International
Scientific Conference

Algebraic and Geometric Methods of Analysis

Devoted to 160 anniversary of
Dvytro Grave
(25.08.1863 - 19.12.1939)
Academician of the Ukrainian Academy of Sciences, the first director of the Institute of Mathematics of NAS of Ukraine

May 29 – June 1, 2023
Odesa, Ukraine

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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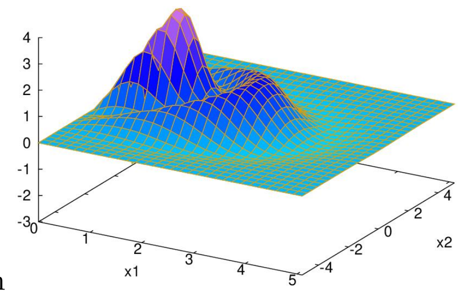

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FIGURE 3.1. $w_l^N(\cdot, T) - w^T$, $N = 3$, $l = 50$.

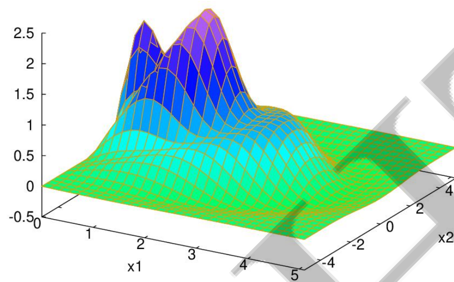

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FIGURE 3.2. $w_l^N(\cdot, T) - w^T$, $N = 4$, $l = 200$.

FIGURE 3.3. The influence of the controls $u_{N,l}$ on the difference $w_l^N(\cdot, T) - w^T$.

On partial preliminary group classification of some class of $(1+3)$-dimensional Monge-Ampere equations. Two-dimensional Abelian Lie algebras

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Classes of Monge-Ampère equations, in the spaces of different dimensions and different types, arise in solving of many problems of the geometry, theoretical physics, optimal mass transportation, geometric optics, one-dimensional gas dynamics and etc.

At the present time, there are a lot of papers and books in which those classes have been studied by different methods.

We consider the following class of $(1+3)$-dimensional Monge-Ampère equations:

$$\det\left(u_{\mu\nu}\right) = F\left(x_0, x_1, x_2, x_3, u, u_0, u_1, u_2, u_3\right),$$

where $u = u(x)$, $x = (x_0, x_1, x_2, x_3) \in M(1,3)$, $u_{\mu\nu} \equiv \dfrac{\partial^2 u}{\partial x_\mu \partial x_\nu}$, $u_\alpha \equiv \dfrac{\partial u}{\partial x_\alpha}$, $\mu, \nu, \alpha = 0, 1, 2, 3.$

Here, $M(1,3)$ is a four-dimensional Minkowski space, F is an arbitrary real smooth function.

For the group classification of this class we have used the classical Lie-Ovsiannikov approach. At the present time, we have performed partial preliminary group classification of the class under investigation, using two-dimensional Abelian nonconjugate subalgebras of the Lie algebra of the Poincaré group $P(1,4)$.

In our report, I plan to present some of the results obtained concerning with partial preliminary group classification of the class under consideration.

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Homotopy type of stabilizers of functions with non-isolated singularities on surfaces

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Let M be a smooth compact surface, $\mathcal{D}(M)$ be a group of diffeomorphisms of M, and P be either $\mathbb{R}$ or S^1. For a smooth function $f : M \to P$ denote by $\mathcal{S}(f)$ a group of f-preserving diffeomorphisms of M, i.e.,

$$\mathcal{S}(f) = \{h \in \mathcal{D}(M) \,|\, f \circ h = f\},$$

and by $\mathcal{S}_{\mathrm{id}}(f)$ a connected component of $\mathcal{S}(f)$ containing id_M.

In [1] the author considered the following class of functions $\mathcal{F}(M,P)$ and described the homotopy type of $\mathcal{S}_{\mathrm{id}}(f)$ for functions from it.

Definition 1. A smooth function $f \in C^\infty(M,P)$ on M belongs to the class $\mathcal{F}(M,P)$ if the following conditions are satisfied:

(1) for each connected component V of the boundary ∂M a function $f|_V$ either takes a constant value or is a covering map,