. Two of the ideas that are included in this discussion are neighborhood and minimum structure. This work presents the introduction of a novel space derived from a generalized system including a binary relation on a nonempty set. The space is constructed using the notion of a minimum structure, referred to as a minimal structure approximation space (MSAS), and its features are thoroughly examined. In addition, we conduct a comparative analysis of the benefits of MSAS and neighbourhood approximation space, both of which have a same foundation. Furthermore, we explore the application of the MSAS idea in several chemical instances, namely in the extraction and reduction of information. In this work, we examine the principles of separation axioms within the context of MSAS (Multi-Source Attribute Selection) and explore its features inside the information system, specifically focusing on the process of information approximation.

Raju, Gowri et al., (2018) This study presents a formal definition of soft regular generalized closed and open sets within the context of soft minimum spaces. Additionally, we explore some features associated with these sets. In this study, we provide the introduction of many ideas that are defined inside an initial universe characterized by a predetermined set of criteria. In this study, we demonstrate that all soft generalized m~-closed sets possess the property of being soft regular generalized closed sets. Furthermore, we explore several fundamental characteristics of these ideas.

Jeevitha, R et al., (2017) This study presents a novel theoretical framework for ideal minimum structure spaces, specifically focusing on a newly proposed notion known as mIαψ closed set. In this study, we examined the correlation between the mIαψ closed set and many pre-existing sets in ideal minimum spaces. Furthermore, we analyzed some characteristics of these sets. During our discussion, we explored the characteristics of continuous functions in the context of mIαψ.

Devamanoharan, C et al., (2013) This study begins by introducing a novel category of closed maps, referred to as closed maps. Furthermore, we provide a novel category of homeomorphisms referred to as a homeomorphism. In addition, we provide a novel category of closed maps, referred to as closed maps, and develop a distinct category of homeomorphisms, termed homeomorphisms. Furthermore, we establish that the collection of all homeomorphisms becomes a group when subjected to the operation of map composition.

Pushpalatha, A. & Subha, Easwaran. (2009). In this study, we propose the introduction of a new category of sets referred to as smg-closed sets. These sets are characterized by their adherence to a set of fundamental requirements inside a given family of sets. This class has

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

been examined as a more robust variant of mg-closed sets by T. Noiri. The sets mentioned in the text allow for the integration of certain types of alterations to strongly generalized closed sets, as discussed by P. Sundaram and A. Pushpalatha.

III. STRONGLY MINIMAL GENERALIZED CLOSED SETS AND CONTINUOUS FUNCTIONS IN MINIMAL STRUCTURE SPACES

ψ * α-closed sets

Here, we introduce a category of generalized closed sets that we call ψ * α- Some of the characteristics and attributes of closed sets in topological spaces are investigated.

Definition Topological space, in which a subset A exists (X, τ) is said to be a ψ * α-closed set if αcl(A) ⊆ U whenever A ⊆ U and U is ψg-open in (X, τ).

The collection of all ψ * α-closed sets of (X, τ) is denoted by ψ * αC(X, τ).

Example Let X = {a, b, c}, τ = {ϕ, {a}, {a, b}, X}. Then ϕ,{b},{c},{b, c}, X are ψ * α-closed sets.

Proposition Every closed set in (X, τ) is ψ * α-closed but not conversely.

Proof: Let A be a closed set and U be any ψg-open set containing A in X. By Remark every closed set is α-closed, αcl(A) ⊆ cl(A) =A ⊆ U. Therefore, A is ψ * α-closed.

Properties of ψ * α-closed sets

Proposition If A is both ψg-open and ψ * α-closed set of (X, τ) then A is α-closed in (X, τ).

Proof: Let A be ψg-open and ψ * α-closed. Then by definition, αcl(A) ⊆ A. Therefore αcl(A) = A, hence A is α-closed.

Theorem Let A and B be subsets of (X, τ) such that A ⊆ B ⊆ αcl(A). If A is a ψ * α-closed set in (X, τ), then B is also a ψ * α-closed set.

