Journal of Interdisciplinary Mathematics
ISSN: 0972-0502 (Print), ISSN: 2169-012X (Online)
Vol. 27 (2024), No. 4, pp. 745–752
DOI : 10.47974/JIM-1764

Fibrewise locally micro sliceable and fibrewise locally micro-section able micro-topological space

Esraa A. Dawood *
Y. Y. Yousif †
Department of Mathematics
College of Education for Pure Sciences (Ibn Al-Haitham)
University of Baghdad
Baghdad
Iraq

Abstract

The primary objective of this research be to develop a novel thought of fibrewise micro—topological spaces over B. We present the notions from fibrewise micro closed, fibrewise micro open, fibrewise locally micro sliceable, and fibrewise locally micro-section able micro topological spaces over B. Moreover, we define these concepts and back them up with proof and some micro topological characteristics connected to these ideas, including studies and fibrewise locally micro sliceable and fibrewise locally micro-section able micro topological spaces, making it ideal for applications where high-performance processing is needed. This paper will explore the features and benefits of fibrewise locally micro-sliceable and fibrewise locally micro-section able micro, topological spaces therein detail, and providing a clear understanding.

Subject Classification: *(2020) 54C10.*

Keywords: *Fibrewise micro, Topological spaces, Fibrewise locally micro sliceable, Fibrewise locally micro sectionable.*

1. Introduction and Preliminaries

As a beginning point in the fibrewise categorization, indicated via the symbol (Ƒ.ƓƊ.), sets across the provided set known as the fundamental set. If Ƀ indicates the fundamental set, after that Ƒ.ƓƊ set over Ƀ includes from set Ɲ, and

---

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

* *E-mail:* **israa.abd2103m@ihcoedu.uobaghdad.edu.iq (Corresponding Author)**
† *E-mail:* **yousif.y.y@ihcoedu.uobaghdad.edu.iq**

the function $\wp$: Ɲ → Ƀ known as a projection[1]–[4]. At each point b from Ƀ, a fiber over b is a subset $Ɲ_b = \wp^{-1}(b)$ from Ɲ. As surjectivity is not necessary, fibers might be empty, thus for any subset Ƀ* of Ƀ we regard $Ɲ_{Ƀ^*} = \wp^{-1}(Ƀ^*)$[5], [6], or in the other words $Ɲ_{Ƀ^*} = \wp^{-1}(Ƀ^*) = Ɲ|Ƀ^*$ being the Ƒ.Ꞷ set over Ƀ* with determined by a projection via $\wp$.

Definition 1.1: [7] Assume that Ʉ is a finite, non-empty set referred to as the universe, and consider Ʀ is an indiscernibility relation on Ʉ. Ʉ is separated into many equivalence classes. An element is given a name. If they belong to the same equivalence class, they are indistinguishable. An approximated space is a pair (Ʉ, Ʀ). Consider W to be a subset of Ʉ.

I. Lower approximation from Ʉ to Ʀ is the set of all objects that are very certainly classed as W about Ʀ, which is denoted by $\mathcal{L}_Ʀ(W)$, which be $\mathcal{L}_Ʀ(W) = \cup_{w \in Ʉ}\{Ʀ(w): Ʀ(w) \subseteq W\}$, where Ʀ(w) the equivalent group established via w ∈ Ʉ.
II. The upper approximation from Ʉ to Ʀ is the set from all objects that may be categorized while W about Ʀ, which be denoted via $Ʋ_Ʀ(W)$. In other words, $Ʋ_Ʀ(W) = \cup_{w \in Ʉ}\{Ʀ(w): Ʀ(w) \cap W \neq \emptyset\}$.

The boundary area of Ʉ about Ʀ is a set of all objects that cannot be categorized, such as W or as if W did not exist about Ʀ, which is indicated via $\beta_Ʀ(W)$. In other words, $\beta_Ʀ(W) = Ʋ_Ʀ(W) - \mathcal{L}_Ʀ(W)$.

