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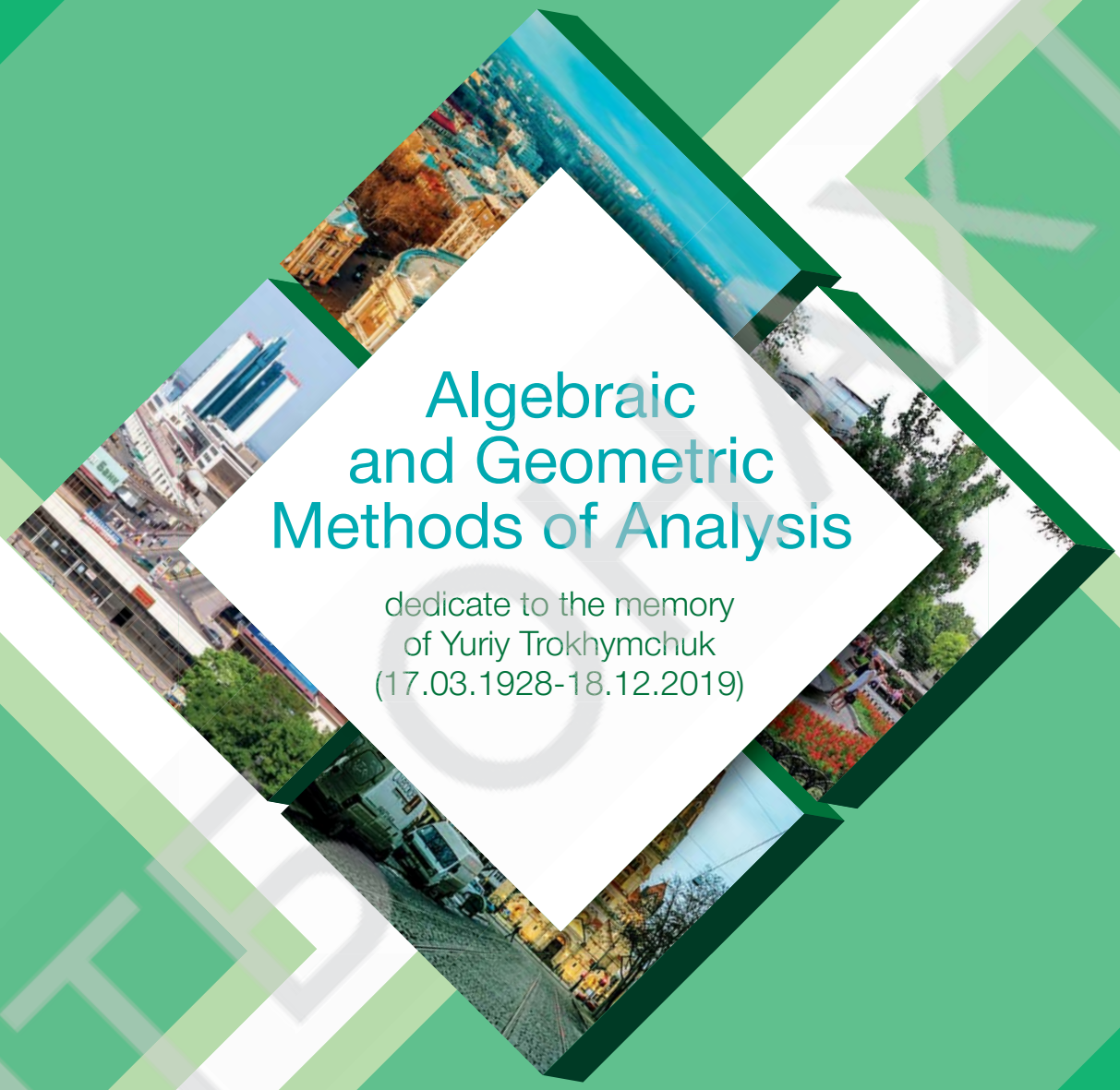

Algebraic and Geometric Methods of Analysis

dedicate to the memory
of Yuriy Trokhymchuk
(17.03.1928-18.12.2019)

May 25-28, 2021
Odesa, Ukraine

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 Collatz conjecture from an algebraic point of view

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The Collatz conjecture is an open problem in number theory stablished in 1937 by Lothar Collatz and can be stated as follows: If $f : \mathbb{N} \to \mathbb{N}$ is the function defined by:

$$f(n) = \begin{cases} \frac{n}{2} & ; n \text{ is even} \\ 3n+1 & ; n \text{ is odd} \end{cases}$$

the conjecture says that given $n \in \mathbb{N}$, there exists $k > 0$ such that $f^{(k)}(n) = 1$ and the only orbit is $\{1, 2, 4\}$

Every topology τ can be seen as a commutative semiring under union and intersection. If τ_f is the topology on $\mathbb{N}$ given by the open sets as those subset θ of $\mathbb{N}$ such that $f^{-1}(\theta) \subset \theta$, we prove that the Collatz conjecture is true if and only if τ_f, viewed as a commutative semiring, is a local semiring.

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