



International
Scientific Conference

Algebraic and Geometric Methods of Analysis

26-30 may 2020
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 problems in mathematical analysis
- Geometric and topological methods in natural sciences

ORGANIZERS

- Ministry of Education and Science of Ukraine
- Odessa National Academy of Food Technologies
- Institute of Mathematics of the National Academy of Sciences of Ukraine
- Odessa I. I. Mechnikov National University
- Taras Shevchenko National University of Kyiv
- International Geometry Center
- Kyiv Mathematical Society

PROGRAM COMMITTEE

Chairman: Prishlyak A. (<i>Kyiv, Ukraine</i>)	Kiosak V. (<i>Odesa, Ukraine</i>)	Pokas S. (<i>Odesa, Ukraine</i>)
Balan V. (<i>Bucharest, Romania</i>)	Kirillov V. (<i>Odesa, Ukraine</i>)	Polulyakh E. (<i>Kyiv, Ukraine</i>)
Banakh T. (<i>Lviv, Ukraine</i>)	Konovenko N. (<i>Odesa, Ukraine</i>)	Sabitov I. (<i>Moscow, Russia</i>)
Bolotov D. (<i>Kharkiv, Ukraine</i>)	Lyubashenko V. (<i>Kyiv, Ukraine</i>)	Savchenko A. (<i>Kherson, Ukraine</i>)
Borysenko O. (<i>Kharkiv, Ukraine</i>)	Maksymenko S. (<i>Kyiv, Ukraine</i>)	Sergeeva A. (<i>Odesa, Ukraine</i>)
Cherevko Ye. (<i>Odesa, Ukraine</i>)	Matsumoto K. (<i>Yamagata, Japan</i>)	Shelekhov A. (<i>Tver, Russia</i>)
Fedchenko Yu. (<i>Odesa, Ukraine</i>)	Mormul P. (<i>Warsaw, Poland</i>)	Volkov V. (<i>Odesa, Ukraine</i>)
Karlova O. (<i>Chernivtsi, Ukraine</i>)	Mykhailyuk V. (<i>Chernivtsi, Ukraine</i>)	Zarichnyi M. (<i>Lviv, Ukraine</i>)
	Plachta L. (<i>Krakov, Poland</i>)	

ADMINISTRATIVE COMMITTEE

- Egorov B., chairman, rector of the ONAFT;
- Povarova N., deputy chairman, Pro-rector for scientific work of the ONAFT;
- Mardar M., Pro-rector for scientific-pedagogical work and international communications of the ONAFT;
- Fedosov S., Director of the International Cooperation Center of the ONAFT;
- Kotlik S., Director of the P.M. Platonov Educational-scientific institute of computer systems and technologies "Industry 4.0";
- Svytyy I., Dean of the Faculty of Computer Systems and Automation.

ORGANIZING COMMITTEE

Kirillov V.
Konovenko N.
Fedchenko Yu.

Maksymenko S.
Cherevko Ye.

Osadchuk E.
Prus A.

ІНТЕРНАЦІОНАЛЬНИЙ ЦЕНТР СПІВРОБІТНИЦТВА

Some topological obstructions for strong coloring of uniform hypergraphs

Leonid Plachta

(L'viv, Ukraine)

E-mail: dept25@gmail.com

A hypergraph $H = (V, E)$ based on the vertex set V and with the edge set E is called k -uniform if all its edges have cardinality k . A strong l -coloring of the hypergraph H is a map $h: V \rightarrow [l]$ where $[l] = \{1, 2, \dots, l\}$ such that for each edge $e = \{v_1, v_2, \dots, v_k\} \in E$ the vertices v_1, v_2, \dots, v_k are labeled with different colors. Note that a strong coloring of a uniform hypergraph H is just a proper coloring of its 1-skeleton $H^{(1)}$, which is covered by a collection of k -cliques.

Let \mathbf{S} be a family of nonempty subsets of some base set X . The generalized Kneser hypergraph $Kg_m^k(\mathbf{S})$ where $m \leq k - 1$ is defined as follows. The vertices of $Kg_m^k(\mathbf{S})$ are the elements S_i of \mathbf{S} and there is a k -edge $e = \{S_{i_1}, \dots, S_{i_k}\}$ in $Kg_m^k(\mathbf{S})$ if and only if $S_{i_1} \cap \dots \cap S_{i_{m+1}} = \emptyset$ for any distinct sets $S_{i_1}, \dots, S_{i_{m+1}}$ from \mathbf{S} (see also [1, 12]).