Definition 1.2: [7] Suppose that Ʉ be the universe set, Ʀ a relation of equivalence on Ʉ, and $\mathcal{T}_Ʀ(W) = \{Ʉ, \emptyset, \beta_Ʀ(W), Ʋ_Ʀ(W), \mathcal{L}_Ʀ(W)\}$, where W ⊆ Ʉ conforms to the following axioms:

I. $Ʉ, \emptyset \in \mathcal{T}_Ʀ(W)$
II. Intersection from the elements from any finite subcollection from $\mathcal{T}_Ʀ(W)$ be in $\mathcal{T}_Ʀ(W)$.
III. Union from the elements from any subcollection from $\mathcal{T}_Ʀ(W)$ be in $\mathcal{T}_Ʀ(W)$.

As a consequence of this, nano topology on Ʉ concerning W be known, while $\mathcal{T}_Ʀ(W)$. The elements from $\mathcal{T}_Ʀ(W)$ are referred to as nano open sets, and the space $(Ʉ, \mathcal{T}_Ʀ(W))$ is a nano topological space.

Definition 1.3: [7], [8] Let $(Ʉ, \mathcal{T}_Ʀ(W))$ be nano topological space, and the family $m_Ʀ(W) = \{\mathcal{N} \cup (\mathcal{N}' \cap m): \mathcal{N}, \mathcal{N}' \in \mathcal{T}_Ʀ(W), m \notin \mathcal{T}_Ʀ(W)\}$ be micro.topological space on Ʉ with respect to W, which be indicated via the symbol (m.Ŧ.ς).

Definition 1.4: [9] The m.Ŧ.ς adheres to the following hypotheses:

I. $Ʉ, \emptyset \in m_Ʀ(W)$

II. The intersection of the elements from any finite sub-collection from $m_{R}(W)$ be in $m_{R}(W)$

III. Union of the elements from each sub-collection of $m_{R}(W)$ be in $m_{R}(W)$.

The m.Ŧ.ς be defined as a triplet (Ʉ, $\mathcal{T}_{R}(W)$, $m_{R}(W)$). Each member from $m_{R}(W)$ be referred to as a micro-open, indicated via the symbol (m.open). The complement to the m.open set is also known as the m.closed set.

Definition 1.5: [10], [11] Assume that $\mathcal{H}$ and $\mathcal{Y}$ are m.Ŧ.ς,s, the function φ: $\mathcal{H} \to \mathcal{Y}$ is stated to be m.continuous if, at any element h ∈ $\mathcal{H}$, inverse image of any m.open set from φ(h) be m.open set of h.

Definition 1.6: [5], [12,13] Consider Ƀ is the topological space, the Ƒ.Ꭶ. topology on Ƒ.Ꭶ. set Ɲ over Ƀ, with the intention of all topology on Ɲ at as the projection ℘ be continuous.

2. Fibrewise Locally Micro Sliceable and Fibrewise Locally Micro-section Micro-Topological Space

This section includes study generalizations that are Ƒ.Ꭶ. locally micro-sliceable and Ƒ.Ꭶ. locally micro.sectionable micro topological space over Ƀ. These concepts and some related topological properties are examined.

Definition 2.1: A Ƒ.Ꭶ.m.Ŧ.ς Ɲ over Ƀ is referred to as locally micro.sliceable which is represented via the symbol ($\mathcal{L}$.m.δ) if for any point η ∈ $Ɲ_{b}$; b ∈ Ƀ, there exist a m.open set $\dot{W}$ of b, and section $\delta:\dot{W} \longrightarrow Ɲ_{\dot{W}}$; δ(b) = η.

The criterion indicates that ℘ be m.open, if Ʊ be m.open set from η in Ɲ, thereafter $\delta^{-1}(Ɲ_{\dot{W}} \cap Ʊ) \subseteq ℘(Ʊ)$ be m.open set from b in $\dot{W}$ as well as in Ƀ. It is finitely multiplicative to classify m.Ŧ.ς as $\mathcal{L}$.m.δ.

