

Abstract

The main aim of this work is to create a new type of proper G -space namely, "Generalized Proper G -space " and study of its properties .

We introduce a new definition for a generalized proper function which is considered as the basis of our main definition . Also , we study the properties of this function.

Throughout this work , some important and new concepts have been illustrated including a generalized convergence of nets , generalized compactly generalized closed spaces and generalized Cartan G -space and clarified their properties .

Finally, we have introduced the definitions of generalized limit sets and use it to characterize certain types of generalized G -space.

Also , this study proves that:

(i) Let X be a T_2 -space , then:

(•) A subset A of a topological space X is cgc-set if and only if it is g-closed set .

(•) A cgc-space and gcgc-space are equivalent .

(ii) Let $f: X \rightarrow Y$ be a g-proper function , then the restriction of f on a closed subset F of a space X is g-proper function .

(iii) Let $f: X \rightarrow Y$ and $h: Y \rightarrow Z$ be a g-continuous functions, then:

(•) If hof is g-proper function and f is onto , where X , Y are T_1 -spaces , then h is g-proper.

(•) If hof g-proper and h is gl-continuous, one to one , then f is g-proper.

(iv) If $f_1: X_1 \rightarrow Y_1$ and $f_2: X_2 \rightarrow Y_2$ be two g-proper functions , Then $f_1 \times f_2$ is g-proper function .

- (v) Let $f: X \rightarrow Y$ be a g -proper function, where X g -compact and X, Y are T_1 -spaces, then f is g -compact.
- (vi) If X and G are g -compact, T_1 -space and X be a g -proper G -space, then the orbit space X/G is gT_2 -space. Moreover If G is gT_2 -space, then X is also.
- (vii) Let (f, h) be a morphism from G_1 -space X_1 into G_2 -space X_2 such that $f: G_1 \rightarrow G_2$ is onto and $h: X_1 \rightarrow X_2$ is homeomorphism, where X_i are T_1 -spaces if X_1 is g -proper G_1 -space, then X_2 is g -proper G_2 -space.
- (iix) Let X be a G -space, then:
- (•) If K_1, K_2 are g -compact subsets of X then $((K_1, K_2))$ is g -closed subset of G and $((K_1, K_2))$ is g -compact when K_1 and K_2 are relatively g -thin.
 - (•) If $\Lambda^g(x) = \emptyset$ for each $x \in X$, then the orbit $G.x$ is not g -compact.
 - (•) Let X and G are g -compact T_1 -spaces, then X is g -proper G -space if and only if $J^g(x) = \emptyset$ for each $x \in X$.
- (ix) Let X be a gCG -space, then $\Lambda^g(x) = \emptyset$ for each $x \in X$.
- (x) Let (I_G, h) be a morphism from G -space X_1 into a G -space X_2 such that $h: X_1 \rightarrow X_2$ be a gl -continuous and g -homeomorphism. If X_1 is gCG -space, then so is X_2 .