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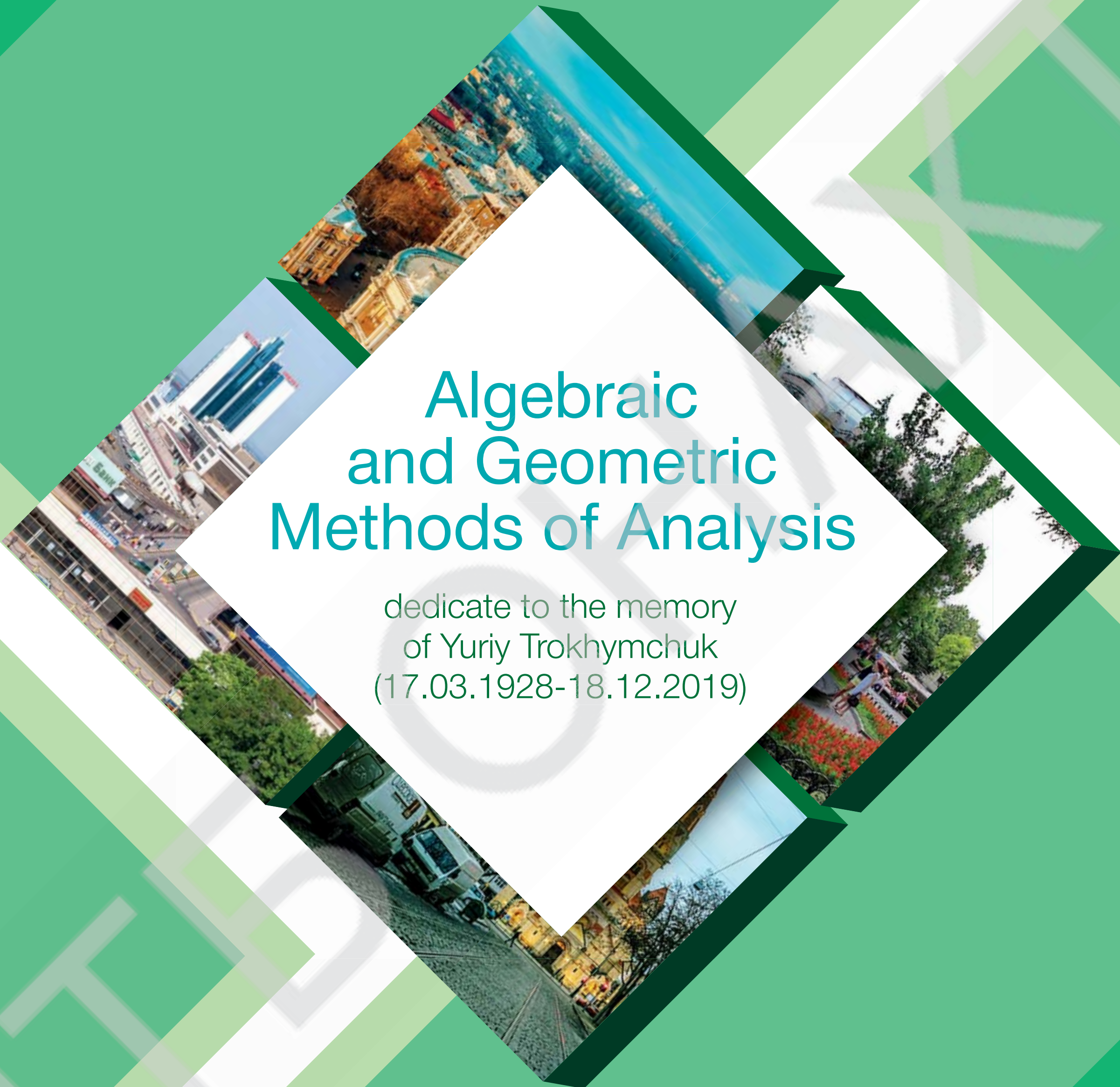

Algebraic and Geometric Methods of Analysis

dedicate to the memory
of Yuriy Trokhymchuk
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List of topics

- Topological methods in analysis
- Geometric problems of complex and mathematical analysis
- Algebraic methods in geometry
- Differential geometry in the whole
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Geometric and topological methods in natural sciences

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The local τ-density of a linearly ordered spaces

Farkhod Mukhamadiev
(National University of Uzbekistan, Yeoju Technical Institute in Tashkent, Uzbekistan)
E-mail: `farhod8717@mail.ru`

A set $A \subset X$ is said to be dense (in X), if $[A] = X$. The density of the space X is defined as the smallest cardinal $|A|$, where A is a dense subset of X [1]. This cardinal is denoted by $d(X)$. If $d(X) = \tau$, $\tau \geq \aleph_0$, the space X is said to be $\tau-$dense. If $d(X) \leq \aleph_0$, then X is said to be separable.

A topological space X is called locally $\tau-$dense at the point $x \in X$, if τ is the smallest cardinal number, such that x has a neighbourhood of density τ in X [2]. Local density at x is denoted by $ld(x)$. Local density of the space X is defined as follows:

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

It is clear that local density of a topological space cannot exceed the density of said space, i.e. $ld(X) \leq d(X)$.

We say that the weak density of the topological space is $\tau \geq \aleph_0$, if τ is the smallest cardinal number such that there exists a π-base coinciding with τ of centered systems of open sets, i.e. there is a π-base $B = \cup\{B_\alpha : \alpha \in A\}$ where B_α is a centered system of open sets for each $\alpha \in A, |A| = \tau$ [3]. Weak density of topological space X is denoted by $wd(X)$.

Topological space X is said local weak τ-dense at a point x, if τ is the smallest cardinal number such that x has a neighborhood of weak density τ in X [4]. Local weak density at a point x is denoted by $lwd(x)$. The local weak density of a topological space X is defined as the supremum of all numbers $lwd(x)$ for $x \in X$:

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

It is clear that local weak density of a topological space cannot exceed the weak density of said space, i.e. $lwd(X) \leq wd(X)$.

Let X be a set, and $<$ be some relation on X. We say that $<$ is a linear order on X if the relation $<$ satisfies the following properties:

1) If $x < y$ and $y < z$, then $x < z$;
2) If $x < y$ then the relation $y < x$ does not hold;
3) If $x \neq y$ then either $x < y$ or $y < x$ holds.

A set X together with some linear order defined on it is called a linearly ordered set [1].

Theorem 1. *Suppose that a space X satisfies at least one of the following conditions:*
1) X is a linearly ordered topological space with the interval topology,
2) X is pseudometric space.
Then X is locally $\tau-$dense if and only if it is locally weak $\tau-$dense.

References

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