Example 2.2: Suppose that Ʉ = {r, j, k}, Ʉ/Ʀ = {{j}, {r, k}, $\mathcal{H}$ = {r} ⊆ Ʉ. The $\mathcal{T}_{R}(\mathcal{H})$ = {Ʉ, ϕ, {r}}, let m = {r, k} ∉ $\mathcal{T}_{R}(\mathcal{H})$. Then $m_{R}(\mathcal{H})$ = {{j}, {r, k}, Ʉ, ϕ}. Let Ƀ = {c, n}, Ƀ/Ʀ = {{n}, {c}}, ϑ = {n} ⊆ Ƀ, then $\mathcal{T}_{R}(\vartheta)$ = {Ƀ, ϕ, {n}}, then m = {c} ∉ $\acute{\mathcal{T}}_{R}(\vartheta)$. Then $m_{R}(\vartheta)$ = {Ƀ, ϕ, {c}, {c, n}}. Define a projection ℘: Ʉ → Ƀ; ℘ (r) = ℘(k) = n, ℘(j) = c. We now have $Ʉ_{c}$ = {j}, $Ʉ_{n}$ = {r, k}. Let δ_{j}:{c} ⟶ {j }; δ(c) = j, δ_{k}:{n} ⟶ {k, r}; δ(n) = {r, k}. Hence, Ʉ be a Ƒ.Ꭶ.$\mathcal{L}$.m.δ.

Remark 2.3: Each Ƒ.Ꭶ.$\mathcal{L}$.m.δ be Ƒ.Ꭶ.m.open (resp., m.closed).

Proof: It is clear of Define (2.1).

An inverse from Remark (2.3) does not have to be correct in all cases.

Example 2.4: Suppose that Ʉ = {q, r, t, p}, Ʉ/Ʀ = {{r}, {p}, {q, t}}, $\mathcal{H}$ = {t, p} ⊆ Ʉ. The $\mathcal{T}_{R}(\mathcal{H})$ = {Ʉ, ϕ, {r}, {t, p}}, let m = {t} ∉ $\mathcal{T}_{R}(\mathcal{H})$. Then $m_{R}(\mathcal{H})$ = {{t}, {t, p}, {p}, {q, t, p}, {q, t}, Ʉ, ϕ}. Let Ƀ = {c, b, n, h}, Ƀ/Ʀ = {{b}, {h}, {c, n}}, ϑ = {n, h} ⊆ Ƀ, then $\mathcal{T}_{Ɽ}(ϑ)$ = {Ƀ, ϕ, {b}, {n, h}}, then m = {n} ∉ $\acute{\mathcal{T}}_{Ɽ}(ϑ)$. Then $m_{Ɽ}(ϑ)$ = {Ƀ, ϕ, {n}, {n, h}, {h}, {c, n, h}, {c, n}}. Define a projection ℘: Ʉ → Ƀ; ℘ (q) = c, ℘(r) = b, ℘(t) = n, ℘(p) = h. then ℘ be m.open set in Ʉ, but not $\mathcal{L}$.m.δ, since $Ʉ_b$ = {r}; δ(b) = {r}. Hence Ʉ is not Ƒ.Ꮚ.$\mathcal{L}$.m.δ.

For the class from Ƒ.Ꮚ.$\mathcal{L}$.m.δ.m.Ŧ.ς, it has a finite multiplicative.

Proposition 2.5: Let $\{Ɲ_i\}_{i=1}^{n}$ be finite family of $\mathcal{L}$.m.δ.m.Ŧ.ς over Ƀ. The Ƒ.Ꮚ.m.Ŧ product Ɲ = $\prod_{Ƀ}(Ɲ_i)$ be $\mathcal{L}$.m.δ.

Proof: Assume that η = ($η_i$) is a point from $Ɲ_b$, b ∈ Ƀ, as well as $η_i = \prod_i(η)$ for each index i. Because $Ɲ_i$ be $\mathcal{L}$.m.δ.m.Ŧ.ς; there be m.open set $\dot{W}_i$ from b, and section $δ_i:\dot{W}_i \to Ɲ_i|\dot{W}_i$, where $δ_i(b) = η_i$, then the intersection $\dot{W} = \dot{W}_1 \cap \dot{W}_2 \cap \ldots \cap \dot{W}_n$ be m.open set from b, and section δ: $\dot{W} \longrightarrow Ɲ_{\dot{W}}$ is provided via (Π_i o δ)($\dot{W}$) = $δ_i(\dot{W})$ for each index i, and each point w ∈ $\dot{W}$, then Ɲ be $\mathcal{L}$.m.δ.m.Ŧ.ς.

