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New patterns about supra MC function

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Abstract

In our research paper we introduced a weak concept to supra Mc function which we call supra M semi pre-closed function. We also presented other types of this new function, studied the relationship between them, the most important facts and properties, and presented many examples and results related to these new types.

Subject Classification: *Primary 93A30, Secondary 49K15.*

Keywords: *Supra semi pre open sets, Supra Mc function, Supra Mspc function, Supra Lc function, Supra Lspc function.*

1. Introduction

In [1] the concept of Mc functions introduced a function Ƒ : Ҳ ⟶ ʹY is said to be a Mc function if Ƒ -1(F) is closed subset of Ҳ, whenever F is a compact subset of ʹY. Also in [2], the concept of M-gc functions introduced a function Ƒ : Ҳ ⟶ ʹY is said to be an M-gc function if Ƒ -1(F) is g-closed subset of Ҳ, whenever F is a compact subset of ʹY. In this work we introduce new function through the supra spaces, which are : su.Mc, su.Mspc, su.spMc, su.spMsp, su.Lc and su.Lspc function, We proved several theorems concerning this concept. The supra open (supra closed) set is abbreviated as su.o (su.c). Supra topology μ which is defined on a non-empty set whenever Φ , X ∈ μ and $U_\alpha \in \mu$, $\alpha \in \Lambda$, then $\cup_{\alpha\in\Lambda} U_\alpha \in \mu$. Also supra closure of a set U shortly (su.cl(U)) (= intersection of all su.c sets which absorb U).

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2. On supra M semi pre-closed function

In this item we have created new types of Mc function, kc and Lc spaces with help supra topology.

Definition 2.1: [5] Let Ą be subset of supra space it is called a supra semi pre open (shortly su.spo) set if there is a supra pre open (shortly su.po) set in Ꭓ say Ų such that Ų ⊆ Ą ⊆ su.cl(Ų). The set of all su.spo of Ꭓ is symbolizes by su.spo(Ꭓ). The complement of su.spo is symbolized by su.spc and the set of all su.spc sets of Ꭓ is symbolizes by su.spc(Ꭓ).

Remark 2.2: [5] Every su.o set is su.spo set but the converse is not true in general.

Definition 2.3: [6] A su.space (Ꭓ,μ) is said to be supra compact (shortly su.compact) if for all su.o cover to Ꭓ has a finite sub cover

Definition 2.4: [5] A su.space (Ꭓ, μ) is said to be supra semi pre compact (shortly su.sp.compact) if for all su.spo cover to Ꭓ has a finite sub cover.

Definition 2.5: [4] Ꭓ is expressed a su.T_2 space if all two ҳ and ү in Ꭓ with ҳ ≠ ү, available su.o sets Ų and Ѵ s.t ҳ ∈ Ų, ү ∉ Ų and ҳ ∉Ѵ and ү ∈Ѵ with Ų ∩Ѵ = φ.

Remarks 2.6: [5]

1) Every su.sp.compact is su.compact.
2) Every su.sp.lindelof is su.lindelof.
3) Every su.sp.compact is su.sp.lindelof .

Definition 2.7: The function Ƒ : (Ꭓ, μ) → (Ύ,Ύ) is called

1) A supra.continuous (shortly su.conts) function whenever $Ƒ^{-1}$(Ų) is su.o set in Ꭓ for all su.o set Ų in Ύ.[4]
2) A su.sp-conts* whenever $Ƒ^{-1}$(Ų) is su.o set in Ꭓ, for all su.spo set Ų in Ύ
3) A su.sp-conts** whenever $Ƒ^{-1}$(Ų) is su.spo set in Ꭓ, for all su.spo set Ų in Ύ. The following example is similar to the first example in ii above.

Definition 2.8: The function Ƒ : (Ꭓ, μ) → (Ύ,Ύ) is called :

1) A su.compact function whenever $Ƒ^{-1}$(Ų) is su.compact set in Ꭓ, for all su.compact set Ų in Ύ.
2) A su.sp.compact function whenever $Ƒ^{-1}$(Ų) is su.sp.compact set in Ꭓ, for all su.compact set Ų in Ύ.
3) A su.sp* compact function whenever $Ƒ^{-1}$(Ų) is su.compact set in Ꭓ, for all su.sp.compact set Ų in Ύ.
4) a su.sp** compact function whenever $Ƒ^{-1}$(Ų) is su.sp.compact set in Ꭓ, for all su.sp.compact set Ų in Ύ.

Definition 2.9: A su.space (Ҳ,μ) is said to be

1) su.kc if for each su.compact set in Ҳ is su.c set.
2) su.sp-kc if for each su.sp.compact set in Ҳ is su.c set. As an example, the two concepts are achieved by imposing space su.discrete.

Lemma 2.10: [6] *In su.T_2 space every su.compact subset is su.c set.*

Definition 2.11: A function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is said to be su.Mc if Ƒ $^{-1}$(F) is su.c set in Ҳ, for every su. compact set F in ˊY. Also a function has su.discrete domain achieved.

Definition 2.12: A function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is said to be su.Mspc if Ƒ $^{-1}$(F) is su.spc set in Ҳ..

Remark 2.13: Every su.Mc function is su.Mspc function. But the converse is not true in general.

Example 2.14: A function I_R : (R, μ_{ind}) ⟶ (R, ˊ$ϒ_{cof}$) is su.Mspc function but it is not su.Mc function, since Q is su.compact set in ˊY but I_R^{-1}(Q)=Q is not su.c set in R.

