



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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(1) to a continuous flow  $(\theta_{s,t})_{-\infty < s \leq t < \infty}$  of mappings of  $M$  in the sense that  $\Phi_n(t) = \theta_{s,t}(\Phi_n(s))$ ,  $s_n \leq s \leq t$ .

Our main result is the following. Assume that  $(\Phi_n)_{n \geq 1}$  is a sequence of continuous mappings,  $\Phi_n \in C([s_n, \infty), M)$ , that satisfies (1) and is such that the sequence  $((s_n, \Phi_n(s_n)))_{n \geq 1}$  is dense in  $\mathbb{R} \times M$ , and for every compact  $L \subset \mathbb{R} \times M$  the set

$$\{\Phi_n|_{[s,\infty)} : s_n \leq s, (s, \Phi_n(s)) \in L\}$$

is relatively compact with respect to the topology of uniform convergence on bounded intervals. Consider sets  $\mathcal{K}_x^{s,t} = \bigcap_{\varepsilon > 0} \{\Phi_n|_{[s,t]} : s_n \leq s, \rho(\Phi_n(s), x) \leq \varepsilon\}$ , and let

$$E = \{(s, x) \in \mathbb{R} \times M : \forall t > s \mathcal{K}_x^{s,t} \text{ contains at least two distinct functions}\}.$$

Assume that  $F$  is a closed subset of  $\mathbb{R} \times M$ , such that  $E \subset F$ .

**Theorem 1.** *Let  $(\theta_{s,t} : -\infty < s \leq t < \infty)$  be a family of mappings of  $M$ . Define*

$$\sigma_x^s = \inf\{t > s : \theta_{s,t}(x) \in F\}.$$

Assume that

- for all  $t \in (s, \sigma_x^s)$ ,  $\theta_{s,t}(x) \in \mathcal{K}_x^{s,t}$ ;
- if  $s_n \leq s \leq t$ , then  $\theta_{s,t}(\Phi_n(s)) = \Phi_n(t)$ ;
- if  $\sigma_x^s \leq t$ , then  $\theta_{\sigma_x^s, t}(\theta_{s, \sigma_x^s}) = \theta_{s,t}(x)$ ;
- if  $t > \sigma_x^s$ , and  $\theta_{s,t}(x) \in F$ , then there exists  $n \geq 1$ , such that  $s_n \leq t$  and  $\theta_{s, \cdot}(x)|_{[t, \infty)} = \Phi_n|_{[t, \infty)}$ .

Then for all  $r \leq s \leq t$   $\theta_{s,t} \circ \theta_{r,s} = \theta_{r,t}$ .

We will give applications of the theorem to analogues of Arratia and Burdzy-Kaspi flows on metric graphs.

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# On symmetries of sections of convex bodies

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Abstract: Christos Saroglou and Sergii Myroshnychenko proved [1] that a convex origin-symmetric body in  $\mathbb{R}^n$ ,  $n \geq 3$ , with central sections having symmetries of a cube, must be a Euclidean ball. We will discuss several results on floating bodies related to this problem.

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