Proposition 2.6: Consider λ : Ɲ → Q be a m.continuous Ƒ.Ꮚ. surjection, when Ɲ and Q are Ƒ.Ꮚ.m.Ŧ.ς,s over Ƀ. If Ɲ be $\mathcal{L}$.m.δ then Q also be $\mathcal{L}$.m.δ.

Proof: Suppose q ∈ Q_b such that b ∈ Ƀ, thereafter λ(η) = q, for some η ∈ $Ɲ_b$. If Ɲ be a $\mathcal{L}$.m.δ, afterward, there be a m.open set $\dot{W}$ from b, and section δ: $\dot{W} \longrightarrow Ɲ_{\dot{W}}$; δ(b) = η. Afterward λ o δ: $\dot{W} \longrightarrow Q_{\dot{W}}$ be section; δ(b) = q. Hence, Q is $\mathcal{L}$.m.δ.

Definition 2.7: Assume that Ɲ be Ƒ.Ꮚ.m.Ŧ.ς over Ƀ, is referred to as Ƒ.Ꮚ micro. discrete, indicated via the symbol (Ƒ.Ꮚ.m.Ꝺ), when the projection ℘ is local.m.homeomorphism. The projection ℘: Ɲ ⟶ Ƀ is $\mathcal{L}$.m.homeomorphism (it means that ℘ is one-to-one, m.continuous, $℘^{-1}$ be m.continuous, and m.open).

Example 2.8: Consider Ʊ = {a, b, c}, Ʊ/Ɽ = {{b, c}, {a}}, $\mathcal{H}$ = {a, b} ⊆ Ʊ. The $\mathcal{T}_{Ɽ}(\mathcal{H})$ = {Ʊ, ϕ, {a}}, then m = {b} ∉ $\mathcal{T}_{Ɽ}(\mathcal{H})$. Then $m_{Ɽ}(\mathcal{H})$ = {ϕ, {a}, {b}, {a, b}, Ʊ}. Let Ƀ = {g, h, j}, Ƀ/Ɽ = {{h, j}, {g}}, ϑ = {g, h} ⊆ Ƀ, then $\acute{\mathcal{T}}_{Ɽ}(\vartheta)$ ={{g}, Ƀ , ϕ}, then ḿ = {h} ∉ $\acute{\mathcal{T}}_{Ɽ}(\vartheta)$. Then $\acute{m}_{Ɽ}(\vartheta)$ = {Ƀ, ϕ, {g, h}, {h}, {g}}. Define a projection ℘: Ʊ→ Ƀ; ℘ (a) = g, ℘(b) = h, ℘(c) = j. Let $\dot{W}$ = {g} subset of Ƀ, and section $δ_g$:{g}⟶ {a}; $δ_g$(g) = a. Afterward, ℘ be m.local homeomorphism, and Ʊ be Ƒ.Ꮚ.m.Ꝺ. Hence, ℘ be $\mathcal{L}$.m.homeomorphism, also Ʉ be Ƒ.Ꮚ.m.Ꝺ.

Remark 2.9: Suppose that Ɲ is a Ƒ.Ꮚ.m.Ŧ.ς over Ƀ, if Ɲ be Ƒ.Ꮚ.m.Ꝺ.m.Ŧ.ς, then Ɲ a $\mathcal{L}$.m.δ, and m.open.

The m.discrete m.Ŧ.ς,s in a class of Ƒ.Ꮚ are finitely multiplicative.

Proposition 2.10: Let $\{Ɲ_i\}_{i=1}^{n}$ be finite family of Ƒ.Ꮚ.m.Ꝺ.m.Ŧ.ς,s over Ƀ. Thereafter Ƒ.Ꮚ.m.Ŧ product Ɲ = $\prod_{Ƀ}(Ɲ_i)$ be a Ƒ.Ꮚ.m.Ꝺ.