Proposition 2.15: Every su.conts function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is su.Mspc function, whenever (ˊY,ˊϒ) is su.T_2

Definition 2.16: A function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is said to be su.spMc if Ƒ $^{-1}$(F) is su.c set in Ҳ, for every su. sp.compact set F in ˊY. Also a function that has su.discrete domain achieved.

Remark 2.17: Every su.Mc-function is su.spMc function. But the converse is not true in general.

Proposition 2.18: Every su.conts function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is su.spMc function, whenever (ˊY,ˊϒ) is su.T_2 space.

Proof: Let K be su.sp.compact subset of su.T_2 space ˊY, then K is su.compact so by (lemma 2.10) K is su.c and but by Ƒ is su.conts then Ƒ $^{-1}$(K) is su.c, therefore Ƒ is su.spMc function.

Proposition 2.19: Every su.sp-conts* function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is su.spMc function, whenever (ˊY,ˊϒ) is su.T_2 space.

Definition 2.20: A function Ƒ : (Ҳ, μ) ⟶ (ˊY,ˊϒ) is said to be su.spMspc if Ƒ $^{-1}$(F) is su.spc set in Ҳ, for every su.sp.compact set F in ˊY. Also a function that has su.discrete domain achieved.

Remarks 2.21:

1) Every su.Mspc function is su.spMspc.
2) Every su.spMc function is su.spMspc.
3) Every su.Mc-function is su.spMspc.
4) Every su.Mc function is su.spMc

There is no relation between su.Mspc and su.spMc function.

Proposition 2.22: Every su.conts function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.spMspc function, whenever $(Ύ,ϒ)$ is su.T_2 space.

Corollary 2.23: *Every su.sp-conts* function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.spMspc function, whenever $(Ύ,ϒ)$ is su.T_2space.*

Proposition 2.24: Every su.conts function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.Mc (su.Mspc) function, whenever $(Ύ,ϒ)$ is su.kc space.

Proof: Let G be su.compact subset of su.kc space Ύ, then G is su.c set of Ҳ but Ƒ is su.conts then $Ƒ^{-1}(G)$ is su.c therefore Ƒ is su.Mc (su.Mspc) function.

Proposition 2.25: Every su.conts function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.spMc function, whenever $(Ύ,ϒ)$ is su.sp-kc space.

Corollary 2.26: *Every su.conts function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.spMc function, whenever $(Ύ,ϒ)$ is su.kc space.*

Definition 2.27: A function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is said to be su.Lc if $Ƒ^{-1}(F)$ is su.c set in Ҳ.

Definition 2.28: A function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is said to be su.Lspc if $Ƒ^{-1}(F)$ is su.spc set in Ҳ, for every su.lindelof set F in Ύ.

Remark 2.29:

1) Every su.Lc function is su.Mc but the converse may not be true.
2) Every su.Lc function is su.Mspc but the converse may not be true.

Proposition 2.30: Every su.compact function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.Mc function, whenever $(Ҳ, \mu)$ is su.T_2 space.

Corollary 2.31: *Every su.compact function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.spMc function, whenever $(Ҳ, \mu)$ is su.T_2 space.*

Proposition 2.32: Every su.Mc function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.compact function, whenever $(Ҳ, \mu)$ is su.compact.

Corollary 2.33: *A function $Ƒ : (Ҳ, \mu) \longrightarrow (Ύ,ϒ)$ is su.compact function iff Ƒ is a su.Mc function, whenever $(Ҳ, \mu)$ is a su.compact and su.T_2 space.*

Proposition 2.34: Every su.spMc function Ƒ : (Ҳ, μ) ⟶ (Ύ,Ύ) is su.sp*compact function, whenever (Ҳ, μ) is su.compact.

Corollary 2.35: *Every su.sp*compact function Ƒ : (Ҳ, μ) ⟶ (Ύ,Ύ) is su.spMc function, whenever (Ҳ, μ) is su.T_2 space.*

Proposition 2.36: Let Ƒ : (Ҳ, μ) ⟶ (Ύ,Ύ) and ɡ : (Ύ,Ύ) ⟶ (Ƙ, Ɛ) be functions, then If Ƒ be a su.conts function and ɡ is a su.Mc-function, then ɡoƑ is an su.Mspc function.

Proposition 2.37: Every su.compact function Ƒ : (Ҳ, μ) ⟶ (Ύ,Ύ) is su.Mc function, whenever (Ҳ, μ) is su.Kc space.

Proposition 2.38: Let Ƒ : (Ҳ, μ) ⟶ (Ύ,Ύ) and ɡ : (Ύ,Ύ) ⟶ (Ƙ, Ɛ) be functions, then If Ƒ be a su.conts function and ɡ is a su.compact function and Ύ is a su.Kc space, then ɡoƑ is an su.Mc function.

Remark: It is possible to use Grill topology or Nano or soft topology instead of supra topology to get new results, you can review the following sources : [3, 7, 8, 9, 10, 11].

5. Discussion and Conclusion

In our work we have provided new concepts of supra Mc functions It is called supra Mspc functions (shortly su.Mspc), We also provided many functions, which are : su.spMc, su.spMsp, su.Lc and su.Lspc function, We presented several facts, theorems and examples regarding this concept and also discussed its relationship with some function.

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