In the present talk, we represent k -uniform hypergraphs H as generalized Kneser hypergraphs $Kg_{k-1}^k(\mathbf{S})$. For the given k, l with $l \geq k$ we define the generalized Kneser k -uniform hypergraph $Kg_{k-1}^k(\mathbf{T})$ which is called the testing hypergraph for l -coloring of k -uniform hypergraphs. Both $Kg_{k-1}^k(\mathbf{S})$ and $Kg_{k-1}^k(\mathbf{T})$ have the natural geometric interpretation as cell complexes, denoted by $B_k(Kg_{k-1}^k(\mathbf{S}))$ and $B_{k,l}(\mathbf{T})$, respectively. The cell complexes $B_k(Kg_{k-1}^k(\mathbf{S}))$ and $B_{k,l}(\mathbf{T})$ are enhanced with natural action of the symmetric group S_k . The action of the group S_k is effective on both cell complexes. For each l -coloring of a k -uniform hypergraph H there is a natural homomorphism $g: Kg_{k-1}^k(\mathbf{S}) \rightarrow Kg_{k-1}^k(\mathbf{T})$ of hypergraphs $Kg_{k-1}^k(\mathbf{S})$ and $Kg_{k-1}^k(\mathbf{T})$. The homomorphism $g: Kg_{k-1}^k(\mathbf{S}) \rightarrow Kg_{k-1}^k(\mathbf{T})$ induces an S_k -equivariant cellular map $g': B_k(Kg_{k-1}^k(\mathbf{S})) \rightarrow B_{k,l}(\mathbf{T})$. Therefore, the nonexistence of such S_k -equivariant map from $B_k(Kg_{k-1}^k(\mathbf{S}))$ to $B_{k,l}(\mathbf{T})$ is a topological obstruction for existence of strong l -coloring of the k -uniform hypergraph H . We discuss the conditions under which such topological obstructions do not vanish.

REFERENCES

- [1] C.E.M.C. Lange, and G. M. Ziegler, *Note on generalized Kneser Hypergraph coloring*, J. Comb. Theory, ser. A **114**, 2007, pp. 159-166.
- [2] G. M. Ziegler, *Generalized Kneser coloring theorems with combinatorial proofs*, Inventiones Math., **147**, 2002, pp.671-691.

I. Kuznietsova, S. Maksymenko <i>On the squares of diffeomorphisms of surfaces</i>	40
K. Matsumoto <i>A recurrent (CHR)-curvature tensor field in a trans-Sasakian manifold</i>	41
N. Mazurenko, M. Zarichnyi <i>Spaces of probability measures and box dimension</i>	43
L. Michalak <i>Framed cobordism of systems of submanifolds in the classification of free quotients</i>	44
F. G. Mukhamadiev <i>The density and the τ-placed of the N_τ^φ-nucleus of a space X</i>	45
I. V. Mykytyuk <i>Ricci-flat Kähler metrics on tangent bundles of rank-one symmetric spaces of compact type</i>	47
A. Y. Narmanov, A. N. Zoyidov <i>On the group of isometries of foliated manifolds</i>	49
I. Petkov, V. Ryazanov <i>On boundary behavior by prime ends of solutions to Beltrami equations</i>	50
L. Plachta <i>Some topological obstructions for strong coloring of uniform hypergraphs</i>	51
S. Maksymenko, E. Polulyakh <i>On quotient spaces and their spaces of continuous maps</i>	53
A. Prishlyak, A. Prus <i>Topology of flows with collective dynamics on surfaces</i>	54
V.M. Prokip <i>On similarity of two families of matrices over a field</i>	56
A. M. Romaniv, N. S. Dzhaliuk <i>Some connections between invariant factors of matrix and its submatrix</i>	57
Y. Sachkov <i>Conjugate time in sub-Riemannian problem on Cartan group</i>	58
A. Sadullaev, F. Mukhamadiev <i>The density and the local density of the space of permutation degree</i>	59
U. Samanta <i>A short note on Hurewicz and \mathcal{L}-Hurewicz properties in topological spaces</i>	60
O. Sazonova <i>About one class of Continual distributions with screw modes</i>	62
A. Serdyuk, T. Stepanyuk <i>Asymptotically best possible Lebesgue inequalities on the classes of generalized Poisson integrals</i>	64
A. Ya. Narmanov, X. F. Sharipov <i>Differential invariants of transformations group</i>	66
S. Som, A. Bera, L. K. Dey <i>Some remarks on the Metrizable of F-metric spaces</i>	67
V. Starodub, R. Skuratovskii <i>Triangle Cubics and Conics</i>	69
T. P. Mokritskaya, A. V. Tushev <i>On some fractal-based estimations of subsidence volume for various types of soils</i>	71
Jun Ueki <i>Non-acyclic SL_2-representations of twist knots and non-trivial L-invariants</i>	73