Proof: Consider η be a point in Ɲ, when η ∈ $Ɲ_b$; b ∈ Ƀ, so there is at any index i, the m.open set $Ʊ_i$ from $\prod_i(η)$ in $Ɲ_i$, when the projection $℘_i = ℘ \, o\prod_i$ maps $Ʊ_i$ m.homomorphically onto m.open $℘_i(Ʊ_i) = \dot{W}_i$ from b, thereafter a m.open $\prod_{Ƀ}(Ʊ_i)$ of η be m.homomorphically mapped onto intersection $\dot{W} = \cap \dot{W}_i$ where is an m.open from b, thereafter $Ɲ = \prod_{Ƀ}(Ɲ_i)$ be the Ƒ.Ꞷ.m.Ꝗ.

The following Proposition provides an appealing characterization of Ƒ.Ꞷ.m.Ꝗ.m.Ŧ.ς,s.

Proposition 2.11: If Ɲ be a Ƒ.Ꞷ.m.Ŧ.ς over Ƀ, after that Ɲ be a Ƒ.Ꞷ.m.Ꝗ, if and only if:

I. Ɲ be Ƒ.Ꞷ.m.open .

II. A diagonal embedding Д: Ɲ → Ɲ $\times_{Ƀ}$ Ɲ is a m.open.

Proof: **(Part if)** Let Ɲ be a Ƒ.Ꞷ.m.Ꝗ, by Remark (2.9) Ɲ be Ƒ.Ꞷ.m.open. To demonstrate that Д be m.open, such that, Д (Ɲ) is m.open in Ɲ $\times_{Ƀ}$ Ɲ.

Suppose that η ∈ $Ɲ_b$; b ∈ Ƀ, so let Ʊ is m.open set from η in Ɲ, when $\dot{W}$ = ℘(Ʊ) be m.open set of b ∈ Ƀ, and ℘ is map Ʊ m.homomorphically onto $\dot{W}$, thereafter Ʊ $\times_{Ƀ}$ Ʊ be included in Д(Ɲ) as if not, thereafter they are distinct ẽ, ẽ* ∈ $Ɲ_{\dot{W}}$, when w ∈ $Ɲ_{\dot{W}}$, ẽ and ề ∈ Ʊ, inconsistency!!, therefore Д(Ɲ) must be m.open, then Д is m.open.

(Part only if) Consider (I) and (II) are validated. Let Ɲ a Ƒ.Ꞷ.m.open, and a diagonal embedding Д: Ɲ → Ɲ $\times_{Ƀ}$ Ɲ such that η ∈ $Ɲ_b$; b ∈ Ƀ, thereafter Д(η) = (η, η), admits to $\mathcal{T} \times \mathcal{T}$ be m.open set in Ɲ $\times_{Ƀ}$ Ɲ is included in Д(Ɲ), We state $\mathcal{T} \times \mathcal{T}$ a m.open set be from the Ʊ $\times_{Ƀ}$ Ʊ, when Ʊ be m.open set from η in Ɲ. Therefore ℘|Ʊ be m.homeomorphism. Hence, Ɲ is a Ƒ.Ꞷ.m.Ꝗ.

The m.open subset of Ƒ.Ꞷ.m.Ꝗ.m.Ŧ.ς is also Ƒ.Ꞷ.m.Ꝗ, we have, in fact the outcomes are as follows.

Proposition 2.12: Let a function λ : Ɲ → Q is m.continuous Ƒ.Ꞷ. injection in which Ɲ and Q are Ƒ.Ꞷ.m.open.m.Ŧ.ς,s over Ƀ, if Q is a Ƒ.Ꞷ.m.Ꝗ, thus Ɲ also Ƒ.Ꞷ.m.Ꝗ as defined in Figure 1.

Proof: Consider the following diagram:

$$\begin{tikzcd} Ɲ \arrow[r, "Д"] \arrow[d, "λ"'] & Ɲ \times_{Ƀ} Ɲ \arrow[d, "λ \times λ"] \\ Q \arrow[r, "Д"] & Q \times_{Ƀ} Q \end{tikzcd}$$

Figure 1
Diagram of Proposition (2.12).

