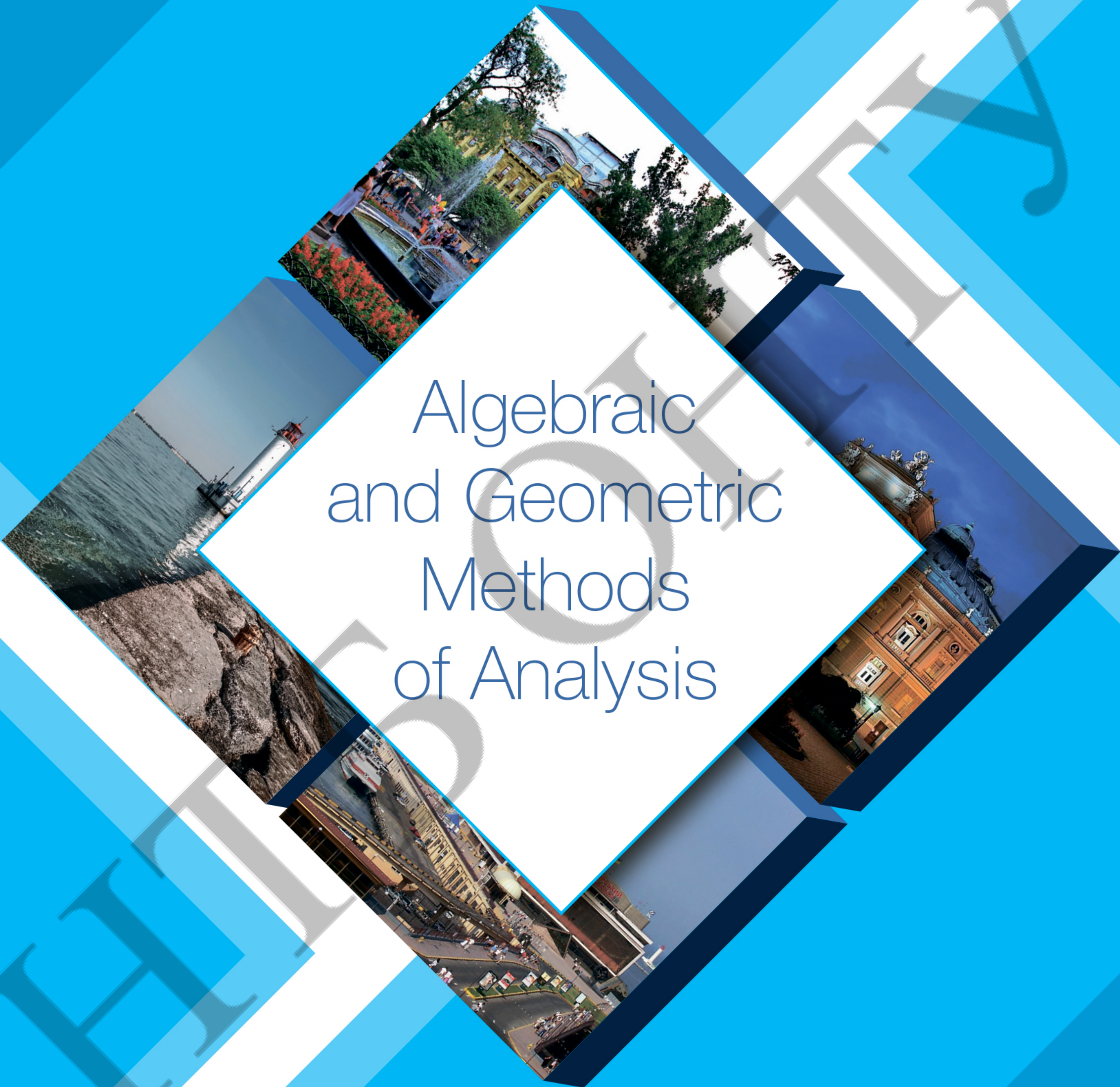
International
Scientific Conference



Algebraic and Geometric Methods of Analysis

27-30 May 2024

Odesa, Ukraine

The purpose of this conference is to bring together researchers in geometry, topology, algebra, analysis and dynamical systems and to provide for them a forum to present their recent work to colleagues from different nationalities. This way we aim to stimulate discussion about the latest findings in geometrical and topological methods in analysis and to increase international collaboration.

The conference continues the traditional annual conference «Geometry in Odesa» holding from 2004, and hosted by Odesa National University of Technology (Odesa National Academy of Food Technologies till 2021). From 2017 the conference was renamed to «Algebraic and geometric methods of analysis» (AGMA).

The Conference languages: Ukrainian and English.

List of topics

- Algebraic methods in geometry
- Differential geometry in the large
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Dynamical systems and their applications
- Geometric and topological methods in natural sciences
- Geometric problems in mathematical analysis

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On 2-convex embeddings of non-orientable surfaces in four-dimensional Euclidean space

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Let us recall the definition of k-convexity of a subset of a Euclidean space (see [1]).

Definition 1. A subset $C \subset E^n$ of Euclidean space is called k-convex if through each point $x \in E^n \setminus C$ there passes a k-dimensional plane that does not intersect C.

Note that the usual convexity corresponds to case $k = n - 1$.

We present the following result.

Theorem 2. *The Projective plane and the Klein bottle do not admit a 2-convex embedding in a four-dimensional Euclidean space if the embedding is assumed to be C^2-smooth or is a PL-embedding such that the valence of the vertices does not exceed five.*

References

[1] Yu. B. Zelinsky, *Vypuklost'. Izbrannyye glavy*, Inst. matematiki NAN Ukrainy, Kiev, 2012.

Mixing optimization in the batch crystallization of CAM

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The citric acid monohydrate (CAM) is an important organic substance but, until 1997, the scientific literature covered mostly the kinetics of nucleation [4] and the crystal growth [5] rather than its production via the crystallization by cooling in a stirred tank reactor (STR). The Department of Chemical Engineering at the University "La Sapienza" of Rome decided to fill that sci-tech gap through a meticulous investigation, with three STRs at the laboratories of San Pietro in Vincoli's district, on the crystallization in discontinuous (batch) of CAM from aqueous solutions. The author participated in that cutting edge experience, as experimenter and coder under the supervision of Prof. Barbara Mazzarotta, in the years 1997-1998 [1]. Our specific tasks were to spot the main operating conditions, to modify them until an *optimal* crystal size distribution (CSD), i.e., large-sized homogeneous crystals of CAM, and to write a QBasic program predicting the outcomes of any test in batch reactors [2]. Here we focus on the influence of the *agitation*, i.e., the role played by the impellers in crystallizing the CAM thanks to their different shapes and speeds. All the data, collected and simulated, show that the three-blade marine impeller performs better than the Rushton turbine and that a low stirring rate gives the best CSD [3]. The homogenous distribution of large crystals from a low agitated round-bottomed tank, stirred via a 3-blade marine impeller, is due to the *optimal* suspension state that the axial flow provides for the dispersed phase of CAM particles [6], as confirmed by the computational fluid-dynamics software `VisiMix`.

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