The Shanin number and the predshanin number of N_τ^φ-kernel of a topological spaces

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A cardinal $\tau \geq \aleph_0$ is said to be a caliber of the space X if for any family $\mu = \{U_\alpha : \alpha \in A\}$ of nonempty open in X sets such that $|A| = \tau$, there exists $B \subset A$, for which $|B| = \tau$, and $\bigcap\{U_\alpha : \alpha \in B\} \neq \emptyset$. Set $k(X) = \{\tau : \tau$ is a caliber of the space $X\}$.

The cardinal number $min\{\tau : \tau^+$ is caliber of $X\}$ is called the Shanin number of X and denoted by $sh(X)$, where τ^+ is the least cardinal number from all cardinals strictly greater that τ.

A cardinal $\tau \geq \aleph_0$ is said to be a precaliber of the space X if for any family $\mu = \{U_\alpha : \alpha \in A\}$ of nonempty open in X sets such that $|A| = \tau$, there exists $B \subset A$, for which $|B| = \tau$, and $\{U_\alpha : \alpha \in B\}$ is centered. Set $pk(X) = \{\tau : \tau$ is a precaliber of the space $X\}$.

The cardinal number $min\{\tau : \tau^+$ is precaliber of $X\}$ is called the predshanin number of X and denoted by $psh(X)$, where τ^+ is the least cardinal number from all cardinals strictly greater that τ.

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

$E = O(U_1, U_2, \ldots, U_n)\langle V_1, V_2, \ldots, V_s\rangle = \{M \in NX :$ for any $i = 1, 2, \ldots, n$ there exists $F_i \in M$ such that $F_i \subset U_i$, and for any $j = 1, 2, \ldots, s$, $F \cap V_j \neq \varnothing$ for any $F \in M\}$, where $U_1, U_2, \ldots, U_n$, $V_1, V_2, \ldots, V_s$ 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) $sh(N_\tau^\varphi X) \leq sh(X)$;

2) $psh(N_\tau^\varphi X) \leq psh(X)$.

References

[1] Fedorchuk V. V., Filippov V. V. *General Topology. Basic Constructions.* Fizmatlit, Moscow. 2006.

[2] Ivanov A. V. Cardinal-valued invariants and functors in the category of bicompacts. *Doctoral thesis in physics and mathematics*, Petrozavodsk, 1985.