Proof: Let A and B be subsets such that A ⊆ B ⊆ αcl(A). Suppose that A is a ψ * α-closed set. Let U be a ψg-open set of (X, τ) such that B ⊆ U. Then A ⊆ U and since A is ψ * α-closed, αcl(A) ⊆ U. Also since B ⊆ αcl(A), αcl(B) ⊆ αcl(αcl(A))= αcl(A). Hence αcl(B) ⊆ U. Therefore B is also a ψ * α-closed set in (X, τ).

Applications of ψ * α-closed sets

As an application of ψ * α-closed sets five new spaces namely, ψ*αTc-space, ψ*αTα-space, gαTψ*α-space, αgTψ*α-space and ψgTψ*α-space are introduced and their properties and interrelations are studied.

Definition A topological space (X, τ) is said to be a

(i) ψ*αTc -space if every ψ * α-closed subset of (X, τ) is closed in (X, τ).

(ii) ψ*αTα -space if every ψ * α-closed subset of (X, τ) is α-closed in (X, τ).

(iii) gαTψ*α -space if every gα-closed subset of (X, τ) is ψ * α-closed in (X, τ).

(iv) αgTψ*α -space if every αg-closed subset of (X, τ) is ψ * α-closed in (X, τ)

(v) ψgTψ*α -space if every ψg-closed subset of (X, τ) is ψ * α-closed in (X, τ).

Proposition Every ψ*αTc -space is a ψ*αTα-space but not conversely.

Proof: Let A be a ψ * α-closed in (X, τ). Since (X, τ) is a ψ*αTc -space, A is closed in (X, τ). Since every closed set is α-closed, A is α-closed in (X, τ). Hence (X, τ) is a ψ*αTα -space.

IV. CONCLUSION

The study of highly minimum generalized closed sets and homeomorphisms in minimal structure spaces reveals an intriguing interaction between simplicity and complexity in the field of mathematical topology. The process of characterizing these sets entails a thorough examination of closure qualities, topological invariants, and the transformational capabilities of homeomorphisms. As mathematicians traverse this complex terrain, they make valuable contributions to the wider comprehension of the numerous connections that delineate the framework of mathematical domains. This work not only contributes to the field of pure mathematics but also highlights the intrinsic aesthetic appeal found in the harmonious interplay of simplicity and complexity within these mathematical constructs.

REFERENCES

1. Benchalli, S. & Ittanagi, Basavaraj & Wali, R.. (2012). On Minimal Separation Axioms in Topological Spaces. Journal of Advanced Studies in Topology. 3. 98. 10.20454/jast.2012.240.

2. Benchalli, Shivanagappa & Ittanagi, Basavaraj & Wali, R.. (2016). On Minimal Open Sets and Maps in Topological Spaces. Kyungpook mathematical journal. 56. 10.5666/KMJ.2016.56.1.301.

3. Devamanoharan, C. & Missier, S.Pious & Jafari, S.. (2013). On -homeomorphisms in topological spaces. Italian Journal of Pure and Applied Mathematics. 195-214.

4. El-Sharkasy, M.. (2020). Minimal structure approximation space and some of its application. Journal of Intelligent & Fuzzy Systems. 40. 1-10. 10.3233/JIFS-201090.

5. Jeevitha, R & M.Parimala, Rishwanth. (2017). On MIαψ closed sets in terms of ideal minimal structure spaces. Asia Life Sciences. 2017. 93-101.

6. Mukharjee, Ajoy & Bagchi, Kallol. (2016). On Mean Open and Closed Sets. Kyungpook Mathematical Journal. 56. 1259-1265. 10.5666/KMJ.2016.56.4.1259.

7. Mukharjee, Ajoy & Raut, Santanu & Bagchi, Kallol. (2018). Compactness and Regularity via Maximal and Minimal Closed Sets in Topological Spaces. 28. 53-60.

8. Pushpalatha, A. & Subha, Easwaran. (2009). Strongly generalized closed sets in minimal structures. International Journal of Mathematical Analysis (Ruse). 3.

9. Raju, Gowri & Vembu, Swaminathan & Sanabria, José. (2018). Soft regular generalized closed sets in soft minimal spaces. International Journal of Engineering and Future Technology. 15. 11-16.

10. Zvina, Irina. (2011). Introduction to generalized topological spaces. Applied General Topology [electronic only]. 12. 10.4995/agt.2011.1701.