Given that, λ be m.continuous, then λ × λ be m.continuous. Presently Д(Q) be ℌ × ℌ m.open in Q $\times_{Ƀ}$ Q, using the Proposition (2.10), since Q be a Ƒ.Ꞷ.m.Ꝗ, as well Д(Ɲ) = Д($λ^{-1}$(Q)) = $(λ \times λ)^{-1}$Д(Q)) be a $\mathcal{T} \times \mathcal{T}$ m.open set in Ɲ $\times_{\text{Ƀ}}$ Ɲ, so a conclusion is drawn from Proposition (2.11), therefore Д : Ɲ → Ɲ $\times_{\text{Ƀ}}$ Ɲ be m.open

Proposition 2.13. Let λ, ψ : Ɲ → Q be m.continuous Ƒ.Ꮯ function, when Ɲ be Ƒ.Ꮯ.m.Ŧ.ς, and Q be Ƒ.Ꮯ.m.Ω .m.Ŧ.ς over Ƀ, then there was a coincidence set Q(λ, ψ) from λ, and ψ be m.open Ɲ as defined in Figure 2.

Proof: A coincidence set be exact $Д^{-1}(\lambda \times \partial)^{-1}(Д(Q))$, when:

$$Ɲ \xrightarrow{Д} Ɲ \times_{\text{Ƀ}} Ɲ \xrightarrow{\lambda \times \psi} Q \times_{\text{Ƀ}} Q \xleftarrow{Д} Q$$

Figure 2
Diagram of Proposition (2.13)

As a result, the needed outcome follows immediately from the Proposition (2.9), more specifically, take = Q, $\lambda = j\,\partial_{Ɲ}$, and ψ = δo ℘, when δ be section. We get to the conclusion that when Ɲ is an Ƒ.Ꮯ.m.Ω.m.Ŧ.ς, after that δ be m.open embedding. (it means that δ is one-to-one, m.continuous, δ^{-1} be m.continuous, and m.open).

Definition 2.14: A Ƒ.Ꮯ.m.Ŧ.ς Ɲ over Ƀ is referred to as locally micro. section able, which be indicated by the symbol (ℒ.m.Ş) if any point b ∈ Ƀ, there is an m.open set $\dot{W}$, and section δ: $\dot{W} \longrightarrow Ɲ_{\dot{W}}$.

Example 2.15: Suppose that Ư = {r, j, k}, Ư/Ɽ = {{k}, {r, j}, $\mathcal{H}$ = {r, j} ⊆ Ư. The $\mathcal{T}_{Ɽ}(\mathcal{H})$ = {Ư, ϕ, {r, j}}, let m = {k} ∉ $\mathcal{T}_{Ɽ}(\mathcal{H})$. Then $m_{Ɽ}(\mathcal{H})$ = {{k}, {r, j}, Ư, ϕ}. Let Ƀ = {1, 2, 3}, Ƀ/Ɽ = {{3}, {2}, {1}}, ϑ = {1, 2} ⊆ Ƀ, then $\mathcal{T}_{Ɽ}(\vartheta)$ = {Ƀ, ϕ}, then m = {1} ∉ $\acute{\mathcal{T}}_{Ɽ}(\vartheta)$. Then $m_{Ɽ}(\vartheta)$ = {Ƀ, ϕ, {1}}. Define a projection ℘: Ư → Ƀ; ℘ (k) = 1, ℘(j) = 2, ℘(r) = 3. We now have, there is δ_k:{1} ⟶ {k}; δ(1) = k. Hence, Ư be a Ƒ.Ꮯ.ℒ.m.Ş.

Remark 2.16: A Ƒ.Ꮯ. non.empty ℒ.m.δ.m.Ŧ.ς,s are ℒ.m.Ş conversely, however, is untrue. In actuality ℒ.m.Ş.m.Ŧ.ς are not required Ƒ.Ꮯ.m.open.

