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The local density and the local weak density of N_τ^φ -kernel of a topological spaces

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We say that a topological space X is locally τ -dense at a point $x \in X$ if τ is the smallest cardinal number such that x has a τ -dense neighborhood in X . The local density at a point x is denoted by $ld(x)$.

The local density of a space X is defined as the supremum of all numbers $ld(x)$ for $x \in X$; this cardinal number is denoted by $ld(X)$.

A topological space is locally weakly dense at a point $x \in X$ if τ is the smallest cardinal number such that x has a neighborhood of weak density τ in X . The weak density at a point x is denoted by $lwd(x)$.

A topological space X is called locally weakly τ -dense if it is weakly τ -dense at each point $x \in X$.

The local weak density of a topological space X is defined with following way:

$$lwd(X) = \sup \{ lwd(x) : x \in X \}.$$

A system $\xi = \{F_\alpha : \alpha \in A\}$ of closed subsets of a space X is called *linked* if any two elements from ξ intersect [1].

A.V. Ivanov defined the space NX of complete linked systems (CLS) of a space X in a following way:

Definition 1. A linked system M of closed subsets of a compact X is called a *complete linked system* (a CLS) if for any closed set of X , the condition

“Any neighborhood OF of the set F consists of a set $\Phi \in M$ ”
implies $F \in M$ [2].

A set NX of all complete linked systems of a compact X is called *the space NX of CLS of X* . This space is equipped with the topology, the open basis of which is formed by sets in the form of

$E = O(U_1, U_2, \dots, U_n) \langle V_1, V_2, \dots, V_s \rangle = \{M \in NX : \text{for any } i = 1, 2, \dots, n \text{ there exists } F_i \in M \text{ such that } F_i \subset U_i, \text{ and for any } j = 1, 2, \dots, s, F \cap V_j \neq \emptyset \text{ for any } F \in M\}$, where $U_1, U_2, \dots, U_n, V_1, V_2, \dots, V_s$ are nonempty open in X sets [2].

Definition 2. Let X be a compact space, φ be a cardinal function and τ be an arbitrary cardinal number. We call an N_τ^φ -kernel of a topological space X the space

$$N_\tau^\varphi X = \{M \in NX : \exists F \in M : \varphi(F) \leq \tau\}.$$

Theorem 3. Let X be an infinity compact space and $\varphi = d, \tau = \aleph_0$. Then:

- 1) $ld(N_\tau^\varphi X) \neq ld(X)$;
- 2) $lwd(N_\tau^\varphi X) \neq lwd(X)$.

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