P^*-$*$-Connectedness in Ideal Bitopological Spaces

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Abstract: The aim of this paper is to use the concepts of ideal $\mathscr{I}$, bitopological space (X, τ_1, τ_2) and its associated supra topological space (X, τ_{12}) to introduce a new local function, A^{*}_{12}. The properties of these local function A^{*}_{12} and some important results related to it have obtained. The local function A^{*}_{12} is used to generate a family τ^{*}_{12} which is finer than τ_1, τ_2 and τ_{12}, τ^{*}_{12} is a supra topology not a topology in general. In addition, a supra topology τ^{*}_{12} is used to study connectedness in the ideal bitopological space $(X, \tau_1, \tau_2, \mathscr{I})$. Examples have introduced to illustrate the concepts in a friendly way. Finally, the relationship between the current study and the previous one has been given.

Keywords: Bitopological spaces, Ideal, Supra-topological spaces, P^*-Continuous mappings, P^*-separated set, P^*-Connected spaces, P^*-$*$-separated set, P^*-$*$-Connected spaces.
Mathematics Subject Classification (2010): 54A05, 54A10, 54E55.

1 Introduction

In 1963 Kelly [10] was introduced a bitopological space (X, τ_1, τ_2) as a richer structure than topological space. A study of bitopological space is a generalization of the study of general topological space as every bitopological space (X, τ_1, τ_2) can be regarded as a topological space (X, τ) if $\tau_1 = \tau_2 = \tau$.

The concept of ideals in topological spaces has been introduced and studied by Kuratowski [11] and Vaidyanathaswamy [17]. An ideal is a nonempty collection of subsets closed under heredity and finite additivity. The study of ideal bitopological spaces was initiated by Jafari and Rajesh [6].

As a generalized to topological spaces, Mashhour et al. [13] introduced supra-topological spaces by dropping only the intersection condition. Kandil et al. [9] generated a supra-fuzzy topological space (X, τ_{12}) from the fuzzy bitopological space (X, τ_1, τ_2) and studied some properties of the space (X, τ_1, τ_2) via properties of the space (X, τ_{12}).

The notion of connectedness in bitopological spaces has been studied by Pervin [14], Reily [15] and Swart [16]. In

2014 Mandira Kar and Thakur [12] have been studied the notion of connectedness in ideal bitopological spaces, but the studying of such spaces by using the supra-topological space has not been considered.

In this paper, given a bts (X, τ_1, τ_2) and its associated supra topological space (X, τ_{12}) [13]. Also, let $\mathscr{I}$ be an ideal on a space X, we introduce a new local function, $A^{*}_{12} : P(X) \longrightarrow P(X), A^{*}_{12}(A) = \{x \in X : O_x \cap A \notin \mathscr{I} \quad \forall \quad O_x \in \tau_{12}(x)\}$, where $\tau_{12} = \{U_1 \cup U_2 : U_i \in \tau_i, i = 1, 2\}$ is a supra topology [13] generated by τ_1 and τ_2, (X, τ_{12}) is a supra topological space associate to the bts (X, τ_1, τ_2). The properties of the operator A^{*}_{12} have obtained. In addition, we show that $A^{*}_{12}(A) = A^{*}_1(A) \cap A^{*}_2(A)$. Moreover, we show that the operator $cl^{*}_{12}(A) = A \cup A^{*}_{12}(A)$ is a supra closure operator [8,9] and then induces a supra topology τ^{*}_{12} which is finer than τ_1, τ_2 and τ_{12}, τ^{*}_{12} is not a topology in general. Furthermore, a supra topology τ^{*}_{12} is used to study connectedness in the ideal bitopological space $(X, \tau_1, \tau_2, \mathscr{I})$, since the dealing with one family is easier than the dealing with two families. Also, the class of all supra-topological spaces is wider than the class of topological spaces. So, the study of supra-topological spaces is a generalization of the study of topological spaces. The notions of P^*-$*$-connected spaces, P^*-$*$-separated sets and P^*-$*$-connected sets in ideal

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