Example 2.17: Suppose that Ư = {q, r, t, b}, Ư/Ɽ = {{r}, {p}, {q, t}}, $\mathcal{H}$ = {t, p} ⊆ Ư. The $\mathcal{T}_{Ɽ}(\mathcal{H})$ = {Ư, ϕ, {r}, {t, p}}, let m = {t} ∉ $\mathcal{T}_{Ɽ}(\mathcal{H})$. Then $m_{Ɽ}(\mathcal{H})$ = {{t}, {t, p}, {p}, {q, t, p}, {q, t}, Ư, ϕ}. Let Ƀ = {1, 2, 3}, Ƀ/Ɽ = {{3}, {2}, {1}}, ϑ = {1, 2} ⊆ Ƀ, then $\mathcal{T}_{Ɽ}(\vartheta)$ = {Ƀ, ϕ}, then m = {1} ∉ $\acute{\mathcal{T}}_{Ɽ}(\vartheta)$. Then $m_{Ɽ}(\vartheta)$ = {Ƀ, ϕ, {1}}, Define a projection ℘: Ư → Ƀ; ℘ (r) = 1, ℘(t) = 2, ℘(q) = 3 = ℘(p). Let $\dot{W}$ = {1}; $℘^{-1}(1)$ = {r} be not m.open set, then Ư be ℒ.m.Ş, but not ℒ.m.δ.

3. Conclusion

Over the years, topological spaces have been presented in a broad range of different methods. Many interesting problems arise when openness is taken into account. In this study, we examine some of the basic characteristics of locally micro. section able sets, and locally micro. sliceable sets, in fibrewise micro topological spaces. Numerous branches from mathematics and associated sciences value its importance. This will be developed upon and additional applications added in later study.

References

[1] I. M. James, Fibrewise Topology, no. 91. Cambridge University Press (1989). doi: 10.1017/cbo9780511896835.

[2] N. F. Mohammed and Y. Y. Yousif, "Connected Fibrewise Topological Spaces," *J. Phys. Conf. Ser*., vol. 1294, no. 3 (2019), doi: 10.1088/1742-6596/1294/3/032022.

[3] R. B. Esmaeel and A. A. Jassam, "On Nano f-pre-g-Open Set," *Ibn AL- Haitham J. Pure Appl. Sci.,* vol. 33, no. 3, p. 68 (2020), doi: 10.30526/33.3.2474.

[4] A. R. Sadek, "P, P-L. Compact Topological Ring," *Iraqi J. Sci.*, vol. 57, pp. 2754–2759 (2016).

[5] Y. Y. Yousif, "Some Results on Fibrewise Topological Spaces," *Ibn Al-haitham Journal for pure and Applied science*, vol. 21, no. 2. pp. 118-132E (2017).

[6] A. R. S. and J. H. Hussein, "On Mildly - Regular Space," Int. Math. Forum, Vol. 12, no. 20, 967 - 972, (2017). HIKARI Ltd, www.m-hikari.com https//doi.org/10.12988/imf.2017.710299, no. December, 2017.

[7] S. Chandrasekar, "Micro Topological Spaces," New Theory, pp. 23–31 (2019), [Online]. Available: http://www.newtheory.org.

[8] A. A. Salih and H. J. Ali, "A study of m-N-extremally disconnected spaces with respect toτ, maximum mx-N-open sets," *Iraqi J. Sci.,* vol. 62, no. 4, pp. 1265–1270 (2021), doi: 10.24996/ijs.2021.62.4.21.

[9] M. P. Scholar, "Micro-α-open sets in Micro Topological Spaces," *Int. J. Res. Advent Technol.,* vol. 6, no. 10, pp. 2633–2637 (2018).

[10] T. H. Jasim, S. S. Mohsen, and K. S. Eke, "On Micro-generalized closed sets and Micro-generalized continuity in Micro Topological

spaces," *Eur. J. PURE Appl. Math.*, vol. 14, no. 4, pp. 1507–1516 (2021), doi: https://doi.org/10.29020/nybg.ejpam.v14i4.3823.

[11] N. F. Mohammed, "α-Semi-Regular Closed Sets," *Ibn AL- Haitham J. PURE APPL. SCI.*, vol. 24 (2) (2011).

[12] A. R. Kadzam and Y. Y. Yousif, "Fibrewise Totally Topological Spaces," AIP Conf. Proc., vol. 2414, no. February (2023), doi: 10.1063/5.0116985.

[13] Abbood, Mohaimen M. , Ebrahim, Hassan H., Al-Fayadh, Ali & Obaid, Ahmed J. () Measure defined on Γ–algebra and some of their generalizations, *Journal of Interdisciplinary Mathematics*, 1-7, DOI: 10.47974/JIM-1502.

Received October, 2023